Environmental Assessment

For

Smith Mountain Watershed Management Project

Montgomery County, Arkansas

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Ouachita National Forest
Caddo-Womble Ranger District

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Chapter 1
Purpose and Need for the Proposed Action

Proposed Action

The USDA, Ouachita National Forest, Caddo-Womble Ranger District, proposes to implement management activities in the 25,597 acre project area known as Smith Mountain that primarily lies within the watershed identified as Collier Creek-Caddo River. These areas are also identified as portions of Management Areas 6, 9, 14, 17 and 20 in the Revised Land and Resource Management Plan (RLRMP 2005). Compartments 39, 40, 41, 42, 43, 52, 53, 54, 56, 57, 63 and 1636 fall completely or partially within the project area, which is located in T3S and T4S, R23W and 24W in Montgomery County, Arkansas. (See attached project map) Specifically, the Forest Service proposes the following activities*:

- Regeneration harvests – 711 acres
- Hand plant shortleaf pine seedlings – 572 acres
- Commercial thinning – 2,321 acres
- Timber Stand Improvement - 125 acres
- Precommercial thinning – up to 1,053 acres
- Wildlife Prescribed Burns – 1,435 acres
- Site Preparation Prescribed Burns- 555 Acres
- Fuel Reduction Prescribed Burns-7,535 acres
- Mechanical site preparation for artificial regeneration – 572 acres
- Fire line construction/Reconstruction – 18/13 miles
- Temporary road construction – 8 miles
- Pre-haul road maintenance – 14 miles
- Road Reconstruction – 8 miles
- Road Closures- 3 miles
- Changes to Motor Vehicle Use Designations
- Road Barriers – 34 each
- Wildlife Stand Improvements – within 1,585 acres
- Pond improvements/maintenance – 12 each
- Watershed improvements - .22 miles
- Fish passage barrier removal – 34 each
- Fish passage improvement (replace slab) – 1 each
- Wildlife opening construction – 3.5 acres
- Wildlife opening improvement – 16 acres
- Nest box installation – 54 each
- Nonnative invasive plant species treatment- 50 acres

* All numbers are approximate

Purpose of the Action:

The proposed action improves the health and vigor of the Ouachita National Forest by reducing the existing overstocked timber stands, removing the offsite loblolly pine, reducing the threat of severe wildfires and improving early seral wildlife habitat while creating a more natural appearing mixed pine and hardwood stands to increase biological diversity. Current conditions of the project area do not meet the goals and objectives designed to meet an ecosystem management approach to for a healthy native system. These management decisions are based on experience, ecological concepts and scientific research. By implementing these activities we will provide for a diversity of plant and animal communities throughout the project area, provide early seral habitat in a well-distributed grass/forb or shrub/seedling stage, reduce fuel accumulation and produce a sustainable yield of wood products.

Need for the Action:

- Current conditions exist in the Ouachita National Forest that does not meet the desired conditions for the forest Management Areas (MA's) and the ecological systems that occur within.
- Past fire suppression activities have removed the natural role of fire from the landscape. The absence of fire has resulted in excessive fuel accumulations, increasing the risk of damage to resources in the event of wildfire.
- The absence of fire has also resulted in reduced open understories necessary for wildlife foods, the natural regeneration of pine and oak and loss of habitat conditions for plants adapted to fire.
- Pine stands contain damaged, poorly formed and diseased trees. The trees are overcrowded or densely stocked, reducing growth and crown development. These conditions result in stress and reduced vigor and health, thus increasing susceptibility to insects and disease.
- There is limited access to those identified stands in need of silvicultural treatment, resulting in the need for temporary road construction. Some existing roads are not useable by log trucks for hauling and require reconstruction.
- There is a lack of high quality forage and a lack of nesting habitat for species requiring early seral habitat in the form of permanent wildlife openings within the project areas. Less than 1% of the suitable acres will be present in 10 years of the 0-10 year-old early seral habitat. As of 2010, suitable land contained 4.2% early seral habitat in MA 14 and 2.6% in MA 17 (3.2% of all suitable land). In 2020, if no action is taken, these numbers will drop to 0% and .2% respectively.

Management Area (MA) *Desired Conditions* as Described in the Revised Land and Resource Management Plan (RLRMP) for the Ouachita National Forest

The following describes the Management Areas within the Smith Mountain project area and their desired conditions:

MA 6: Rare Upland Communities

This MA consists of Rare Upland Communities, including upland (non-riparian; non-bottomland) areas supporting one or more natural communities that are relatively rare or uncommon in the Ouachita Mountains or West Gulf Coastal Plain. These communities

are managed to perpetuate or restore their ecological integrity, including high-quality habitat for certain sensitive species. Forest-wide desired conditions by structural class and community for this MA are described for the following ecological systems listed below: Ouachita Mesic Hardwood Forest, Ouachita Montane Oak Forest, Ouachita Novaculite Glade and Woodland, and Central Interior Acidic Cliff and Talus.

MA 9: Water and Riparian Communities

Riparian areas, lakes, and ponds have a relatively natural appearance. Permanent roads are minimized but may occur at designated crossings and designated access points. Water quality is good to excellent. Protection for public water sources would be provided. Aquatic ecosystems function properly and support aquatic biota commensurate with the associated ecoregion. Vegetation consists of native species. Suitable lakes and ponds sustain a diversity of sport fishing experiences. Developed recreation sites containing intensively managed lakes and ponds provide improved visitor access and sport fish populations provide sustained yield. Lakes and ponds managed for primitive use and fishing have limited access but support balanced sport fish populations. Movement of fish and other aquatic organisms in otherwise free-flowing perennial streams and other streams is not obstructed by road crossings, culverts, or other human-caused obstructions.

MA 14: Ouachita Mountains-Habitat Diversity Emphasis

This MA is a mosaic of shortleaf pine-hardwood (including pine-dominated, hardwood-dominated, and evenly mixed forests and woodlands). Within this MA, grass-forb and seedling-sapling conditions are well represented, particularly in the portions suitable for timber management, where they make up at least 6 percent of the landscape. These "early-successional" conditions would exist primarily under partial canopies of scattered overstory pines and/or hardwood trees. Mid-successional and mature forests and woodlands are even more widespread, making up at least 70 percent of the landscape.

Adequate amounts of all forest conditions needed to sustain viable populations of many of the plant and animal species native to the Forest are available. The habitat needs of other native species with specialized habitat needs are met in other appropriate MAs. Deer and turkey habitat capability remain at viable levels, habitat capability for prairie warbler and northern bobwhite, among other indicator species are expected to increase.

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

Recently cut areas with logging slash, stumps, and some areas of disturbed soil are evident on a short-term and continuing basis, as are signs of prescribed burning and roadwork. Where such active management activities take place, appropriate scenery management techniques are practiced.

MA 17: Semi-Primitive Areas

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

MA 20: Wild and Scenic River Corridors and Eligible Wild and Scenic River Corridors

A variety of dispersed and developed recreational opportunities are available. Visitors encounter natural landscapes featuring exceptionally scenic, free-flowing mountain rivers. Little evidence of human-caused disturbance are visible, except in the form of a few system roads, prescribed fire, control activities to address pest outbreaks, trails, and river access facilities. Much of the vegetation in the corridor has old-growth characteristics. Signs of natural disturbances may be evident.

Ecological Systems-Ouachita National Forest

The forest is comprised of seventeen ecological systems categorized as Terrestrial, Riparian and Aquatic ecosystems. Within the Smith Mountain Project Area, the following ecosystems are identified with their desired conditions as described below.

Ouachita Shortleaf Pine-Oak Forest and Woodland (comprised of):

Ouachita Shortleaf Pine-Oak Forest subsystem – This subsystem represents the closed-canopy, somewhat fire-dependent, more densely forested component of pine-oak dominated systems on the Forest. The desired condition for vertical structure is 6-14 percent in grass/forb or seedling/sapling/shrub condition and 60-90 percent in the mature forest condition, with an average canopy closure of greater than 70 percent (Basal Area 60 or greater). At least 50 percent of the spatial extent of the pine-oak forest is treated with prescribed fire every 5-7 years with an occasional growing season fire.

Ouachita Shortleaf Pine-Oak Woodland subsystem – This subsystem represents the more open canopy, fire-dependent, less densely forested component of pine-oak dominated systems on the Forest. The desired condition for vertical structure is 6-14 percent in grass/forb and seedling/sapling/shrub and 60-90 percent in the mature woodland condition. Prescribed fire is applied to at least 50 percent of this community every 3-5 years, with an occasional growing season fire.

Ouachita Mesic Hardwood Forest - This system is found on toeslopes and valley bottoms within the region, as well as on north slopes. Northern red oak increases in abundance compared to dry-mesic habitats. American beech, sugar maple, chinquapin oak, American basswood, and redbud may be locally common. They are maintained primarily through naturally occurring circumstances, such as elevation, moisture regime, soil productivity, slope, and aspect. The desired condition for vertical structure is 0.5 - 5 percent in grass/forb and seedling/sapling/shrub and 80-98 percent in the mature forest condition with mostly closed canopy and infrequent fire.

Ouachita Dry Oak Woodland - This system occurs along gentle to steep slopes and over bluff escarpments with southerly to westerly aspects. Oak species dominate this system with an understory of herbaceous and shrub species. Drought stress and associated fire are the major dynamics influencing and maintaining this system. The desired condition for vertical structure is 4-10 percent in grass/forb seral stage and 60-90 percent in the mature woodland condition, as defined by abundant herbaceous groundcover and canopy closures ranging from 40-80 percent. At least 50 percent of the dry oak woodland community is treated with prescribed fire every 5-7 years, with an occasional growing season fire included.

Ouachita Dry-Mesic Oak Forest - This system occurs on dry-mesic to mesic sites and gentle to moderately steep slopes. A closed canopy of oak-hickory species typifies this system. The desired condition for vertical structure is 4-10 percent in grass/forb and seedling/sapling/shrub and 60-90 percent in the mature forest condition. To mimic natural fire regimes, many of these communities will receive prescribed burns.

Ouachita Montane Oak Forest - This system represents hardwood forests on relatively shallow soils at the highest elevations of the Ouachita Mountains. Vegetation consists of forests dominated by oaks. Canopy trees are often stunted due to the effects of ice and wind, in combination with fog, shallow soils over rocks, occasional fire, and periodic severe drought. The desired future condition is a stunted, oak-dominated system maintained by naturally occurring processes and occasional prescribed fire.

Ouachita Novaculite Glade and Woodland - This system represents a mosaic of glades and woodlands found on novaculite outcrops in the central Ouachita Mountains of western Arkansas. This community appears as a mosaic of small woodlands scattered on ridges and upper slopes with outcrops and patches of talus scattered throughout. The desired condition is an open glade structure maintained by prescribed fire. The fire regime should reflect that at least 50 percent of the novaculite glade and woodland community is treated with prescribed fire every 3-5 years with an occasional growing season burn included.

Central Interior Acidic Cliff and Talus - This system is found primarily in the Interior Highlands. Sandstone outcrops and talus ranging from moist to dry typify this system. It is typically sparsely vegetated; however, on moister sites with more soil development, several fern species and sedges (*Carex spp*.) may become established. The desired

condition is an open, rocky, herbaceous-dominated system with sparse woody vegetation occasionally influenced by natural or prescribed fires.

Ouachita Mountain Forested Seep - Forested seeps occur in the Ouachita Mountains of Arkansas and Oklahoma. Examples may be found along the lower slopes of smaller valleys where rock features allow water to seep out of the mountainsides and into the riparian zones of larger creeks, sometimes extending upslope along small ephemeral drains. The vegetation is typically forested but is highly variable in canopy composition. Red maple, black tupelo, sweetgum, and white oak are common and typical; American beech and/or umbrella magnolia may be present. Canopy coverage may be moderately dense to quite open. The subcanopy is well-developed and characteristically includes American holly, umbrella magnolia, and ironwood. The desired condition for this system is a largely undisturbed, mature community with a protective buffer 100 feet from the seep boundaries. Old growth seep communities develop and regenerate naturally in relatively small patches.

Ouachita Riparian - This system is found along streams within the project area. These communities are often characterized by a cobble bar with forest directly adjacent and little or no marsh development. Typical trees include sweetgum, sycamore, river birch, maple species, and oak species. These areas are typically dominated by wetland-obligate species of sedges, ferns, and other herbaceous species. The desired condition for this system is largely undisturbed, mature or old growth community with intact hydrologic functions and processes within a minimum protective buffer of 100 feet on each side of perennial streams and 30 feet on each side of defined channels.

Ouachita River and Streams - This system consists of flowing water. The desired conditions for this system is good to excellent water, quality, site productivity, channel stability, intact riparian vegetation, sustainability of the sport fisheries, and connectivity of habitats for riparian-dependent species. Aquatic ecosystems function properly. Movement of fish and other aquatic organisms are not obstructed by road crossings, culverts, or other human-caused obstructions.

Ouachita Ponds, Lakes, and Waterholes - Ponds, lakes, and waterholes consist of lentic (still, impounded, or otherwise non-flowing) aquatic systems. The desired condition for unstocked ponds and waterholes is habitat suitable for amphibians and other wildlife and a source of water for upland wildlife species.

EXISTING VERSIS DESIRED CONDITIONS

Contrasts between existing and desired conditions, as well as possible management activities designed to meet project objectives, are shown in Table 1.1. These management activities were determined to be within the scope of this analysis. The intent of this project is to move the existing conditions of the project area toward the desired conditions as referenced in the Revised Forest Plan. Within the Proposed Management Activities section below, the acres outlined for specific projects are often given in total acres within a stand. **Sensitive areas such as riparian or steep slopes would be avoided, resulting in fewer actual acres disturbed.**

EXISTING CONDITIONS CONTRASTED TO THE DESIRED CONDITIONS (TABLE 1.1)

Desired Conditions	Existing Conditions	Site Specific Needs	Proposed Management Activities
Provide early seral habitat: Within MA 14, grass-forb and seedling-sapling conditions… where they make up at least 6 percent of the landscape (RLRMP, p.35). **WF001** …provide grass-forb or shrub-seedling habitats at the rate of 6% in MA14…. (RLRMP, p. 78) **WF002** Limit even-age regeneration cutting… to no more than 14%...except for 6-10% in Semi-primitive Areas, MA17…. (RLRMP, p. 78) **WF008** Where open habitats are not provided by other conditions, develop one permanent wildlife opening, one to five acres per 160 acres of habitat. (RLRMP, WF008 P. 78)	There are 113 acres (4.2%) in MA14 and 105 acres (2.6%) in MA 17 that qualify as early seral (0-10 age year) habitat through a majority of the planning period 8 acres in 5 early seral wildlife plots 8 acres in 1 utility line ROW and two reclaimed roads	Provide between 161 acres (6% of the suitable acres) and 376 acres (14% of the suitable acres) of early seral conditions in MA14. Provide between 238 acres (6%) and 398 acres (10%) of early seral conditions in MA17 Provide additional wildlife openings	Regeneration harvest of 381 acres in MA14 and 330 acres in MA17. These are total stand acres, without riparian, steep slopes or other exclusions. Maintain 5 permanent early seral openings, utility ROW and existing roads (C42 and C4) for a total of 16 acres of existing wildlife openings Establish 5 permanent openings for a total of 3.5 acres
Improve forest health: Improve forest health by reducing the likelihood of insect infestations, disease outbreaks, and establishment of non-native, invasive species on National Forest System lands (RLRMP, p. 58). Improve the forest resource (RLRMP, pp 83, 84): **FI001** Release approximately 200 pine trees per acre on pine-hardwood management type. **FI002** Release approximately 100 desirable hardwoods on pine-hardwood management type.	95% of the stands to be treated within the project area have a basal area of 70 or more. 86% of the pine-hardwood stands are over 70 years of age. The combined age and overstocked conditions reduce the health and vigor of the stands and increase susceptibility to damage from insects and disease 3 stands containing 125 acres were identified as needing timber stand improvements 45 stands containing 2,321 acres were identified as being overstocked. Basal	Reduce basal area levels in stands that are overstocked Reduce the number of stems per acre in stands that are overstocked	Commercial thinning within 2,321 acres 125 acres of timber stand improvement 481 acres of pre-commercial thinning Other woodland and wildlife stand improvements within 910 acres

Desired Conditions	Existing Conditions	Site Specific Needs	Proposed Management Activities
FI005 Use the basal areas given in Table 3.6 as approximate guides to desired conditions…. **(RLRMP, p. 84)**	areas range from 75 to 240 11stands containing 481 acres exceed the desired number of seedling/saplings		
Where native species have been displaced by non-native or off-site species, systems will be restored over time to native species composition. (RLRMP, p. 6). **OBJ 11** Apply management practices to begin replacing off-site loblolly pine plantations with short leaf pine… where such plantations were installed outside the natural range of loblolly pine. (RLRMP, p. 60) **FR010** Clear cutting may be utilized… to restore native forests on lands that currently support non-native tree species. (RLRMP, p. 82) **FR013** Following a regeneration harvest cut, a site preparation treatment will be implemented if needed to control competing vegetation…. (RLRMP, p. 82) Approximate regeneration harvest age will be 35 years in loblolly pine stands when completing a final harvest cut intended for plant community restoration. (RLRMP, p. 81)	Four loblolly pine plantations were acquired from Weyerhaeuser Company. Loblolly pine is off site in these locations	Restore shortleaf pine to these sites	Clearcut loblolly pine, retaining any shortleaf pine (241 acres) Site prep and plant genetically improved shortleaf pine (up to 241 acres)
Manage for identified natural plant communities: **Pine-Oak Woodland** The pine-oak woodland should constitute 20 – 45 percent of all pine-oak dominated systems on the Forest (RLRMP, p. 8).	15 stands containing 910 acres (6% of project area) in C56 have woodland characteristics. These stands are situated adjacent to a high concentration of residential development	Reduce the overall BA to about 50 allowing for equipment needs. Promote a grass-forb understory.	Commercial thin 11 stands within 642 acres for woodland stand development (part of the overall commercial thin) Perform a midstory reduction in 9 stands within 343 acres Regenerate two adjacent mature pine stands and manage the combined stand as woodland

Desired Conditions	Existing Conditions	Site Specific Needs	Proposed Management Activities
Wildlife habitat functions are sustained or improved, including primary feeding areas, breeding areas…. (RLRMP, p.20) **FI005** Use the basal areas given in Table 3.6 as approximate guides to desired conditions…. (RLRMP, p. 84) **FR008** In pine-hardwood mixed management type, desired hardwood species will be managed to accomplish project level objectives. … Follow-up vegetation management treatments may be used to control species composition and density and to meet other resource needs. (RLRMP, p. 81) **Obj01** Increase prescribed burning on the forest to help achieve and maintain desired future conditions. (RLRMP, p. 59) In the Wildland Urban Interface, …stands will be treated by reducing the number of overstory trees to approximately 50 – 70 square feet basal area…. A "park-like" or "woodland" condition is the goal in pine and oak types…. (RLRMP, p. 25)	In pine stands, BAs range from 83 – 136. In hardwood stands, BAs range from 60 - 80 An additional, 15-acre stand located in C63 has woodland characteristics		Burn whenever grass-forbs constitute less than 50% of the understory Conduct 1,653 acres of prescribed burn in MA 14 Conduct 7,761 acres of prescribed burn in MA 17
Improve Wildlife Habitat: Wildlife habitat functions are sustained or improved, including primary feeding areas, breeding areas…. (RLRMP, p.20). **FR008** In pine-hardwood mixed management type, desired hardwood species will be managed to	943 acres within 16 stands were identified with large number of stems in the smaller diameter classes. The large number of stems/acre reduce the forage quality of the forest floor	Improve feeding areas Reduce the overall stem density	Overstory Development (OSD): Improve mast production within three stands (434 acres) by removing intermediate and co-dominant trees Develop woodland habitats Wildlife stand improvements: Reduce small diameter stem density by using fire and/or mechanical means. (within 943 acres)

Desired Conditions	Existing Conditions	Site Specific Needs	Proposed Management Activities
accomplish project level objectives. … Follow-up vegetation management treatments may be used to control species composition and density and to meet other resource needs. (RLRMP, p. 81) **Obj01** Increase prescribed burning on the forest to help achieve and maintain desired future conditions. (RLRMP, p. 59)			Conduct prescribed burning for wildlife on 1,435 acres. (includes 6 acres on private land with permission)
HR001 Known historic properties will be protected from project impacts. (RLRMP, p.89)	Two Civilian Conservation Corps' powder houses listed on the National Registry are located in C1636 stand 2	Protect the powder houses from potential damage from wind thrown trees	Maintain and manage the cleared area around the powder houses by brush hogging for wildlife opening
Fuels: In the Wildland Urban Interface, …stands will be treated by reducing the number of overstory trees to approximately 50 – 70 square feet basal area…. A "park-like" or "woodland" condition is the goal in pine and oak types…. (RLRMP, p. 25) Reduce fuel loads of National Forest System lands that have the greatest potential for catastrophic wildland fire. Lands in and around "Firewise Communities" and other "Communities at Risk" are the highest priority…. (RLRMP, p. 68, 69). **Obj42** Treat the highest priority areas at a rate of 500 to 1000 acres per year. **Obj43** Complete 50,000 to 100,000 acres per year of hazardous fuel reduction in the other moderate to high priority area.	Fire suppression has resulted in excessive fuel accumulations, increasing the risk of damage to resources in the event of wildfire Only 2197 acres, less than 12% of the 25,597 acres within the project area, have been prescribed burned within the past 10 years Urban development exists within 2 miles of all the burn units	Reduce fuel loadings to minimize the threat to communities and developments adjacent to the Forest as well as the risk of resource damage	Prescribe burning divided among 16 units ranging in size from 92 to 1766 acres. Burning may require 18 miles of fireline construction and 13 miles of fireline maintenance Prescribed Burns = 9,525 acres (includes site prep, wildlife and fuel reduction burns and 111 acres of private) Burn as needed to develop and maintain desired future conditions for reaching objective of a Class 2, with ultimate goal of Class 1.

Desired Conditions	Existing Conditions	Site Specific Needs	Proposed Management Activities
WF003 Provide for and designate areas for mast production at the approximate rate of 20% of each Project Area (RLRMP, p. 78) Wildlife habitat functions are sustained or improved, including primary feeding areas, breeding areas…. (RLRMP, p.20).	There are 4,217 acres (28%) in hardwood and hardwood-pine forest types age 50 years and older within the project area	Increase mast production by managing hardwood and hardwood-pine forest types	Overstory Development (OSD) within 434 acres; Midstory Reduction (MSR) within 317 acres, Woodland Stand Restoration (WSR) on 166 acres
WF010 Where there is no existing water source, provide at least one wildlife pond per 160 acres…. (RLRMP, p. 79) Quality fish and wildlife habitat and a variety of access opportunities are available to the public (RLRMP, p. 22).	Streams, ponds, and seeps/spring communities provide adequate water sources to meet desired conditions. Ponds within the Project Area have become overgrown with vegetation, have blocked/eroded spillways, or contain unwanted fish species	No new ponds are required Maintenance of existing recreational and wildlife ponds across the project area	Remove unwanted vegetation from the pond dams and/or surface Repair spillways
WF009 Provide nesting structures where suitable natural cavities do not occur and when needed. (RLRMP, p.79)	There is a lack of suitable natural nesting cavities for wildlife within the project area.	Provide nesting structures	Install 54 nesting structures
Road Density: **Obj05** For wildlife concerns, strive to achieve an open road density (ORD) of 1 mile per square mile or less for MA 14 and 20. Desired open road density for MA 17 is 0.75 miles per square mile during critical wildlife periods (RLRMP, p. 59) **TR005** …. Where the current total open road density is greater than wildlife objectives…,use roads analysis to identify opportunities to reduce the density of open roads and OHV trails under Forest Service jurisdiction (RLRMP, p. 91).	The existing open road density within the project area is 1.9 miles per square mile (including Public Roads) MA14 within the project area currently has an ORD of 1.0 miles per square mile (not including Public Roads) MA 17 within the project area currently has an ORD of 1.03 miles per square mile during March-August (not including Public Roads) ORD is 1.2 during remainder of	Reduce open road density to the greatest extent possible	Road closure of 3.0 miles Installation of 34 road barriers and/or gates Review and revise travel management classifications to reflect needs. (MVUM) Overall open road density decreased from 1.9 to 1.82 after EA is complete (including Public Roads) MA 14 ORD after EA would be .9 (not including Public Roads) MA 17 ORD after EA would be .9 (not including Public Roads) during March-August. ORD would be 1.1 the remainder of the year

Desired Conditions	Existing Conditions	Site Specific Needs	Proposed Management Activities
TR006 Do not exceed 1.0 mile per square mile where current road density is 1.0 mile per square mile or less. In MAs 17 and 21, do not exceed 0.75 mile per square mile where that density of open roads exists (RLRMP, p 91). **WF012** Where possible, seasonally close roads during critical periods for wildlife (March – August) (RLRMP p. 79).	year. The portion of MA 20 within the project area has no roads		
Transportation System: Develop and operate the road system, maintained to the minimum standard needed to meet the requirements of the proposed actions, protect the environment, and provide for reasonable and safe access (RLRMP p. 67). **TR007** When a road is needed to provide access, base the road type on such factors as soil and water protection needs…. (RLRMP, p 91) **TR008** Road locations in habitats of… woodland seeps,… will be avoided (RLRMP, p 91). **TR009** Do not locate roads or trails within or immediately adjacent to SMAs unless alternative routes are more environmentally damaging or not in the best public interest (RLRMP, p 91).	There is limited access to some of the stands proposed for harvest and silvicultural activities. Some of the roads will not support timber hauling in current condition The stream adjacent to Rd 177 has caused erosion requiring reshaping Road C40C has damage to stream crossing and roadbed requiring placement of rock Road's 208, C40C, 177, 177L, 177M were damaged by recent flood events. Multiple culverts and road beds were damaged Numerous culverts are rusted and require replacement	Provide access to stands in need of silvicultural treatment Improve road conditions on travel ways proposed for timber hauling Limit resource damage by removing and/or relocating road locations	8 miles of temporary road construction 14 miles of pre-haul road maintenance 8 miles of system road reconstruction 3 miles of road closures Review and revise travel management classifications to reflect needs. (MVUM)
Invasive Species Treatments: Where native species have been displaced by non-native or off-site species, systems will be restored over time to native species composition. (RLRMP, p. 6).	Nonnative, invasive species presently identified within the project area include: • Chinese lespedeza *(Sericea lespedeza)*	Remove known invasive species on NFS lands across the project area Treat additional areas as they are identified	Use prescribed fire, mechanical means and/or herbicides to remove invasive species

Desired Conditions	Existing Conditions	Site Specific Needs	Proposed Management Activities
Take steps to improve forest health by reducing the likelihood of... establishment of non-native, invasive species….(RLRMP, p 58). **Obj03** Treat forest to eliminate non-native, invasive species. (RLRMP, p. 59). **9.02** Table 3.10 describes permitted and prohibited activities within SMAs. Use aquatic approved pesticides for treatment of invasive non-native and nuisance species within the primary and secondary buffers. (RLRMP, p. 104). **9.13** Terrestrial vegetation control using herbicides within MA9 may only be conducted… for control of invasive and/or exotic species…. (RLRMP, p. 106).	• mimosa (*Albizia julibrissin)* • honeysuckle (*Lonicera japonica.)* • privet *(Ligustrum sp.)* • autumn olive *(Elaeagnus umbellata)* • sacred bamboo *(Nandina domestica)* Others found throughout the forest are: • multiflora rose *(Rosa multiflora)* • trifoliate orange *(Poncirus trifoliata)* • royal paulownia *(Paulownia tomentosa)* • kudzu (*Pueraria montana)* Any of these invasive species may be found within a stream management area (SMA). However, honeysuckle and privet are found in large concentrations in the Project Area SMAs A concentration of honeysuckle has been identified in C53 stand 59 along Liberty Road A large number of autumn olive is located along road C39A in C40		
Fish passage: Movement of fish and other aquatic organisms are not obstructed by road crossings, culverts, or other human-caused obstructions	There are 35 fish barriers that have been identified within watershed. These include drops from culverts where fish cannot pass or where	Improve aquatic organism passage	Place large stone and/or construct concrete ramps or remove debris to improve fish passage

Desired Conditions	Existing Conditions	Site Specific Needs	Proposed Management Activities
(RLRMP, p. 20 and 34) **Obj40** Improve aquatic organism passage on an average of no less than six stream crossings per year…. (RLRMP, p. 67) **TR003 / 9.22** All new stream crossings will be constructed so that aquatic organism passage is not impaired…. Reconstruction of all stream crossings will consider aquatic organism passage…. (RLRMP, p. 91) (RLRMP, p. 107). **9.02** Table 3.10 describes permitted and prohibited activities within SMAs. Roads and crossings are to be located and designed to… restore aquatic organism passage. (RLRMP, p. 104).	debris is blocking passage. One is a slab located on Collier Creek where fish cannot pass upstream		Replace the slab on Collier Creek with a box culvert or other suitable structure
Watershed Improvement: **Obj14** Maintain or improve watershed health (RLRMP, p. 62) **Obj15** Conduct watershed improvement on at least 40 acres per year. (RLRMP, p. 62) **SW008** For erosion control, plan, install, and maintain drainage structures in roads, skid trails, and firelines using spacing guides from state Best Management Practices and/or Forest Service directives. For waterbar spacing guidelines use Table 3.1…. (RLRMP, p. 75)	Several illegal dumping locations have been identified across the project area Roads, unclassified trails and other areas have been identified as having active erosion	Clean up dump sites and restrict access where applicable Prevent/repair resource damage along roads, trails, gravel pits, and other areas identified with appropriate erosion control measures	Clean up dump sites as identified Seed, fertilize, and place waterbars on closed roads and ROW's in need of watershed improvement
Recreation Management **Obj24** Maintain all recreation facilities to standard. (RLRMP p.65)	Crystal Campground and Collier Springs day use area fall within project area.	Maintain use of recreation areas for public use	Maintain, as necessary, to minimize fuel loads within administrative areas (i.e. campgrounds)

Desired Conditions	Existing Conditions	Site Specific Needs	Proposed Management Activities
Obj 26 Designate and sign a system of roads and trails suitable for public access…. (RLRMP p.65) TR018 Structures such as fences, trails and roads will be designed and built so they minimize movement barriers and hazards for wildlife. (RLRMP p. 92)	Crystal campground has short hiking trail		Provide public access to utilize recreation facilities Review travel management classifications to provide adequate access to public facilities such as dispersed camp sites or other recreation needs. See Appendix D.
Minerals 9.15 Common variety minerals operations must be designed and implemented so that no mining or mining related activity takes place within water and riparian areas (MA 9) (RLRMP p. 106) Hand collecting of exposed surface mineral specimens … for personal purposes is allowed …. (RLRMP p.95)	There are known Quartz resources that fall within project area Singing Springs Mine is currently under contract in Compartment 40 Three additional mines are within project area, on private land but are accessed by National Forest Driggers Gravel Pit located in Compartment 52 off C52 Unnamed shale pit and access road located in Compartment 1650 off 177W Unnamed gravel pit located in Compartment 1636 off 177L	None	Mineral operation permit or contract requests will be analyzed during the review and authorization process to ensure compliance and protection of water resources Maintain and manage road access to private mines/property Areas for surface mineral collection will be identified as requested

Scope of This Environmental Analysis

History of the Planning and Scoping Process

The Caddo-Womble District interdisciplinary team (IDT) initiated internal scoping on February 24, 2010. External scoping was initiated on July 8, 2010. Scoping letters requesting comments on the proposal were mailed to 150 agencies, groups or individuals. The project was also published in the Ouachita National Forest Schedule of Proposed Actions.

The IDT received four responses during scoping efforts. One requested additional maps of the project areas, one was curious why the letter was sent, one was concerned about the potential water contamination and one requested burning of private property adjacent to the Forest Service land. Based on information gathered during scoping, the IDT identified issues to be analyzed in depth and developed objectives for the proposed project. The issues are identified and explained below in this section.

Relevant Planning Documents

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

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

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

The treatments described in the Smith Mountain Resource Management Project Environmental Assessment are consistent with the management direction of the Revised Forest Plan and are typical of those for which environmental effects are disclosed in the FEIS. This assessment tiers to these documents.

REFERENCE FOR FOREST PLAN DESIGN CRITERIA BY MANAGEMENT AREA (TABLE 1.2)

Management Area	Forest Plan Reference
6. Rare Upland Communities	Part 3, p. 102
9. Water and Riparian Communities	Part 3, pp. 103-108
14. Ouachita Mountains-Habitat Diversity Emphasis	Part 3, p. 108
17. Semi-Primitive Areas	Part 3, pp. 111-112
20. Wild and Scenic River Corridors and Recommended Wild and Scenic Corridors	Part 3, pp. 115-118

Issues Eliminated From Further Study

This section details issues identified through scoping that are not appropriate for this project, and provides the reasons for which these issues are eliminated from further study.

- Jurisdictional Wetlands

Analysis conducted by district personnel has concluded that there are no known jurisdictional wetlands within or adjacent to the project area; they would not be impacted by any of the alternatives

- Prime Farmlands

Analysis conducted by district personnel has concluded that there are no prime farmlands that will be converted within or adjacent to the project area; they would not be impacted by any of the alternatives.

- Wild and Scenic Rivers

The Caddo River has been proposed for designation as a recreational river under the Wild and Scenic Rivers Act. Its primary use is canoe/kayak enthusiasts and fishermen. Approximately 52 acres of the project area lies within ¼ mile of the river and is deferred for forest management while the state of Arkansas conducts suitability studies. The Caddo River is also designated as an Extraordinary Water Resource and Ecologically Sensitive Waterbody by the state of Arkansas. No activities are planned in or near the Caddo River and would not be impacted by any of the alternatives.

- Heritage, Historic, and Cultural Resources

Heritage resource surveys were conducted from September 21, 2009 through June 23, 2010. Archaeological investigations of the project area resulted in the survey of 985 acres and the identification of 10 archaeological properties. The Ouachita Cultural Resources report No. 314 was prepared and submitted to the State Historic Preservation Office (SHPO), the Arkansas State Archeologist and the federally recognized tribes: Caddo Tribe, Choctaw Nation, Chickasaw Tribe and Osage Nation. A letter of concurrence from the SHPO was received on August 5, 2010 and the Osage Nation dated August 31, 2010. Significant sites will be protected from any proposed management activities. If any unknown heritage resources are discovered during stand treatments within the project areas, the District and Forest Archaeologists will be notified immediately. They will make an evaluation, in consultation with SHPO and the Tribal Historic Preservation Officers (THPO's), to determine appropriate action. Activity at that location will be suspended until that determination is complete.

- Civil Rights and Minority Groups

The proposed actions would impact minority groups and women in the same manner as all other groups in society. The proposed actions would not violate the civil rights of consumers, minority groups or women, nor would it have disproportionate environmental effects on minority populations or low-income populations

- Federal, State, and Local Laws

All actions proposed would comply with all federal, state, and local laws.

- Forest Fragmentation

Forest fragmentation occurs when large, continuous forests are divided into smaller blocks either by clearing for agriculture, urbanization, roads, or other human development. It is important to distinguish between fragmentations composed of a mosaic of mature and regenerating stands and those composed of agricultural fields and urban developments. Early succession habitat may cause a temporary reduction in habitat for species relying on mature forests while providing habitat for many species dependent on early succession habitat including neotropical migrants. Agricultural and urban development, however, constitute a permanent loss in forest habitat. Fragmentation usually refers to permanent changes within the landscape such as farmland, or converting forestland into parking lots or residential developments. The proposed management actions would not create a change in land use nor ownership. The activities proposed would only make temporary changes to the landscape; no forest fragmentation would occur.

Issues Further Analyzed

This section details issues identified through scoping that drive the development of alternatives to the Proposed Action.

- Herbicide Use

Forest policy requires analysis of alternatives to herbicide use. Herbicide use will be considered a significant issue for this reason, and the environmental consequences of herbicide use are disclosed throughout Chapter 3. *Source: Forest policy, scoping*

- Air Quality

There is public concern that smoke generated from prescribed burning may degrade air quality. This could cause health problems to those living downwind of the project area. *Source: ID Team*

- Soil Productivity

There is a concern that management actions (road construction, skidding, timber harvest, release treatment, site preparation, prescribed burning, etc.) may cause unacceptable levels of erosion,

sedimentation, compaction, and/or nutrient loss and, as a result, a decrease in long-term soil productivity within the Project Area. *Source: ID Team and respondent*

- Water Quality & Municipal Watersheds

There is a concern that management actions, namely timber harvest, road construction, prescribed burning, wildlife pond reconstruction, and the use of herbicides may cause a decrease in water quality in the watersheds which the Smith Mountain project area occurs. Monitoring has shown that lack of road maintenance and increases in OHV use are major issues to water quality. S*ource: ID Team.*

- Floodplains and Riparian Areas

There is a concern that management actions such as road construction, prescribed burning, and timber harvest may cause damage to floodplains and riparian areas within or adjacent to the project area. *Source: ID Team*

- Wildfire Hazards & Fuels Accumulation

There is a concern that management actions such as timber harvest, site preparation activities and wildlife stand improvement treatments may cause an increased accumulation of fuels and result in an increased risk from wildfire. *Source: ID Team*

- Transportation Systems

There is a concern that management actions may require permanent access through road construction and/or reconstruction, and management actions may result in the closure of open roads that provide access for recreational activities. The open road density of the project area exceeds the Revised Forest Plan objective. *Source: ID Team*

- Forest Health

Forest health and stand vigor is declining or at risk due to advanced stand age and overcrowded or densely stocked stands. Several non-native invasive species (NNIS) are present throughout the project area. *Source: ID Team*

- Wildlife and Fisheries and Habitats

There is a lack of early seral habitat within the watershed. There is a concern that management actions such as timber harvest, road construction, herbicide application, and prescribed burning may cause unacceptable impacts to wildlife and fish populations or habitats. *Source: ID Team*

- PETS Species and Habitats

There is a concern that management actions such as timber harvest, road construction, herbicide application, and prescribed burning may impact PETS or PETS habitats. *Source: ID Team*

- Public Health and Safety

There is a concern that management actions, specifically prescribed burning and the application of herbicides may cause hazards to human health and safety. *Source: ID Team*

- Scenic Resources

There is a concern that timber harvest, road construction, site preparation, and prescribed burning may compromise the scenic integrity of the project area. *Source: ID Team*

- Climate Change

There is a concern that management actions such as prescribed burning and timber harvest may cause greenhouse gas (GHG) emissions and contribute to increased climate change. There is also a concern about the effects of climate change on the Smith Mountain Resource Management Project. *Source: ID Team*

Other Relevant Environmental Effects

This section lists effects that based on past experience; the ID Team determined should be disclosed in Chapter 3.

- Prescribed Fire's Effects on Wildfire Hazard and Fuel Loading
- Effects of Management Activities on Early Seral Habitat, Age Class Diversity, Mature Growth, Retention/Recruitment of Hardwoods, Hard Mast Production and Nonnative Invasive Species
- Effects of Management Activities on Local Economy
- Project Financial Efficiency
- Effects of Management Activities on Recreation

Decisions to Be Made

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

Chapter 2
Alternatives Including the Proposed Action

Introduction

As stated in Chapter 1, in relation to issues identified, the Caddo-Womble District IDT initiated internal scoping on February 24, 2010. External scoping was initiated on July 8, 2010. Scoping letters requesting comments on the proposal were mailed to 150 agencies, groups, or individuals. The project was also published in the Ouachita National Forest Schedule of Proposed Actions. The IDT received four responses during scoping efforts. These were primarily questions regarding proposed actions. Alexa Springs, Inc. (a local bottled water company) is concerned that the proposed actions would impact the water purity and quality of their product. This concern is addressed in Chapter 3 under Water Resource & Quality.

During the 30 day comment period for the DRAFT EA, three comments were received. One disagreed strongly with commercial harvest, temporary roads and herbicide use. The second has concern with issues related to sedimentation and erosion, effects on groundwater quality and quantity, prescribed burning, global warming, air pollution and timber management. After careful review, it is determined that the EA describes and analyses the proposed actions described. The third comment questioned the purpose and need of ecosystem prescribed burning, the frequency of which burning is proposed and direct effects of burns on the retention and recruitment on hardwoods. After review of these comments, additional information was provided in the definitions of management activities and in Chapter 3 under Wildfire Hazards and Fuel Accumulation.

Based on information gathered during scoping, the IDT designed Alternative B: Smith Mountain Resource Management Project to satisfy the needs and meet the objectives of management. The IDT also developed Alternative C: No Herbicide Use in response to Forest direction and public issue identified through scoping. The details of the process and specific design criteria are disclosed in the following section.

Alternative Design and Evaluation Criteria

The District Ranger, working with the IDT, identified and approved the following design and evaluation criteria. These were used by the IDT to design and evaluate the Smith Mountain Resource Management Project. Later, the District Ranger will use these same criteria when making the final selection of which alternative to implement.

Technical Requirements (General)

The Revised Land and Resource Management Plan (RLRMP) for the Ouachita National Forest provides overall technical requirements. ***Specific requirements*** are described within the relevant sections that apply. The IDT reviewed the RLRMP Forest-wide Design Criteria, Management Area-specific Design Criteria, and specialist reports, and identified the following ***general*** project-area requirements:

- Even-aged regeneration treatments that exceed or create an opening (as defined by FR005) that would exceed the recommended maximum area of regeneration (RLRMP, p.81, table 3.2) would require Forest Supervisor approval. The following stands may apply: compartment 56, stands 18 and 27; compartment 57, stand 8 and 12; and compartment 63, stand 7.

- Commercial thinning operations that deviate from the guidelines (RLRMP, p.84, table3.6) are subject to approval by the responsible official.(RLRMP, FI005, p.84) The following may apply: compartment 52, stand 8; compartment 53, stands 12, 22, 23, 49, 59; compartment 54, stands 3, 4, 5, 10, 48, 57, compartment 55, stands 18 and 20; compartment 56, stand 10; compartment 63, stands 1 and 8; and compartment 1636, stands 5 and 9.

- During prescribed burning activities, sign travel ways as needed notifying the public there may be smoke along the road. Position flaggers or warning signs along the travel ways during active flaming.

- Inform the public of potential burn days, times, information contacts, and suggested alternatives for those concerned with smoke.

- Notify local, county and state law enforcement that burning will take place.

- Resource management activities such as timber harvests, timber stand improvement, prescribed burns and wildlife habitat improvements will be conducted in a manner that promotes Scenic Integrity Objectives (SIO). (RLRMP, RS002, p.90)

Project Objective Requirements

PROJECT OBJECTIVE REQUIREMENTS AND METHOD OF MEASUREMENT (TABLE 2.1)

Objective	Method of Measurement
Improve the health and vigor of forest stands and improve stand quality.	Acres of timber stands treated resulting in reduced basal areas.
Replace off-site loblolly pine plantations with short leaf pine.	Acres of shortleaf pine planted in previous converted loblolly stands.
Contribute to the economic base of local communities by providing a sustained yield of high-quality wood products.	Volume of timber harvested.
Provide grass-forb and seedling-sapling habitat conditions.	Percent of suitable acres in early seral habitat.
Provide for a diversity of plant and animal communities; reduce fuel loads.	Acres of ecosystem prescribed burning.
Maintain or improve open habitats to provide high quality forage and nesting habitat for wildlife.	Acres of wildlife openings maintained/increased.
Maintain or restore community diversity	Acres of woodland stand development
Provide for mast production	Acres of overstory mast development

Objective	Method of Measurement
Maintain or improve watershed health	Number of fish passage barriers restored, miles of watershed restoration
Eliminate non-native, invasive species	Acres treated for invasive species eradication.
Provide nest structures where suitable natural cavities do not occur	Number of nesting boxes installed.
Reduce open road density.	Miles of open road per square mile.
Develop, operate, and maintain the road system to meet the requirements of the proposed actions, protect the environment, and provide for reasonable and safe access.	Miles of road construction, reconstruction, and pre-haul maintenance.

Monitoring

The Revised Forest Plan lists monitoring activities for the Ouachita National Forest. The Forest's monitoring program is designed to evaluate the environmental effects of actions similar to those proposed in this project, and also serves to assess the effectiveness of treatments.

To ensure that the appropriate design criteria are followed to protect soil stability, water quality and other resources, trained contract administrators and inspectors will conduct routine on-site assessments throughout the implementation phases of the project.

For activities that include the use of herbicides, surveillance monitoring would be followed to ensure that all herbicides are used in accordance to label instructions. Form R8-FS-2100-1, Herbicide Treatment and Evaluation Record would be used to monitor all work involving herbicides. Stream samples would also be taken to monitor for offsite movement.

In areas where the risk level is moderate to high for accumulative effects as indicated by the ACE Model, all fish assemblages will be sampled prior to and after any ground disturbing activities occur to determine the ratio of benthic insectivores within that community.

Alternatives Documented in Detail

This section describes the management treatments proposed throughout this assessment. A summary chart is provided at the end outlining the treatments between alternatives. Acres that were described in the original scoping letter dated July 8, 2010 have been amended throughout document to more accurately depict actual treatments as they were determined throughout this evaluation. Treatment activities and general locations have not changed. Acres listed in Appendix A of harvest treatments are listed as approximate total acres within a stand. For analysis throughout this document, total acres were used, however, when treatments begin those areas that fall within riparian zones or along steep slopes will be excluded from harvest.

Alternative A: Deferred Harvest (No Action)

In this alternative, the management activities described in the proposed action (those listed in Alternative B 'description of treatments') would be deferred until a later entry. However, ongoing Forest Service permitted and approved activities would continue in the project area:

- Road maintenance – normal and emergency road maintenance would continue on all existing roads.
- Power line right of way (ROW) maintenance would continue on existing ROW's.
- Fire suppression – natural caused fires may be suppressed unless appropriate conditions allow for it to be used as a management tool to accomplish resource needs. Human caused fires by accident or intention (arson) would be suppressed.
- Off road vehicle use – ORV use of the area would continue under the Travel Management Plan for the Ouachita National Forest.
- Camping – camping would continue under the current rules of the Ouachita National Forest. Special restrictions would apply during times of fire threat.
- Hunting and Fishing – game hunting and fishing would continue under the rules of the Arkansas Game and Fish Commission.
- Firewood cutting – under the permitting rules of the Ouachita National Forest, the public would continue to harvest firewood.
- Rock gathering – under the permitting rules of the Ouachita National Forest, the public would continue to collect rock for personal use.
- Existing quartz, shale and gravel mining would continue in approved locations.
- Routine maintenance of facilities and administrative sites.
- Prescribed burning and other activities as authorized under Sharptop Environmental Assessment.

Alternative B: Smith Mountain Watersheds Resource Management Project (Preferred Alternative)

Description of Treatments (See Appendix A for complete listing of harvest activities by compartment and stand, Appendix B for all other management activities and Appendix C for forest types)

Timber management can be accomplished by several methods. The following describes four types of harvests designed to provide early seral habitat proposed for Smith Mountain Resource Management Project.

1.) Modified Seed Tree Regeneration (ST) – A timber harvest cut designed to obtain natural regeneration from seed trees left for that purpose. Approximately 15-25 sq. ft. of pine, 15-25 sq. ft. of hardwood basal area per acre is retained in the overstory. Seed trees are retained indefinitely. This cut would establish a two-aged stand. This treatment differs from a traditional seed tree by retaining a mix of hardwoods and pines in the overstory after regeneration. Hardwood trees felled in these areas may be utilized for public firewood or commercial sale. (308 acres proposed)

2.) Overstory Removal (OSR) – A timber harvest cut designed to remove the overstory of a stand to enhance the development of the existing pine regeneration. These are old, uneven aged stands that have advanced regeneration. The same basal area is desired as the modified seed tree regeneration (approx 5 sq ft for hardwoods and 10-20 sq. ft for pine); however the seed trees have already propagated. This cut would allow sunlight to reach the forest floor and promote growth. This allows for a more even aged management approach to minimize the time before re-entry. After harvesting, the areas will be released and/or pre-commercial thinned using chainsaws and/or herbicides. (139 acres proposed)

3.) Shortleaf Pine Restoration (SLR) – A timber harvest where loblolly pine stands (typically those plantations acquired from Weyerhaeuser Company) are removed (clearcut) in upland areas that are "off site" for this species of pine. "Off site" is the term used to indicate the location of which a species is not traditionally native. After harvesting, the site will be prepped using a roller chopper, prescribed fire and/or herbicide application to control the competing vegetation. Afterwards, the area will be ripped to prepare a planting bed and followed with the planting of genetically improved shortleaf pine. After establishment, the areas will be released and/or pre-commercial thinned using chainsaws and/or herbicides. (241 acres proposed)

4.) Modified Shelterwood (SW) – A timber harvest method of regenerating an even-aged stand in which most of the trees are removed leaving a new age class to develop beneath the partially shaded microenvironment provided by the residual trees. For this project, only one stand will undergo this harvest method. The residual basal area will be 35 to maintain scenic integrity. After new stand establishment, overstory may be reduced to seed tree density. (23 acres proposed)

To facilitate natural pine regeneration, adequate site preparation is needed to disturb the soil surface in the newly created openings. Competing vegetation may be removed manually with chainsaws, heavy equipment, scarifying, ripping, prescribed fire, herbicide application and/or the use of a large steel drum pulled behind a bulldozer to chop. If warranted, the herbicide triclopyr, imazapyr, fluroxpyr, imazapic, mutsulfuron methyl, clopyralid and/or glyphosate may be applied using either hack-and-squirt or foliar spray by hand method. Prescribed fire will be employed in late summer/early fall months for best results, however may be conducted during the winter or early spring months to combine activities with other wildlife habitat/fuel reduction prescribed burning. When burning is not possible, ripping of the area may be used. Ripping is the process where soil is mechanically sliced or broken to improve tilth, aeration and permeability. When possible, site preparation activities will coincide with adequate cone crops. If after five years there are fewer than 150 pine seedlings per acre, the area will be hand planted with genetically improved shortleaf pine seedlings.

Where established regeneration is present, seedlings may regenerate too densely causing overcrowded conditions, requiring pre-commercial thinning and/or release. This release may be accomplished manually with hand tools (e.g. chainsaws) or with the herbicides applied as a foliar spray or cut surface application to remove the overtopping and competing vegetation and brush. A foliar spray may be applied to areas with vegetation less than six feet tall and with pine

regeneration that does not require thinning. A cut surface application is employed in areas with vegetation greater than six feet tall and/or with pine regeneration requiring thinning. During any pre-commercial thinning and/or release activities, sufficient hardwood trees would be left scattered throughout the stand to ensure a ten to 30 percent hardwood component in the stand. When selecting hardwood trees, preference would be given to mast producers. Final stocking after treatments would be 250-500 pine stems per acre.

Within the project area, several stands have the potential to exceed the size threshold for regeneration harvesting per the Revised Forest Plan. Boundaries were identified using existing physical topographic features (i.e. drains, ridges, roads) resulting in larger map units. Stands include riparian areas and steep slopes that would be delineated from the harvest area during sale preparation activities. The Plan provides that maximum size of regeneration areas may be exceeded with approval of the Forest Supervisor up to a maximum of 80 acres for pine and pine-hardwood forest types (FR009/Table 3.2, page 81; Table 3.11, page 108; Table 3.17, page 112). If, after riparian and slope delineation, the harvest area exceeds forest Plan requirements, the harvest area would be reduced or the Forests Supervisor's authorization would be requested. It should, however, be noted that four of these stands are off-site loblolly pine plantations that would create three openings (40 acres for MA14 and 20 acres for MA 17). By removing these loblolly pine plantations, it would allow for regeneration of native shortleaf pine. (RLRMP, p.6 and 60)

Pre-commercial Thinning /Release (PCT) – Regenerated pine stands between 5 and 10 years of age would be thinned to a maximum of 700 trees per acre, averaging a 10 x 10 foot spacing, using hand tools or herbicide application as described on the previous page. Leave trees would be free of all competing vegetation such as vines and woody stems to ensure survival, reduced susceptibility to insects and disease, and increase growth of the residual stand. Poorly formed trees would also be removed. The hardwood component would be retained at 10 to 30% of the total trees per acre. (481 acres) Additionally, the previously listed regeneration harvest acres may have PCT conducted at a later date to improve stand quality. (572 acres)

Commercial Thinning (CT) – Stands are normally thinned to a pine residual basal area of 60-75 square feet per acre based on the average stand diameter. However, for mechanical harvesting equipment to operate within these stands and to reduce the amount of damage to the remaining stand, a minimum spacing between trees of 20 feet is required (127 tress/acre). Stands with average diameters less than 10 inches will be thinned below the basal area guides listed in Table 3.6 Thinning Guide by Community Group (Revised Land and Resource Management Plan). Pursuant to Revised Forest Plan Design Criteria FI005, deviations from these guides are allowable if site-specific conditions warrant, subject to approval by the project Responsible Official. Stands with an average diameter of six inches would be thinned to a basal area of 30 square feet. Damaged, diseased, suppressed, and poorly formed trees would be targeted first for removal. Trees harvested will be sold to support the local economy (2,321 acres proposed). One stand totaling 105 acres will be followed by a PCT.

Timber Stand Improvement (TSI) – An intermediate treatment designed to improve the composition, structure, condition, health and growth of existing even aged stands. Two stands are Shortleaf Pine dominated with a large hardwood component. Competing hardwood poles

would be removed to improve pine stand vigor. A third stand is Oak-Hickory dominated with a Shortleaf Pine component. This hardwood stand is young and will be improved by coppice management (reducing hardwood sprouts) and reduction of competitive pines. These areas may be made available for firewood or commercial sale. (125 acres proposed)

Wildlife stand improvements are achieved by using a combination of fire, chainsaws, and/or herbicides. Understory and intermediate trees would be removed, reducing competition for light and nutrients among retained species. Oaks, hickories, and beech are favored for retention. These areas may be made available for firewood or commercial sale. The most common treatments to meet the objectives of these areas are woodland stand restoration, woodland stand development, midstory reduction and overstory development.

Woodland Stand Restoration (WSR) – Work would include removing undesirable tree species, such as sweetgum, elm, cedar, and maple in the understory, midstory, and overstory while retaining and developing hard and soft mast producing species such as white oak, red oak, hickory, and black cherry across the area. Stocking levels are maintained below forest guidelines (approximately 50-60 square feet of basal area per acre) for fully stocked stands. Stands are open, park like with emphasis on maintaining a strong herbaceous component. This treatment will also be followed the periodic use of fire, herbicide and/or manual methods to establish and maintain a grass/forb understory to be determined when the understory has more than 150 seedlings per acre over half the stand or woody vegetation (briars, vines and/or shrubs) which occupy more than half of the understory. Trees felled in these areas may be available for public firewood and/or commercial sale. (within 166 acres)

Woodland Stand Development (WSD) – Management treatment is to reduce the stocking levels to a more open canopy, generally a 25 to 60 percent crown closure. These stands are pine dominated, fully stocked and would be thinned to a level as recommended by RLRMP for woodland habitat (Table 3.6, pg. 84). Individual stand residual basal area will range between 30-60.These areas may be harvested by commercial thinning of pine and/or hardwood and are include in the above mentioned acres under CT. This treatment will also be followed the periodic use of fire, herbicide and/or manual methods to establish and maintain a grass/forb understory to be determined when the understory has more than 150 seedlings per acre or woody vegetation (briars, vines and/or shrubs) which occupy more than half of the understory. Area may also be made available for public and/or commercial firewood. (642 acres included in, not in addition to, the commercial thinning acreages)

Midstory Reduction (MSR) – By using a combination of fire, chainsaws and/or herbicides, suppressed and intermediate trees would be removed. Reducing the midstory will allow more light to filter through the forest canopy to spur the growth of understory vegetation. These areas may be available for public firewood and/or commercial (within 343 acres)

Overstory Development (OSD): Overstory development involves the felling of selected dominant and co-dominant trees and some of the midstory trees in a hardwood stand. Most soft mast producing species are retained through the process. Trees felled would be utilized as micro-habitats by benefiting forest floor species. This would be achieved by using chainsaws and/or herbicides to fall intermediate and co-dominant trees while retaining oaks and hickories in

addition to the soft mast producers. OSD areas may be made available for firewood or commercial sale. (within 434 acres)

Chemical Site Preparation – After pine regeneration harvest, hardwoods would be reduced to 20% of the residual basal area of pine using herbicide application in the form of foliar spray, stem injection, and/or chainsaw fell and cut surface spray. A minimum of 5 square feet per acre of basal area of overstory hardwoods would be retained where available. In modified seed tree harvest areas one-half acre clumps of hardwoods per 20 acres of harvest area would be retained in order to create den trees. (572 acres proposed= ST+SLR+SW)

Mechanical Site Prep - Competing vegetation may be removed manually with chainsaws, heavy equipment and/or ripping. This will be used in lieu of or in addition to other site prep methods to ensure areas are properly prepared for future seed/seedlings. (241 acres proposed=SLR)

Prescribed Burn Site Preparation – After chemical or mechanical site preparation activities have been conducted, prescribed burning may be employed in the even-aged regeneration harvest areas. This treatment would further reduce brush, downed-woody fuels, and duff and litter accumulations that may impede regeneration establishment. A detailed description of burning is provided later in this document under ecosystem prescribed burning. (572 acres proposed= ST+SLR+SW)

Hand Plant Shortleaf Pine – Within the SLR's (241 acres), hand planting of shortleaf pine seedlings will be 8 X 10 spacing. If adequate amount of pine regeneration (150 trees per acre) is not established within 5 years in natural regenerated areas (ST & SW), pine seedlings would be planted to meet target stocking levels. (241 and 331 acres proposed, respectively)

Wildlife Openings – Activities would include brush hogging, disking, fertilizing, and seeding existing wildlife openings with native warm and cool season grasses and forbs. Five permanent early seral openings would be created, totaling 3.5 acres. Sixteen acres of utility ROW's and existing roads (C42 and C43) would be maintained as wildlife openings.

Pond Maintenance – Activities would include repairing spillways, installing signs and clearing vegetation. Traditional methods of controlling nuisance vegetation within and surrounding ponds have proven unsuccessful or impracticable. With Forest Supervisor approval, the use of aquatic labeled herbicides would be used to control non native or invasive aquatic vegetation. There are 12 ponds within project area that would be improved/maintained.

Fish Passage Reconstruction – Activities would include placing large rocks and pouring concrete ramps on the outfall side of culverts and replacing a concrete slab with a concrete box culvert or other suitable structure on Collier Creek crossing. Additionally, 34 fish passage barriers would be corrected.

Watershed Restoration – Roads, trails, gravel pits, and areas with active erosion would be stabilized. Disturbed soil areas would be revegetated with native species, waterbarred and fertilized. Identified dump sites would be cleaned up and rehabilitated by disking, waterbarring, seeding, liming, mulching and fertilizing. (.22 miles proposed)

Nest Box Installation – Where suitable natural cavities do not occur, nesting structures would be installed across the project area to provide habitat for cavity-nesting animals. Fifty-four (54) nesting boxes would be installed.

Invasive/Noxious Plant Species Control – Identified invasive species (i.e. Fescue, Japanese Honeysuckle, Chinese Privet, Multi-flora rose) would be eliminated from the road surface, ditches, and forest floor throughout the project area using various techniques. These techniques would include a combination of herbicide application, prescribed burning, light disking, and seeding with native warm season grasses.

Ecosystem Prescribed Burning- This activity would be implemented during the dormant and growing seasons (described below). Burn blocks would be burned as conditions are appropriate (As needed to reach condition Class 2 with desire to meet condition Class 1). The Interagency Condition Class Guidebook (FRCG), 2010 identifies the condition classes that the Forest Service uses. Fire Regime Condition Class is defined as follows: FRCC 1 represents ecosystems with low (<33 percent) departure from a defined reference period – that is, landscapes still within the natural or historical range of variation; FRCC 2 indicates ecosystems with moderate (33 to 66 percent) departure; and FRCC 3 indicates ecosystems with high (>66 percent) departure from reference conditions. These definitions are also described in the Revised Land and Resource Management Plan (RLRMP) for the Ouachita Forest. The prescribed burn frequency is based on the current fuel loads, the priority of the unit and reasonable accessibility to achieve the desired condition. These are also considered when determining timing or season and intensity of the prescribed burn. Additionally, the RLRMP Objective 43 (pg 69) is to complete 50,000 to 100,000 acres per year and has a performance indicator of the number of acres burned per year and the percent of forest in the fire regime condition class I and II. Over the past 25 years, an average of 77,308 acres per year has been burned on the Ouachita National Forest.

In order to minimize fireline construction, some of the burn blocks extend beyond the project area to natural or existing man-made fuel breaks such as streams and roads.

> Growing Season Prescribed Burning – These burns are implemented during the spring and summer months between leaf emergence in late March and April and leaf fall in late October and November. The burns involve application of controlled, moderate to high intensity fire to control competing vegetation (hardwoods), prepare sites for seeding, and perpetuate fire dependent species (shortleaf pine – bluestem). Vegetation 3 inches and less in diameter at the ground level is targeted for eradication. This will result in less competition for pine seedlings and other desirable fire dependant species, while creating an open understory to stimulate growth of native grasses and forbs and increasing foraging for browsing animals.
>
> Dormant Season Prescribed Burning – These burns are implemented after leaf fall and before leaf emergence during late fall and winter months. Low intensity fire is employed to reduce accumulated fuels, stimulate growth of native vegetation, and improve wildlife habitat. Approximately 80 percent of the area is burned, with expected fuel reduction of approximately 30 percent. Some duff would be retained for soil protection. Vegetation 1¼ inches in dbh and less in diameter is targeted for reduction to create an open understory, stimulating growth of native grasses and forbs, and increasing foraging for browsing animals.

Fireline Construction – A line up to 10-feet wide would be bladed to bare minimum soil using a bulldozer, removing ground vegetation and small trees. The fireline would meander around large trees and they would be left in place. After the burns are completed, these firelines would be waterbarred and seeded with native grasses and forbs where needed to restore vegetative cover to the exposed soil. Approximately 18 miles of new fire line construction may necessary for prescribed burning.

Fireline Maintenance – Up to a 10-foot wide swath of brush and ground vegetation would be removed from existing firelines by blading using a bulldozer. After the burns are completed, these firelines would be waterbarred and seeded with native grasses and forbs where needed to restore vegetative cover to the exposed soil. Approximately 13 miles of existing fire line requires maintenance.

Temporary Road Construction – Approximately 8 miles of temporary road construction is necessary to access harvest areas. After harvest, these roads would be closed with earthen berms or gates, limed, fertilized, seeded and planted with native warm and cool season grasses and nonpersistent cultivars and utilized as temporary wildlife openings.

System Road Reconstruction – Approximately 8 miles of system road reconstruction would be required to support management activities, reduce erosion and sedimentation, and ensure safe travel on the existing road network. Activities could include any road improvements or realignment that results in an increase of an existing road's traffic service level, expands its capacity, changes its original design function, or relocates an existing road or portions of an existing road and treatment of the old roadway.

System Road Pre-haul Maintenance – Prehaul maintenance would be required on approximately 14 miles of road prior to timber hauling. Activities include brush removal, spot gravel, surface protection, blading, culvert replacement and drainage reconditioning as necessary to restore the road to its original design function.

Install Road Closure Devices – Metal gates or earthen berms would be installed to provide road closure. The closure devices would be installed on roads identified for closure or those built as temporary access for timber harvest.

Road Closures- In order to reduce soil erosion, sedimentation, illegal activities and to comply with the Travel Management Rule as outlined by the Motor Vehicle Use Management(MVUM) maps, approximately 3 miles of roads may be closed with gates or earthen berms as funds are available. See Appendix D for complete list of changes due to Motor Vehicle Use Management designation changes.

Road Decommissioning/Obliteration – Due to active erosion, closed or unauthorized roads may be stabilized and restored to a more natural state as funds become available.

Rock Resources – Permits would be offered to the public for collection of rocks by private individuals within existing mine areas or road construction and reconstruction corridors. That is,

rocks may be collected within areas of disturbance associated with existing mine areas or road construction and reconstruction.

Alternative C: No Herbicide Use

This alternative addresses the Forest direction requiring analysis of alternatives to herbicide use. Herbicide application for invasive species control, site preparation and pre-commercial thinning/release would not occur. These activities would be accomplished manually with chainsaws and/or other mechanical means. All other activities are the same as those proposed under Alternative B.

Other Past, Present and Reasonably Foreseeable Future Actions

An Environmental Assessment for Sharp Top Mountain Walk-In Turkey Hunting Area was completed in March 2004, which includes portions of Smith Mountain Resource project. This area included approximately 1,600 acres of ecosystem prescribed burning. It also provides a more primitive access to hunting/ recreational opportunities as motorized vehicle use is limited. The Sharp Top Mountain Walk-in Turkey Hunting Area provides turkey habitat and a turkey hunting experience with little/no interference by motorized vehicles. Located in the southeastern portion of the project area; 3,019 acres of the project area falls within the Sharp Top Mountain Walk-in Hunting Area. Activities would continue as approved in the previous environmental assessment.

In 2001, an ice storm damaged several hundred acres of timber that required salvage resulting in the removal of this timber. Within this region, the potential is high for reoccurrence. Additionally, seedling release/thinning could occur as a result of Southern Pine Beetle outbreak. Salvage timber for ice damage and the control of southern pine beetles would continue as necessary.

There are three privately owned quartz mines within the project area that are accessed by Forest Service owned roads. One quartz mine, OQC227, on Forest Service property is under contract within the project boundary. Additional resources within the project area are Driggers Gravel Pit in Compartment 52, an unnamed gravel pit in Compartment 1636 and an unnamed shale pit located in Compartment 1650. An operating plan will be developed prior to the shale and gravel pit being utilized. The quartz mining operation under contract would continue while contract is current.

The Crystal Scenic Area offers semi primitive recreation opportunities where management is dictated by recreation and wildlife objectives. The Crystal Scenic Area occupies 9,040 acres of the project area. Both Crystal Park Campground and Collier Springs Picnic Area are located within the project area. The Forest Service and Montgomery County provide free camping at Crystal Campground while Collier Springs is a day use picnic area.

Currently six communication facilities are authorized at High Peak under special use authorizations for Entergy, Centerpoint, C&W Communication, U.S. Army Corps of Engineers, Bates Communication and the Arkansas State Police. The Forest Service also has a

communication site at High Peak. The High Peak Repeater Station provides radio relay communications across the Caddo-Womble Ranger District.

Several special use authorizations for roads that are currently approved are: CAD0089; CAD520201; CAD402110; CAD0015; and CAD533001. Other special use authorizations include JES402401, for a fiber optic cable. Requests for additional special use permits will be reviewed as necessary.

Private land ownership – Private owners can be expected to continue their current land use practices (i.e. residential, farming, crystal mining). Persons with vacation homes along the Caddo River would continue to use the river for recreation. Several businesses utilize this river for float trip recreation. Private landowners may develop land *adjacent* to river and/or National Forest System within project area.

Other past activities within the Smith Mountain Resource Project area are evident in descriptions of the present conditions for each resource section analyzed in Chapter 3. Other ongoing activities are listed above in the description of Alternative A: Deferred Harvest (No Action).

SUMMARY COMPARISON OF ACTIONS BY ALTERNATIVE (TABLE 2.2)

Action (measure)	No Action	Alt B	Alt C
Modified Seed Tree Regeneration Harvest (ST) (acres)	0	308	308
Overstory Removal Harvest (OSR) (acres)	0	139	139
Shortleaf Pine Restoration Harvest (SLR) (acres)	0	241	241
Shelterwood Harvest (SW) (acres)	0	23	23
Commercial Thinning (CT) (acres)	0	2,321	2,321
Pre-Commercial Thinning with herbicides (PCT) – includes OSR	0	620	0
Pre-Commercial Thinning without herbicides (PCT)- includes OSR	0	0	620
PCT Site Preparation with Herbicides (all regeneration except OSR)	0	572	0
Site Preparation without Herbicides (all regenerated stands except OSR)	0	0	572
Prescribed Burn Site Preparation (acres)	0	572	572
Timber Stand Improvement (TSI) (acres)	0	125	125
Woodland Stand Restoration (WSR) (acres)	0	166	166
Midstory Reduction (MSR) (acres)	0	343	343
Hand Plant Shortleaf Pine Seedlings (acres)	0	241	241
Hand Plant Shortleaf Pine if Natural Regeneration. fails		572	572
Woodland Stand Development (WSD)-included with CT, not in addition to.	0	642	642
Overstory Development (OSD)(acres)	0	434	434
Wildlife Openings (new and existing)	0	19.5	19.5
Pond Maintenance (ponds)	0	12	12

Action (measure)	No Action	Alt B	Alt C
		(with herbicides)	(no herbicides)
Wildlife Prescribed Burning (acres)	0	1,435	1,435
Fish Passage Reconstruction (structures)	0	1	1
Watershed Restoration (miles)	0	.22	.22
Nest Box Installation (structures)	0	54	54
Invasive Plant Species Control (acres)	0	50 (for analysis)	0
Ecosystem Prescribed Burning (acres)	0	9,532	9,532
Fireline Construction (miles)	0	21	21
Fireline Maintenance (miles)	0	11	11
Temporary Road Construction (miles)	0	8	8
System Road Reconstruction(miles)	0	8	8
System Road Pre-haul Maintenance(miles)	0	14	14
Install Road Closure Devices (structures)	0	37	37
Road Closure (miles)	0	3.03	3.03
Total area potentially treated with pesticides (Natural Regen(2) + PCT+ invasives) (acres)	0	1,675	0

SUMMARY COMPARISON OF ENVIRONMENTAL EFFECTS BY ALTERNATIVE (TABLE 2.3)

Environmental Effect (measure)		No Action	Alt B	Alt C
Risk to Beneficial Uses (Low, Moderate, High)/ Sedimentation (tons per year)	Watershed			
	80401020203	*Mod/74.30*	*Mod/1,258.42*	*Mod/1,258.42*
	*80401010703**	N/A	N/A	N/A
	*80401020202**	N/A	N/A	N/A
	*80401020205**	N/A	N/A	N/A
Air Quality Meets Air Quality Index		Yes	Yes	Yes
Early Seral Habitat Created/Maintained (acres)		0	644	644
Open Road Density (mi/sq. mile)		1.9	1.8	1.8
Scenic Integrity Objectives Met		Yes	Yes	Yes
Volume Harvested (ccf)		0	31,894	31,894

*Watershed numbers 80401020203, 80401010703, 80401020202 and 80401020205 are identified as Collier Creek-Caddo River, Upper Mazarn Creek, Headwaters Caddo River and Mill Creek- Caddo River watersheds respectively. The Smith Mountain project area is primarily within Collier Creek-Caddo River watershed, however because some proposed actions such as prescribed burning and associated fireline construction or re-construction fall outside the boundaries of that watershed, the risk to beneficial uses (sedimentation effects) of these activities will be analyzed for the watershed that contains them as that watershed EA is developed.

*Commercial harvests of less than 30 acres fall within watershed numbers 80401020202 and 80401020205 (Headwaters Caddo River and Mill Creek-Caddo River) and prescribed burning of less than 750 acres in Upper Mazarn (80401010703) are negligible in size on those watersheds for overall impact in terms of sedimentation on a watershed basis. Future activities completed in those watersheds will be analyzed at that time.

SUMMARY COMPARISON OF OBJECTIVES MET BY ALTERNATIVE (TABLE 2.4)

Objective (measure)	No Action	Alt B	Alt C
Improve the health and vigor of forest stands and improve stand quality (acres of timber stands treated resulting in reduced basal areas)	0	4,581	4,581
Contribute to the economic base of local communities by providing a sustained yield of high-quality wood products. (volume harvested – 100 cubic feet (ccf))	0	31,894	31,894
Provide grass-forb and seedling-sapling habitat conditions. (percent of suitable acres in early seral habitat)	0.12	10.2	10.2
Provide for a diversity of plant and animal communities; reduce fuel loads. (acres of ecosystem/wildlife prescribed burning)	0	8,960	8,960
Maintain or Improve open habitats to provide high quality forage and nesting habitat for wildlife. (acres of wildlife openings maintained/created)	0	19.5	19.5
Maintain or restore community diversity. (acres of woodland stand development/restoration)	0	808	808
Provide for mast production. (acres of overstory development(OSD))	0	434	434
Maintain or improve watershed health. (fish passage barriers restored: miles of watershed restoration)	0:0	34:0.22	34:0.22
Eliminate non-native, invasive species. (acres treated for invasive species eradication)	0	Across project area (50 acres for analysis)	0
Provide nest structures where suitable natural cavities do not occur. (number of bird boxes installed)	0	54	54
Reduce open road density. (miles of open road per square mile)	1.9	1.8	1.8
Develop, operate, and maintain the road system to meet the requirements of the proposed actions, protect the environment, and provide reasonable and safe access. (miles of road construction: road reconstruction: and pre-haul maintenance)	0	0: 8: 14	0: 8: 14

The Preferred Alternative

Alternative B: Smith Mountain Resource Management Project (Proposed Action) is the Caddo-Womble District Ranger's preferred alternative.

Chapter 3
Affected Environment and Environmental Consequences

Introduction

Unless stated otherwise, the spatial bound for cumulative effects analysis is the 25,597 acre Smith Mountain Resource Management project area boundary (see location map in Appendix F). The project area boundary is primarily but not completely contained within the Collier Creek-Caddo River watershed. Additional minor treatments fall within the Upper Mazarn, Headwaters Caddo River and Mill Creek-Caddo River watersheds.

Analysis tools and data used to estimate the effects of implementation of the alternatives:

Air Quality – VSMOKE is used to analyze the effects of a single prescribed fire. The program estimates smoke concentrations and cross plume sightline characteristics at specified downwind distances from the fire. The conservative nature of VSMOKE estimates allows the model to be used as a screening system to point out the potential for smoke-related hazards. VSMOKE's results are primarily intended to give an overview of the probable air pollution impact from a single prescribed fire. VSMOKE smoke concentrations estimates are applicable along the downwind centerline of the smoke trajectory.

Soils – The Ouachita National Forest Universal Soil Loss Equation (USLE) model is used to determine potential soil erosion on a project site, and the proposed soil disturbing management activities that have the potential for the most erosion. The model was developed by ONF personnel, and modified by Forest Soil Scientists. The USLE model was developed to determine average year soil erosion based on yearly precipitation and rainfall energy derived from 30 years of rainfall data.

Water Quality – The Aquatic Cumulative Effects model (Clingenpeel & Crump 2005) is used to determine the possible cumulative impacts of management activities on water quality. This model addresses the effects of timber harvesting, roads and wildlife management activities on water quality and fisheries. The model calculates sediment loadings resulting from proposed management activities. The model also assigns a risk rating of low, medium or high for adverse effects to aquatic beneficial uses. The model was developed for the Ouachita National Forest in Arkansas and Oklahoma and is specific to the physiographic zones within the Ouachita National Forest.

Financial Efficiency – Quick-Silver (version 6.0) is used to determine the financial efficiency of each Alternative. This program is a project analysis tool that utilizes a MS Access database for use by forest managers to determine the economic performance of long-term investments.

Public Health and Safety – SERA (Syracuse Environmental Research Associates, Inc.) Human Health and Ecological Risk Assessments were used to analyze the risks associated with the seven herbicides proposed for use in this project. Project specific SERA worksheets (version 4.06) were completed for herbicides triclopyr, imazapyr, fluroxpyr, imazapic, mutsulfuron methyl, clopyralid and glyphosate to determine HQs (Hazard Quotients) for the proposed application rates of these herbicides. An HQ is the

ratio of a projected level of human exposure divided by some index of acceptable exposure or an exposure associated with a defined risk. HQs of 1.0 or less indicate scenarios with acceptably low risk.

Air Quality

- ***Present Conditions***

Air quality is good within and surrounding the project area. As of December 2008, Crittenden County is the only non-attainment area in the state of Arkansas for any of the six criteria air pollutants monitored by the Environmental Protection Agency (EPA). Crittenden County, part of the Memphis metropolitan area, was non-attainment for 8-hour ozone.

The Smith Mountain Resource project area lies within lands designated as Class II with respect to the air resource. The Clean Air Act defines a Class II area as "a geographic area designated for a moderate degree of protection from future degradation of the air quality". A Class I Area is a geographic area designated for the most stringent degree of protection from future degradation of air quality. The closest Class I Area to the project area is the USDA Forest Service Caney Creek Wilderness Area, approximately 18 miles west of the project area.

Other smoke sensitive targets include towns such as Norman, Caddo Gap and Black Springs. Additionally, hospitals, schools, airports and major roadways are also of concern. Prescribed burns would be planned so to minimize the negative effects of burning on human health and safety to the extent possible.

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 Smith Mountain Resource Management area falls completely within Montgomery County. However, portions of the Upper Mazarn watershed extend into portions of Garland County. Based upon the 2002 EPA Emissions by Category Report for "tier-1" sources, no point source emissions were reported to occur within Montgomery County. Point source emissions were identified within Garland County for categories from industrial fuel manufacturing, metal processing and other industrial processes.

POINT SOURCE EMISSIONS OF CRITERIA POLLUTANTS FOR MONTGOMERY AND GARLAND COUNTIES (TABLE 3.1)

Point Source Emissions in Tons Per Year						
	CO	SO_2	NO_x	PM-10	PM-2.5	VOC
Montgomery	0	0	0	0	0	0
Garland	12.2	1.4	15.2	170.8	107.9	224.3

NON-POINT+MOBILE SOURCE EMISSIONS OF CRITERIA POLLUTANTS FOR MONTGOMERY AND GARLAND COUNTIES (TABLE 3.2)

Non-point +Mobile Source Emissions in Tons Per Year						
	CO	SO_2	NO_x	PM-10	PM-2.5	VOC
Montgomery	18,309	254	504	2,686	1,252	4,300
Garland	30,454	177	2,450	5,143	942	6,155

CO-Carbon Monoxide; **SO**- Sulfur Dioxide; **NO**x- Nitrogen Oxides; **PM-10**-Particles < 10 micrometers diameter; **PM-2.5**-Particles < 2.5 micrometers diameter; **VOC**-Volatile Organic Compounds

Miscellaneous, off-highway, highway vehicles and miscellaneous sources are the greatest producers of CO. Highway and off-highway vehicles are the greatest producers of NOx. Miscellaneous sources are the major source of PM-10 and PM-2.5. The greatest area source emissions for SO_2 are emitted from industrial use of fuel oil.

There is public concern that smoke generated from prescribed burning may degrade air quality. This could cause health problems to those living downwind of the project area.

Bounding the Effects Analysis

VSMOKE was used to analyze the effects of a single prescribed fire. The program estimates smoke concentrations and cross plume sightline characteristics at specified downwind distances from the fire. For this analysis the largest proposed burn block of 1,765 acres, was used to assess the worst case scenario. Smoke sensitive targets were identified within an approximate 30-mile radius, although it is recognized that smoke transport and dispersal in the atmosphere would exceed this distance.

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct effects:
The prescribed fire proposed in this project would not occur, therefore there would be no additional smoke generated from the proposed prescribed burning, and no degradation of air quality.

Indirect effects:
The amount of fuel consumed on each of the prescribed burning blocks would average 4 tons per acre. Under the No Action Alternative, this reduction in fuels would not take place. In the event of a wildfire, this fuel would be present, and because wildfires occur without regards to a prescription, climatic conditions might exist that could contribute to the creation of high levels of ozone, PM-10, and PM-2.5 downwind of the fire.

Cumulative effects:
No cumulative effects are foreseen under the No Action Alternative with regards to degradation of air quality from prescribed burning. However, as discussed in the indirect effects section, there is an increased potential for air quality degradation from wildfires due to the retention of fuels. Over time, with no implementation of fuel reduction, the amount of fuels would increase. As fuels accumulate, the potential for exceeding air quality standards due to a wildfire would increase.

- Alternative B: Smith Mountain Resource Management Project (Proposed Action) - Direct, Indirect & Cumulative Effects

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

Smoke can have negative short-and long-term health effects. Fire management personnel exposed to high smoke concentrations often suffer eye and respiratory system irritation. Under some circumstances, continued exposure to high concentrations of carbon monoxide at the combustion zone can result in impaired alertness and judgment. The probability of this happening on a prescribed fire is, however, virtually nonexistent because of limited exposure time.

Smoke is composed of hundreds of chemicals in gaseous, liquid and solid forms, some of which are toxins including carbon monoxide, particulate matter, acrolein and formaldehyde. Over 90 percent of the particulate emissions from prescribed fire are small enough to enter the human respiratory system. The repeated, lengthy exposure to relatively low smoke concentrations over many years can contribute to respiratory and cardiovascular problems.

Prescribed Burn Plans are required for each burn. Smoke sensitive targets identified for this analysis include the Class I Caney Creek Wilderness Area, Arkansas Highway 8, Arkansas Highway 84, Arkansas Highway 240, US Highway 270 & 70, the Mt. Ida Airport, the Mena Airport, the towns of Caddo Gap, Black Springs, Mt. Ida, Norman, Glenwood, Hot Springs and any schools or health care facilities within these towns. Each prescribed burn plan outlines a contingency plan that will be implemented if conditions change from the planned burn. These include 1) Cease firing 2) Monitor the burn if it exceeds management objectives 3) Plow out burn if it exceeds management objectives and 4) Monitor burn until safe to leave. Prescribed burns would be planned so to minimize the negative effects of burning on human health and safety to the extent possible. The direct and indirect effects of smoke on sensitive target areas are listed above. Additionally, a list of agencies is notified prior to ignition of each burn.

The smoke dispersion modeling analysis (using VSMOKE and/or VSMOKE-GIS) for this project was performed for 500.0 acres per hour to be burned on 02/01/2011 at the time period of 1400 hours. This time period has daytime dispersion characteristics to disperse the pollutants from the fire. The location of the fire is at approximately 34.463 degrees latitude and -93.619 degrees longitude (443172.944 meters east and 3813652.796 meters north using US Albers projection). The emission rate of PM2.5 (fine particles) this hour was 7108.3 grams/second, and carbon monoxide was 86928.5 grams/second. The heat release rate was 2969774.4 megawatts. Both emission rates and the heat release rates were calculated using the Fire Emission Production Simulator (FEPS) model. This model is built into VSMOKE and pulls data to manage fuel characteristics concerning consumption, emissions and heat release. The estimated background concentration of fine particles and carbon monoxide of the air

carried with the winds into the fire are 20 micrograms/cubic meter and 4 parts per million, respectively. The proportion of the smoke subject to plume rise was -0.75 percent, which means 75 percent of the smoke is being dispersed gradually as it rises to the mixing height, and 25 percent is dispersed at ground level.

The meteorological conditions used in this model run were:

1.) Mixing height was 5000 feet above ground level (AGL).
2.) Transport wind speed, and surface wind speed were 12 and 5.0 miles per hour, respectively.
3.) The sky had 20 percent cloud cover, and the clouds were located 3000 feet above the ground.
4.) Surface temperature was 45 degrees Fahrenheit, and the relative humidity was 38 percent.
5.) The calculated stability class from VSMOKE was moderately unstable.

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

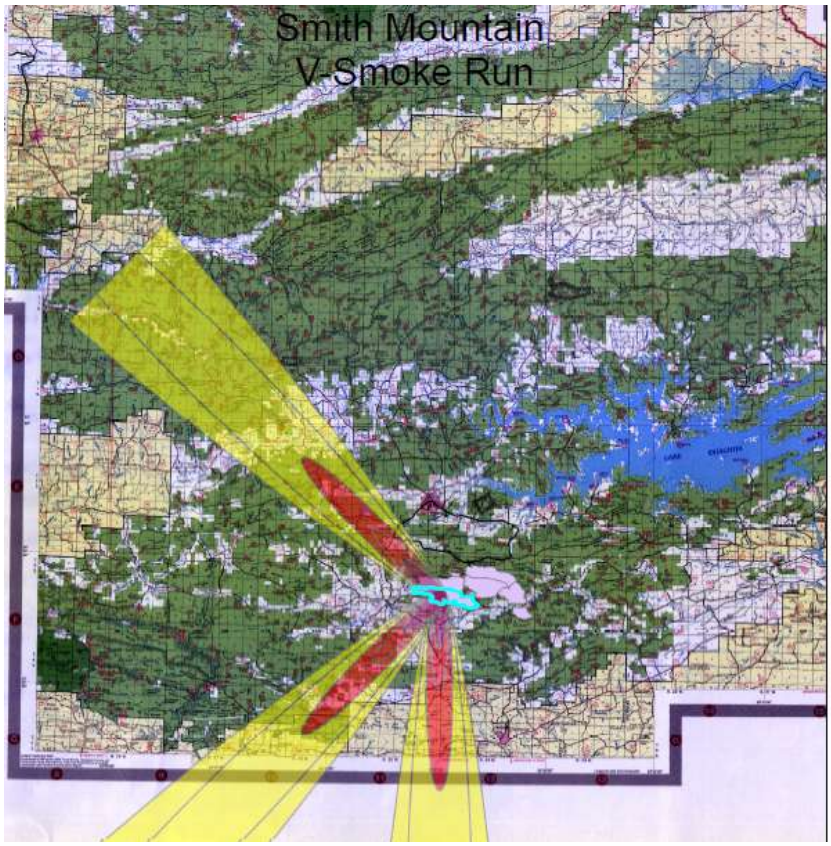
The Dispersion Index (DI) is an estimate of the ability of the atmosphere to disperse smoke to acceptably low average concentrations downwind of one or more fires. This value could represent an area of approximately 1000 square miles under uniform weather conditions. Typically, the Dispersion Index value should be greater than 30 when igniting a large number of acres within an area. The calculated Dispersion Index value was 64, which predicts the atmosphere has a good capacity to disperse smoke.

Combining the Dispersion Index and relative humidity values provide an estimate (like those used in insurance actuary tables) of the likelihood of the smoke contributing to fog formation. The Low Visibility Occurrence Risk Index (LVORI) ranges from 1 (lowest risk) to 10 (greatest risk) and usually you want the value to be less than 4. The base line risk of having low visibility as a result of smoke contributing to fog formation is about 1 in 1000 accidents. The Low Visibility Occurrence Risk Index value for this VSMOKE analysis was 1 which is equal to the base line.

High concentrations of particulate matter, especially fine particles (PM2.5), and carbon monoxide can have a negative impact on people's health. The Environmental Protection Agency has developed a color coding system called the Air Quality Index (AQI) to help people understand what concentrations of air pollution may impact their health. When the AQI value is color coded orange then people who are sensitive to air pollutants, or have other health problems, may experience health effects. This means they are likely to be affected at lower levels than the general public. Sensitive groups of people include the elderly, children, and people with either lung disease or heart disease. The general public is not likely to be affected when the AQI is coded orange. Everyone may begin to experience health effects when AQI values are color coded as red. People who are sensitive to air pollutants may experience more serious health effects when concentrations reach code red levels. This analysis shows the air quality at downwind distances less than 1.96 miles from the edge of the fire may have a 1-hour particulate matter concentrations predicted to be code red or worse, while distances less than 9.85 miles are predicted to be code orange or worse. At distances less than 0.25 miles from the edge of the fire the one-hour carbon monoxide concentrations are predicted to be code red or worse, and distances less than 0.39 miles from the fire are predicted to be coded orange or worse.

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

The VSMOKE-GIS model estimates were for the pre-selected fine particulate matter concentrations (41, 81, 176, 301, and 501 micrograms per cubic meter) to be predicted downwind of the fire. The results (map) are shown below. The VSMOKE-GIS analysis has daytime dispersion characteristics to disperse the pollutants from the fire and this is the same as the VSMOKE analysis. The downwind spacing interval was set at 0.025 kilometers, and the model ceased making downwind estimates at 30 miles from the edge of the fire. The stability class used for the VSMOKE-GIS analysis was moderately unstable and this is the same as the calculated stability from VSMOKE.



VSMOKE or other modeling would be performed on the day of the actual burn, using up-to-date meteorological data. If this modeling shows unacceptable impacts from burning (i.e. extended period of unhealthy smoke concentration levels or impacts to smoke-sensitive sites), the activity would be postponed or altered.

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

- Alternative C: No Herbicide Use – Direct, Indirect & Cumulative Effects

Effects are the same as those listed for Alternative B.

Soils

Present Conditions

The soil resource inventory was developed from studying and classifying soils and describing soil mapping units which are the key to land and soil features significant to soil use and management. Guidelines for soil inventory design, mapping and soil taxonomic classification for interpreting soils information are found in the Forest Service Southern Region Soil Resource Guide and from the Natural Resources Conservation Service (NRCS), previously the Soil Conservation Service, Soil Taxonomy Manual (Agriculture Handbook 436), the NRCS Soil Survey Manual (Agriculture Handbook 18) and the NRCS National Soils Handbook.

The Smith Mountain Resource Management project area lies within the Central Mountain subdivision of the Ouachita Mountains Physiographic Region. The topography of this area is complex and derived primarily from the diversity in geology. Six geologic formations dominate this area, most of which are from the Ordovician time period. They include the Mazarn Shale, Womble Shale, Blakely Sandstone, Crystal Mountain Sandstone and Collier Shale. Also present is the Arkansas Novaculite from the Devonian time period. The landforms within these areas consist of gently sloping to moderately sloping mountaintops and steep to very steep mountainsides, some of which are rugged and with limited access. Slopes exceeding 60 percent and areas of boulders and rock outcrop can be common. These areas are dominated by the Crystal Mountain Sandstone formation. Much of the area consists of gently sloping to moderately sloping footslopes and hillsides which are dominated by the Mazarn Shale and Womble Shale. Also included throughout the watershed are nearly level to gently sloping areas of narrow floodplains, most of which frequently or occasionally flood.

Soil maps, mapping unit descriptions and interpretations are based upon the fact that different soil types result from different combinations of geology, geomorphology, topography, vegetation and climate which influence land use activities, capabilities and various interpretations for management. The nature, patterns and extent of these soils give each mapping unit its own set of interpretations for use and management. The Soil Resource Report for the Smith Mountain Project Area has identified and described 38 soil-mapping units (SMU) within the Project area. Soil properties and associated management implications/precautions of these soil units were analyzed with respect to the proposed practices within each alternative. The project file retains the Soil Resource Report, Soil Map Unit Interpretations for Management, Soil Mapping Unit Descriptions and the Soil Map used for analysis. A table listing the soil types identified can be found in the Project File.

Erosion is the detachment and transport of individual soil particles by wind, water, or gravity. Ground disturbing management practices influence erosion principally because they remove vegetative ground cover and often concentrate and channel runoff water. In areas proposed for harvest, there are approximately 72 acres of soils with a potential erosion hazard of severe.

Soil compaction increases soil bulk density and decreases porosity. In areas proposed for harvest, there are approximately 51 acres of soils with a compaction hazard rating of severe with no areas of high or moderate-high compaction rating.

Bounding the Effects Analysis

The Ouachita National Forest Universal Soil Loss Equation (USLE) model is used to determine potential soil erosion on a project site, and the proposed soil disturbing management activities that have the potential for the most erosion. The model was developed by ONF personnel and modified by Forest Soil Scientists. The USLE model was developed to determine average year soil erosion based on yearly precipitation and rainfall energy derived from 30 years of rainfall data. The model calculates total soil loss based on a three year recovery period for the three stands described in the cumulative effects section.

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

<u>Direct Effects</u>:
Soils in the Ouachita Mountains typically do not have high inherent soil erodibility (high K-Factor) values due to high surface gravel and rock contents and high concentrations of fine roots at the soil surface. Natural erosion from undisturbed forest soils is low. For this analysis area, natural erosion would range from 0.01 to 0.15 tons per acre per year (Smith Mountain Soil Resource Report). Under Alternative A, no soil disturbing activities are proposed; therefore there would be no direct effects to soils.

<u>Indirect Effects</u>:
Under Alternative A, the prescribed burning proposed would not take place; no reduction in fuels would occur. In the event of a wildfire, this fuel would be present, and because wildfires occur without regards to a prescription, excessive soil heating could occur, killing soil biota, alter soil structure, consume organic matter, and remove site nutrients. Soil erosion and nutrient leaching may occur during later rainstorms.

Cumulative Effects:
No cumulative effects are foreseen under the No Action Alternative with regards to soil impacts from proposed management activities. However, as discussed in the indirect effects section, there is an increased potential for negative effects to soils from wildfires due to the retention of fuels. Over time, with no implementation of fuel reduction, the amount of fuels would increase. As fuels accumulate, the potential for soil damage due to a wildfire would increase. This could impair long-term soil productivity.

- Alternative B: Smith Mountain Resource Management Project –Direct, Indirect & Cumulative Effects

Direct Effects:
There is a concern that timber harvest, road construction and prescribed burning may cause unacceptable levels of erosion, sedimentation, compaction and/or nutrient loss and as a result decrease the long-term soil productivity within the project area. Those soil map units with severe erosion and compaction hazards are subject not only to more management requirements but also closer scrutiny and more frequent monitoring. Alternative B proposes timber harvest on 72 acres of soils with a severe erosion hazard. Soils are considered detrimentally eroded when soil loss exceeds soil loss tolerance (i.e. Forested T-factor) values. Ground disturbing management practices influence erosion principally because they remove vegetative ground cover and often concentrate and channel runoff water. Forested T-factors and the soils susceptibility to erosion vary by soil and mapping unit. Soils with higher K-factor values and those soil map units with severe erosion hazard ratings require more intensive management efforts to reduce the potential for accelerated erosion both during and after the soil disturbing activity. Erosion can best be managed to stay within the Forested T-factor values by leaving sufficient amounts of the forest floor, slash and other onsite woody debris material which typically dominates an effective surface cover, not overly compacting soils which would reduce water infiltration rates and result in increased overland flow rates, and not allowing water to concentrate and channel on roads, skid trails and landings. The technical requirements described on pages 46-47 and adherence to Revised Forest Plan Design Criteria (SW003 – SW008) would keep erosion at acceptable levels under normal circumstances. In addition, implementation of Best Management Practices (BMP's) or soil conservation treatment measures would minimize the exposure of soils to erosion. Erosion rates approaching or exceeding Forested T-factor rates are rare when soil conservation treatment measures and water quality BMPs are used. Table 3.3 lists stands that are proposed for commercial harvest that contain soils with a severe erosion potential. There were no areas within high or moderate-high erosion ratings.

AREAS PROPOSED FOR COMMERCIAL HARVEST WITH SEVERE EROSION POTENTIAL (TABLE 3.3)

Compartment	Stand	Soil MU #	Acres
42	1	11	3.6
43	28	112	1.9
52	08	112	25.9
53	12,22,29,61,59,31,32	163	37.6
40	14	159	.02
1636	2,5	163	2.4
57	8	120	.06
54	4	79	.1
39	19	163	.2

Negative effects to soil from prescribed burning are related to the severity and frequency of the burns. Most burning would occur during the cooler winter or early spring months when flame lengths and fire severity should be low to moderate. Only the upper forest floor litter layer should be consumed. This should leave the underlying layer to protect the mineral soil. This organic layer, along with trees and other vegetation, should prevent or minimize any soil movement. Adherence to Revised Forest Plan Design Criteria (PF001-PF006) would keep erosion at acceptable levels.

Soils are classified on the forest as severe, high or moderately high hazard for compaction. Harvests within the project area are proposed on 59 acres of soils with a compaction hazard rating of severe. Compaction increases soil bulk density and decreases porosity as a result of the application of forces such as weight and vibration. All soils can compact, some more so than others. Naturally, soils high in rock content tend to be less compactable. Additionally, some soils can be more susceptible to puddling and compaction during wet soil conditions. Compaction can detrimentally impact both soil productivity and watershed condition by causing increased overland flow during storm events and reduced plant growth due to a combination of factors including reduced amounts of water entering the soil and its reduced availability to plant growth, a restricted root zone, and reduced soil aeration. Table 3.4 lists stands that are proposed for commercial harvest that contain soils with a severe compaction rating. There were no areas found with a high or moderate-high compaction rating.

AREAS PROPOSED FOR COMMERCIAL HARVEST WITH SEVERE COMPACTION HAZARDS (TABLE 3.4)

Compartment	Stand	Soil MU #	Hazard Rating	Acres
53	1,22,31,49,61	60	severe	14.1
53	59	106	severe	
		60	severe	
56	12,14	61	severe	36.91
56	8	61	severe	
56	11,12,17,18	60	severe	

Prescribed burning would not directly cause soil compaction. The use of large machinery in forestry operations has the potential to compact soils, decreasing productivity. To minimize compaction, heavy equipment would be limited to July through November in stands with severe compaction hazards. Operations during December through June are allowed with the use of methods or equipment that does not cause excessive soil compaction. This does not apply to roads, primary skid trails, or log decks. Soil conditions would be monitored and operations would be suspended when soils become wet.

Indirect Effects:
Biomass removal can cause nutrient deficits. However, Masters et al. (1993) did not find that timber harvesting is a nutrient depleting practices in the western Ouachita Mountains but rather serves to reallocate the nutrient capital within the system. They found that the soil nutrient status improved following timber harvest in the Ouachita Mountains on soils similar to those within the project area. Nutrient depletion is generally only a concern where soils are initially poor, whole-tree harvest is used, or rotations are short, on the order of 20-35 years (Jorgenson and Wells, 1986). None of these factors are present under Alternative B; therefore nutrient depletion is not expected.

Light to moderate severity fires accelerate the recycling process by releasing nutrients in the soil, thereby stimulating nutrient uptake by vegetation. Even though prescribed fires release some nitrogen gases, overall nitrogen budgets are not significantly affected. Prescribed fires may also help in reducing rates of soil acidification (FEIS, pp. 46, 47).

Any long-term negative effects to the soil would be related to high severity burns or very short (less than 3-year) frequency of the burns. Typical burn severity will be limited by established burning parameters and mitigation measures designed to protect soils and overstory trees and to minimize risk of escape. These parameters result in retention of enough leaf litter to protect soil from the negative effects listed above in most cases. Underburn frequencies will be 3-years or greater which will allow recovery of forest floors and soil biota and will not deplete soil nutrients.

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

Cumulative Effects:
Monitoring on the Ouachita National Forest has not detected differences in soil nutrient status in stands managed under different intensities (Ku and Lawson, 1993), suggesting that cumulative effects on nutrient levels are not substantial even under the most intense of typical management regimes. General field observation and expert opinion (Wheeler and Eichman, 1991) also do not support the premise that typical management actions such as those proposed under Alternative B, negatively affect long-term soil productivity.

The Revised Forest Plan Forest-wide design criteria identify maximum allowable soil loss thresholds (USDA-Forest Service 2005a, pp. 74-75). In order to determine whether the proposed practices and connected actions meet these criteria, the Universal Soil Loss Equation (USLE) was used to calculate soil loss resulting from proposed activities on a soil type with a potential erosion hazard of severe and on a soil type with a severe compaction hazard potential. For this analysis area, two scenarios were

analyzed to determine if the proposed activities would meet the Revised Forest Plan criteria. The first scenario modeled a commercial thinning harvest in compartment 52 stand 8, soil map unit 112. Soil map unit 112 consists of the Yanush-Avant-Bengal complex with 35 to 60 percent slopes and has a severe erosion and slight compaction potential. Dormant season prescribed burns occurring in years 8 and 15 were also modeled as part of the scenario. The second scenario modeled a commercial thinning in compartment 56 stand 11, soil map unit 60. Soil map unit 60 consists of the Mazarn complex with 0 to 3 percent slopes and severe compaction potential. Dormant season prescribed burns occurring in years 8 and 15 were also modeled as part of the scenario. The USLE analysis results are shown in Table 3.5 below.

COMPARISON OF SOIL LOSS FROM PROPOSED ACTION TO ALLOWABLE SOIL LOSS (TABLE 3.5)

Soil Map Unit	Compartment-Stand	Representing	Soil Loss in Tons Per Acre between Re-entries	
			Proposed Activities	Maximum Allowable
112	52-8	Moderate soil disturbance with severe erosion potential	3.58 *	5.10
60	56-11	Moderate soil disturbance with severe compaction potential	1.44	6.00

* Based on adequately implemented erosion control methods: scarify, waterbar and seed log decks, temporary roads, primary skid trails and firelines.

All the above treatment units shown in Table 3.5 meet the Forest criteria of staying within the allowable soil loss Forested T-factor. These treatment units, along with other proposed treatment units of less intense soil disturbing management actions, therefore, would remain within acceptable limits over the entire project area when erosion control measures are adequately implemented.

The specific technical requirements for harvesting/ burning in compactable or erodible soils are as follows:

- Soils would be managed to maintain a minimum of 85 percent of a treatment area in a condition of acceptable soil productivity following land management activities. (RLRMP, SW003, p.74)
- Allow heavy equipment operations on soils with a severe compaction hazard rating only during the months of July through November. Operations during December through June are allowed with the use of methods or equipment that does not cause excessive soil compaction. This does not apply to roads, primary skid trails, or log decks. (RLRMP, SW001, p.74)
- Allow heavy equipment operations on soils with a high compaction hazard rating only during the months of April through November. Operations during December through March are allowed with the use of methods or equipment that does not cause excessive soil compaction. This does not apply to roads, primary skid trails, or log decks. (RLRMP, SW002, p.74)

- Erosion control treatments of log decks, temporary roads, and primary skid trails will include installing waterbars and seeding. (Smith Mountain USLE report)
- Bulk density would not increase more than 15 percent over the undisturbed level in the upper eight inches of soil. (RLRMP, SW003, p.74)
- Soil organic matter will remain at least 85 percent of the natural or undisturbed total in the upper six inches of soil. (RLRMP, SW003, p.74)
- Soil loss from management actions would not exceed the estimated Forested T-factor for each soil or soil map unit, based on the cumulative time period between soil disturbing management actions. (RLRMP, SW003, p.74)
- Soil puddling (tire track rutting) will not exceed six inched deep. (Smith Mountain USLE report)
- Soil displacement will not exceed two inches or one-half the humus-enriched "A" horizon, whichever is less, over a surface area greater than 100 square feet that is more than ten feet wide. (RLRMP, SW003, p.74)

➢ Alternative C: No Herbicide Use – Direct, Indirect & Cumulative Effects

The effects of Alternative C would be the same as those listed under Alternative B above.

Water Resources & Quality

Present Conditions

The project area boundary is primarily but not completely contained within the Collier Creek-Caddo River Huc-6 watershed. Because watershed boundaries are not congruent with compartment or stand boundaries, some proposed actions such as commercial timber harvests, prescribed burning, associated fireline construction or re-construction, etc. fall outside the boundaries of this watershed. Adjacent watersheds containing management activities include the Upper Mazarn Creek (approx 750 acres prescribed fire), Headwaters Caddo River (approx 27 acres CT) and Mill Creek-Caddo River (approx 23 acres CT) watersheds. Major stream systems which drain the project area include Collier Creek, Caddo River, Smokey Hollow Creek, Montgomery Creek and Wilson Creek. Collier Creek and Wilson Creek discharge into Mazarn Creek while the remaining discharge into the Caddo River. There are 59 wildlife and fishing ponds within the project area. The primary beneficial use of waters within the project area is native fisheries. Downstream beneficial uses (Caddo River) include serving as the public water supply for the communities of Amity, Norman and Glenwood, fisheries, recreation and hydroelectric power. Numerous groundwater sources have been identified within the Smith Mountain Watersheds project boundary. One notable developed source is Collier Springs located approximately 6 miles northeast of the city of Norman.

Analysis identified public surface water sources that flow through the Smith Mountain project are the Caddo River and its tributaries (including Collier Springs) that provide drinking water to municipalities within Glenwood Water Department. One ground water source, a well, is located within Crystal Campground, however does not provide drinking water. Additional ground water sources include an unknown number of privately owned water well. Alexa Spring Inc. has indicated a concern regarding proposed activities that may affect the water purity or quality. This bottling company is located on Owley Road which is one and one quarter mile from the project

area boundary and over two miles to the nearest proposed action (seed tree harvest with site prep burning). Additionally, the project area and Alexa Springs are separated by two mountains: Wheeler Mountain and Crystal Mountains. Impacts to this facility are highly improbable due to the distance and physical barriers. Additionally, public water sources will be notified of these proposed actions.

Section 303(d) of the Clean Water Act requires states to prepare a list of impaired surface waters. Category 5a (high priority) contains stream segments that are impaired and require Total Maximum Daily Load (TMDL) development. In Arkansas, there are 59 stream segments totaling approximately 1,010 stream miles listed in this category. Primary causes of impairment include: Silt, total dissolved solids, copper, pathogens, nitrates, zinc, chlorides, dissolved oxygen, total phosphorus, organic enrichment, temperature, aluminum, and lead. Some segments are impaired by more than one cause. There are no segments identified as 5a within or adjacent to the project area. Category 5c (low priority) contains stream segments where water quality data indicates impairment, but the data is questionable because of quality control/quality assurance issues. In Arkansas, there are 24 stream segments totaling approximately 310 stream miles listed in this category. The majority of these segments are listed due to some type of metals contamination. The Caddo River has been identified in the 2010 Arkansas State 303(d) list as having a classification of 5c. Approximately 17.5 miles of the Caddo River lie above the project area, 5.5 miles lie within the project area and 3.7 miles are below where it leaves the forest boundary. The three segments of the Caddo River list zinc and copper as the cause of impairment and resource extraction (i.e. mining; oil and gas extraction) as the source.

Water quality is the physical, chemical and biological purity of water. Forest management can impact water quality and stream systems in many ways. It is possible to limit the negative impacts of management activities on water quality by implementing projects with Best Management Practices (BMPs). BMPs are defined as "methods, measures, or practices selected by an agency to meet its nonpoint source control needs. BMPs include but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. "BMPs can be applied before, during and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters," (40 CFR 130.2, EPA Water Quality Standards Regulations). BMPs for the Ouachita NF are established in the Revised Forest Plan and the Arkansas State Best Management Practices. These will be implemented during management activities to minimize impacts to water quality.

There is a concern that management actions, namely timber harvest, temporary road construction, prescribed burning, use of herbicides, excessive use of OHV's and insufficient funding to complete road maintenance may cause a decrease in water quality. There is also the concern that prescribed burning will increase mercury levels in the environment. Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act apply to actions affecting waters of the United States. Both laws are administered by the U.S. Army Corps of Engineers (USACE). Nationwide Permits (NWP's) exist which allow work to be done if the conditions set forth in the permit are met, if pre-construction notification thresholds are not exceeded and if nationwide permit regional conditions are followed. Some actions are exempt from these permit requirements, i.e. "construction or maintenance of farm roads or forest roads, or temporary roads for moving mining equipment, where such roads are constructed and maintained, in accordance with best management practices…" The Arkansas Department of Environmental Quality (ADEQ) Water Division performs all state certifications under Section 401 and Section 402 of the Clean Water Act on behalf of the EPA. ADEQ requires permitting for all actions that may impact waters of the

state. Short Term Activity Authorization (STAA) must be obtained for any activity that may cause a violation the Arkansas Water Quality Standard (Reference ADEQ Regulation 2.305 Short Term Activity Authorization) The forest hydrologist will determine any permit requirements necessary and make all appropriate notifications.

Bounding the Effects Analysis

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

Local research has shown that the effects of increased sediment as a result of timber harvests are identifiable for up to 3 years (Miller Beasley and Lawson 1987). The timeframe of this model is bound by three years prior and one year following the implementation year. This captures the effects of other management activities that may still affect the project area. Proposed actions are constrained to a single year. This will express the maximum possible effect that could occur. This is consistent with most project level environmental analyses that have an operability of 5 years. 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.

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
The proposed soil disturbing activities and vegetative treatments in this project would not occur; therefore there would be no direct effects to water quality from Alternative A.

Indirect Effects:
Although proposed soil disturbing activities and vegetative treatments in this project would not occur, watershed improvement activities would also not take place. Roads, trails, and gravel pits identified as having active erosion would not be stabilized and would therefore allow for sediment to continue or increase.

Cumulative Effects:
Mercury is widely distributed naturally in the environment and originates from natural and human-induced (anthropogenic) sources, including combustion of coal and vegetation. Mercury evaporates from soils and surface waters to the atmosphere, is redeposited on land and surface water, and then is absorbed by soil or sediments. After redeposition on land and water, mercury is commonly volatilized (through burning, for example) back to the atmosphere as a gas or as adherents to particulates. Mercury exists in a number of inorganic and organic forms in water with methylmercury the most common.

Methylmercury is highly bioaccumulative, especially in aquatic food webs. Nearly 100 percent of the mercury that bioaccumulates in upper-trophic-level fish (predator) tissue is methylmercury (EPA, 2001). Cumulative effects from a potential wildfire include possible increases in methylmercury accumulations in fish. Bioaccumulation of mercury requires anaerobic decomposition by bacteria. Anaerobic conditions in which the bacteria could methylate the mercury are present in surface waters. Elemental mercury is available due to deposition as well as trace amounts from rock erosion (Standage, 2007). An

intense wildfire could release increased trace amounts from erosion, increased losses from heating of soils and increased levels through volatilization of deposited mercury on vegetation over those levels associated with a low intensity prescribed burn.

To determine cumulative impacts to water quality from sediment from management actions, the Aquatic Cumulative Effects model was used. It analyzes the past, present, and proposed activities for sediment yield. This model is described in the Introduction section of this Chapter under Analysis Tools.

Table 3.6 shows the sediment delivery from the current condition and Alternative A for each watershed in tons per year, and in percent increase over the average annual sediment delivered in an undisturbed watershed condition. Although no management activities are proposed under Alternative A, this sediment is attributed to present or committed activities that are already scheduled to occur within the watersheds on both public and private lands. The risk rating for this alternative is "moderate" indicating some adverse effects from sediment to aquatic beneficial uses. This risk assessment requires that in addition to the application of the Revised Forest Plan standards and Best Management Practices, that the streams be monitored to determine the health of the aquatic biota. Health would be determined based on the relative abundance population scores for that ecoregion. Watershed number 80401020203 identifies Collier Creek-Caddo River watershed primarily comprises the project area boundary. The Smith Mountain Resource Management project area falls within portions of watersheds Upper Mazarn Creek, Headwaters Caddo River and Mill Creek-Caddo River, but are not completely comprised of. Because watershed boundaries are not congruent with compartment or stand boundaries, some proposed actions such as commercial timber harvests, prescribed burning, associated fireline construction or re-construction, etc. fall outside the boundaries of the primary watersheds, the effects of these activities will be analyzed for the adjacent watershed that contained them when necessary. The risk associated with sediment delivery from activities that would occur under Alternative A would not change from the current condition.

SEDIMENT DELIVERY FROM "ALTERNATIVE A" BY WATERSHED (TABLE 3.6)

Watershed Name	6th level Watershed ID #	Sediment Delivery		Risk (Alternative A)	Risk (Alternative B & C)
		Tons Per Year	% Increase		
Collier Creek-Caddo River	80401020203	74.30	457	Moderate	Moderate
Upper Mazarn Creek*	80401010703	X	X	Moderate	X
Headwaters Caddo River*	80401020202	X	X	High	X
Mill Creek-Caddo River*	80401020205	X	X	High	X

* The project area is not completely comprised of these watersheds.
X- Activities within these watersheds are too small to show impacts at watershed basis

➢ Alternative B: Smith Mountain Resource Management Project – Direct, Indirect & Cumulative Effects

Direct Effects:
Direct effects of management activities proposed under Alternative B would result from the impacts of logging equipment and vehicles traversing stream crossings, fireline and road construction through streams, etc. These activities could place pollutants directly into a watercourse and result in direct sedimentation. While it is impractical to eliminate all soil from entering a stream, it is possible to limit the amount that directly enters streams by designing and implementing BMPs found within the Revised Forest Plan and Arkansas Forester's BMPs.

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

Forest monitoring, using a variety of techniques, has demonstrated the adverse effects of unrestricted OHV use on water quality and associated beneficial uses. Unrestricted use in the late 1990s found a large number of user-defined trails and high use levels had resulted in decreases in pool depth and pool volume and increased in percent fines and embeddedness. Trail closure and aggressive restoration demonstrated watershed recovery in 2002 (Clingenpeel, 2002).

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

Direct effects from prescribed burning include the volatilization of deposited mercury on vegetation and possible release of mercury from the 0 soil horizon. Based on what little data is available, it does appear that prescribed fire could have effects on mercury cycling and bioaccumulation in the aquatic food web (Kolka, 2008). The results of a study in Florida suggests that prescribed fires in the southeastern United States mainly re-emit atmospherically deposited mercury and that such re-emission is small relative to the United States Environmental Protection Agency 1997 inventory of US anthropogenic emissions (estimated prescribed fire re-emission in southeastern United States is about 0.09-0.2% of US anthropogenic emissions). This suggestion is further supported by the fact that most forests are subjected to low severity prescribed burns in which the 0 horizon is only partially consumed (Dicosty, et al, 2006).

Indirect Effects:
Indirect effects to water quality are those occurring at a later time or distance from the triggering management activity. Indirect effects are from management activities that do not have a direct connection to a stream course. Potential indirect effects from prescribed burning include increases in methylmercury levels in fish in surface waters. Indirect impacts to fish in surface waters are expected to be minor. The proposed prescribed burning is within acreage limits regularly occurring annually in the area over the last ten to fifteen years. Mercury depositions are expected to remain fairly constant over the period of the proposed action and increases in methylmercury are not anticipated. Since 1994,

measured mercury levels in fish at several locations on Lake Ouachita varied from 0.82ppm and 0.41ppm in 1994, to 0.20ppm and 0.37ppm in 2002, and to 0.51ppm and 0.59ppm in 2008. At present there are no mercury consumption warnings for fish from Lake Ouachita (ADEQ, 2009).

Ash from prescribed fire and nutrients leaching from logging slash are potential indirect sources from activities proposed under Alternative B. Timber harvest and fire can increase nutrients released to streams, with potentially positive or negative effects. Research studies in the Ouachita Mountains have shown increases in concentrations of some nutrients following timber harvest, but increases are generally small and short-lived, particularly where partial harvest are done. (Oklahoma Cooperative Extension Service, OCES, 1994). Nutrient leaching is expected to be small under Alternative B. No stream or lake eutrophication is expected. Small increases in nutrient concentrations may have a beneficial effect on these typically nutrient-poor stream systems. Van Lear and others (1985) examined soil and nutrient export in ephemeral streamflow after three low-intensity prescribed fires prior to harvest in the Upper Piedmont of South Carolina. Minor increases in stormflow and sediment concentrations in the water were identified after low-intensity prescribed fires. It was suggested that erosion and sedimentation from plowed fire lines accounted for the majority of sediment from all watersheds.

Forest monitoring has demonstrated that indirect effects from vegetation manipulation from harvest or stand improvement with buffers did not have a significant effect on water quality (Clingenpeel,1989). The effect of nutrients released to streams as a result of management activities is an indirect effect. Beasley, Miller and Lawson (1987) showed a statistically significant increase in nutrient concentrations of orthophosphorus, potassium and calcium for only the first year after clearcutting. There was no effect from selection harvesting. Because of the short period of increases (one year) and the dilution of untreated areas, there is no significant impact to water quality. The management activities wildlife opening construction, road construction, fireline construction, timber harvest (construction of skid trails and log landings, and logging equipment traversing stream crossings) would result in exposed soil or soil disturbance. These activities would result in some erosion, increasing sedimentation. The projected sediment delivery to streams due to harvesting, site preparation, and erosion of forest roads in the Ouachita is about 0.070 tons per acre per year (OCES, 1994).

Based on the results of these research and monitoring efforts and the mandatory implementation of BMP's an adverse direct or indirect effect resulting from these proposed management actions is unlikely. Stream channels in the area are capable of withstanding small increases in flow.

Alternative B proposes the use of the herbicides triclopyr and imazapyr, fluroxpyr, imazapic, mutsulfuron methyl, clopyralid and/or glyphosate for site preparation, release and for the control of non-native invasive species. The control of terrestrial vegetation using herbicides within MA-9 for the control of non-native invasive species would only be with an appropriately labeled formulation for both aquatic and terrestrial site use. When herbicides are applied, there is a risk that the chemical could move offsite, possibly entering streams, ponds, lakes, or infiltrate ground water by vertical seepage into aquifers. The Forest Service has specific regulations for the use and application of herbicides, and the Ouachita NF adheres to additional design criteria for herbicide application in the Revised Forest Plan. When all BMPs or regulations are implemented, there should be no significant movement of herbicide offsite. The introduction of herbicides into the water is treated as an indirect effect since standards and guidelines (BMPs) do not permit direct application for silvicultural purposes. Herbicide monitoring

across the Forest has found only trace amounts of herbicide have ever been detected in streams (Ouachita National Forest, 1993).

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

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

Based on the results of these research and monitoring efforts and the mandatory implementation of BMP's an adverse direct or indirect effect resulting from these proposed management actions is unlikely.

Cumulative Effects:
In 1989, the Forest began a long-term monitoring effort to determine cumulative effects from silvicultural activities using paired watersheds and Basin Area Stream Survey methods (Clingenpeel and Cochran, 1992). Results found that examining all physical, chemical and biological characteristics, no single factor was indicative of adverse cumulative effects resulting from silvicultural activities (Ouachita National Forest, 1994, Williams et. al, 2001, Williams et. al, 2002, Williams et. al, 2003).

In addition, the Forest developed a model to estimate sediment yields and analyze the cumulative effects of proposed management actions on water quality (USDA Forest Service, Ouachita National Forest, 1990). This early process, and several updates, provided a process to systematically evaluate water quality conditions for watersheds covered in whole or part by forest activities. However, this early process required a considerable amount of data preparation and did not adequately address road interactions and determination of the current watershed condition with respect to risk to fisheries.

The recent version is considerably different. GIS databases have been analyzed and land use, slope, and road data have been summarized by 6th level watersheds. New road and trail sediment coefficients have been developed and a range of risk levels for fish communities have been established by ecoregion sections.

A cumulative effects analysis needs to address pollutants resulting from management activities. Typical activities on the forest include timber harvest, site preparation, road construction and maintenance, and recreation. Monitoring efforts have demonstrated that, with proper implementation of forest standards and state best management practices, 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. Pollutants associated with forest management activities (timber harvest, site preparation, road construction and maintenance, and recreation) may include increased 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 the increase in water yield is less than the natural variability. Miller, Beasley and Covert (1985) could not identify increases in peak flow as a result of timber harvest and site preparation, and could only determine significant increases in summer baseflow.

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.

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.

The potential impacts from a wildfire also include increased mercury release of stored mercury and later deposition. Nearly 100% of mercury stored in plant-derived fuels is emitted to the atmosphere with 85% of that emitted as elemental mercury and particulate mercury accounting for the remainder. Intense wildfires consume much more fuel than moderate to low intensity prescribed burns resulting in more mercury emissions. Newly released elemental mercury enters the global 1 cycle whereas the remaining 15% that is emitted as particulate mercury has the potential to be re-deposited locally during a fire event. Soils are also sources of mercury during fires. Studies indicate that upper soil layers experience significant decreases in mercury following fire (Kolka, 2008). The more severe the fire, the more mercury is released from the soil and more mercury is released from depositions on vegetation since more fuels are consumed.

Changes in land use and other disturbances can be modeled with respect to estimated increases in sediment. This model 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.

To determine cumulative impacts to water quality and fisheries from sediment from management actions, the Aquatic Cumulative Effects model was used. It analyzes the past, present, and proposed activities for sediment yield. The Aquatic Cumulative Effects model is referenced above and is described in the Introduction section of this Chapter under Analysis Tools.

Table 3.7 shows the sediment delivery from the current condition and Alternative B for each watershed in tons per year, and in percent increase over the annual sediment delivered in an undisturbed watershed condition. These levels of sediment increase would decline in subsequent years. The risk rating for this alternative is “moderate” indicating some adverse effects from sediment increases to aquatic beneficial

uses. This risk assessment requires that in addition to the application of the Revised Forest Plan standards and Best Management Practices, that the streams be monitored to determine the health of the aquatic biota. Health would be determined based on the relative abundance population scores for that ecoregion. Because some proposed actions such as harvest, prescribed burning and associated fireline construction or re-construction fall outside the boundaries of this watershed, the effects of these activities will be analyzed for the adjacent watershed that contained them when necessary. The risk associated with sediment delivery from activities that would occur under Alternative B would not change from the current condition.

SEDIMENT DELIVERY FROM "ALTERNATIVE B" BY WATERSHED (TABLE 3.7)

Watershed Name	6th level Watershed ID #	Sediment Delivery		Risk (Current Condition)	Risk (Alternative B)
		Tons Per Year	% Increase		
Collier Creek-Caddo River	80401020203	1258.42	547	Moderate	Moderate
Upper Mazarn Creek*	80401010703	X	X	Moderate	X
Headwaters Caddo River*	80401020202	X	X	High	X
Mill Creek-Caddo River*	80401020205	X	X	High	X

* The project area is not completely comprised of these watersheds.
X- Activities within these watersheds are too small to show impacts at watershed basis

- Alternative C: No Herbicide Use - Direct, Indirect & Cumulative Effects

Direct Effects:
Direct effects of management activities proposed under Alternative C would be the same to those under Alternative B with the exception that no herbicides would be used. Harvest activities, road construction, fireline construction, prescribed burns, etc would all occur under this alternative. Site preparation activities would not use herbicides under this alternative; however, there is still a need to create an adequate seedbed for natural regeneration to occur. Under this alternative, all site preparation activities would use manual or mechanical means to prepare the seedbed for natural regeneration. These activities could cause soil disturbance and may increase sedimentation. Non-native, invasive species control would not utilize herbicides under this alternative as well. Manual means to control and eliminate these species would be employed. This could involve cutting down the vegetation, burning in the form of fuel reduction burns, or manually pulling the vegetation from the ground. Because these species have a high propensity to sprout, manual methods to control these species are not always successful or cost effective.

Indirect Effects:
Indirect effects to water quality are those occurring at a later time or distance from the triggering management activity. Indirect effects are from management activities that do not have a direct connection to a stream course.

Potential indirect effects from prescribed burning include increases in methylmercury levels in fish in surface waters. Indirect impacts to fish in surface waters are expected to be minor. The proposed prescribed burning is within acreage limits regularly occurring annually in the area over the last ten to fifteen years. Mercury depositions are expected to remain fairly constant over the period of the proposed action and increases in methylmercury are not anticipated. Since 1994, measured mercury levels in fish at several locations on Lake Ouachita varied from 0.82ppm and 0.41ppm in 1994, to 0.20ppm and 0.37ppm in 2002, and to 0.51ppm and 0.59ppm in 2008. At present there are no mercury consumption warnings for fish from Lake Ouachita (ADEQ, 2009).

Ash from prescribed fire and nutrients leaching from logging slash are potential indirect sources from activities proposed under Alternative C. Timber harvest and fire can increase nutrients released to streams, with potentially positive or negative effects. Research studies in the Ouachita Mountains have shown increases in concentrations of some nutrients following timber harvest, but increases are generally small and short-lived, particularly where partial harvest are done (OCES, 1994). Nutrient leaching is expected to be small under Alternative C. No stream or lake eutrophication is expected. Small increases in nutrient concentrations may have a beneficial effect on these typically nutrient-poor stream systems.

Increases in water yield are generally proportional to decreases in vegetative cover. Because vegetative cover would to some extent decrease under Alternative C, water yield increases are expected to be small (OCES, 1994). Stream channels in the area are capable of withstanding small increases in flow.

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

The management activities wildlife opening construction, road construction, fireline construction, timber harvest (construction of skid trails and log landings, and logging equipment traversing stream crossings) would result in exposed soil or soil disturbance. These activities would result in some erosion, increasing sedimentation. The projected sediment delivery to streams due to harvesting, site preparation, and erosion of forest roads in the Ouachita is about 0.070 tons per acre per year (OCES, 1994).

Based on the results of these research and monitoring efforts and the mandatory implementation of BMP’s an adverse direct or indirect effect resulting from these proposed management actions is unlikely. Stream channels in the area are capable of withstanding small increases in flow.

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

Based on the results of these research and monitoring efforts and the mandatory implementation of BMP's an adverse direct or indirect effect resulting from these proposed management actions is unlikely.

Cumulative Effects:
The background and description of the cumulative effects process for Alternative C is the same as that described in Alternative B. The cumulative effects under this alternative are the same as those listed under Alternative B. Harvest activities, road construction, fireline construction, prescribed burns, etc would all occur under this alternative. Site preparation activities would not use herbicides under this alternative; however, there is still a need to create an adequate seedbed for natural regeneration to occur. Under this alternative, all site preparation activities would use manual or mechanical means to prepare the seedbed for natural regeneration. These activities could cause soil disturbance and may increase sedimentation. Non-native, invasive species control would not utilize herbicides under this alternative as well. Manual means to control and eliminate these species would be employed. This could involve cutting down the vegetation, burning in the form of fuel reduction burns, or manually pulling the vegetation from the ground. Because these species have a high propensity to sprout, manual methods to control these species are not always successful or cost effective.

To determine cumulative impacts to water quality and fisheries from sediment from management actions, the Aquatic Cumulative Effects model was used. It analyzes the past, present, and proposed activities for sediment yield. The Aquatic Cumulative Effects model is described in the Introduction section of this Chapter under Analysis Tools.

Table 3.8 shows the sediment delivery from the current condition and Alternative C for each watershed in tons per year, and in percent increase over the annual sediment delivered in an undisturbed watershed condition. These levels of sediment increase would decline in subsequent years. The risk rating for this alternative is "moderate" indicating some adverse effects from sediment increases to aquatic beneficial uses. This risk assessment requires that in addition to the application of the Revised Forest Plan standards and Best Management Practices, that the streams be monitored to determine the health of the aquatic biota. Health would be determined based on the relative abundance population scores for that ecoregion. Because some proposed actions such as commercial timber harvest, prescribed burning and associated fireline construction or re-construction fall outside the boundaries of this watershed, the effects of these activities were analyzed for the adjacent watershed that contained them. The risk associated with sediment delivery from activities that would occur under Alternative C would not change from the current condition.

SEDIMENT DELIVERY FROM "ALTERNATIVE C" BY WATERSHED (TABLE 3.8)

Watershed Name	6th level Watershed ID #	Sediment Delivery		Risk (Current Condition)	Risk (Alternative C)
		Tons Per Year	% Increase		
Collier Creek-Caddo River	80401020203	1,258	547	Moderate	Moderate
Upper Mazarn Creek*	80401010703	X	X	Moderate	X
Headwaters Caddo River*	80401020202	X	X	High	X
Mill Creek-Caddo River*	80401020205	X	X	High	X

* The project area is not completely comprised of these watersheds.
X - Activities within these watersheds are too small to show impacts at watershed basis

Riparian Areas and Floodplains

Present Conditions

There are 3316 acres of riparian areas within the project area. Soil units identified as 100-year floodplains comprise 2754 acres. These floodplains are located along the perennial stream courses. All or part of a floodplain may be included as part of the stream's riparian area.

There is a concern that the management actions of timber harvest, prescribed burning, temporary road construction, and fireline construction may cause damage to floodplains and riparian areas within the project area.

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
No activities are proposed under Alternative A, therefore there would be no direct effects to riparian areas.

Indirect Effects:
No indirect effects are expected under Alternative A to riparian areas.

Cumulative Effects:
No cumulative effects are expected under Alternative A to riparian areas.

- Alternative B: Smith Mountain Watersheds Resource Management Project – Direct, Indirect & Cumulative Effects

Direct Effects:
Riparian areas are protected by implementation of stream side management areas (SMAs). SMAs include at a minimum the first 100 feet adjacent to perennial drainages and water bodies greater than ½

acre and the first 30 feet adjacent to other defined drainages and ponds less than ½ acre. Log loading areas and wheeled or crawler vehicles outside of designated crossings are not permitted within SMAs. The use of temporary roads and skid trails would impact riparian areas at designated crossings, as well as construction of firelines for prescribed burns. These effects would be minimized by adhering to Revised Forest Plan Design Criteria (9.20-9.24). Additional protection measures for SMA's are outlined on pg 104 of the RFLP.

Only limited use of aquatic labeled herbicides for terrestrial vegetation control of invasive plant species would be permitted within riparian areas. When treating invasive plant species within riparian areas, only direct foliar application or cut and spray methods are to be utilized.

Only low intensity backing fires would be utilized in riparian areas and floodplains. This type of fire typically consumes only the dry surface fuels. It does not consume the duff layer, damage the mineral soil, or kill overstory vegetation.

Timber harvest is proposed on approximately 288 acres of soil units identified as 100-year floodplains. Most 100-year flood plains are located within stream side management areas; however due to elevation some soil units identified as 100-year floodplains are located outside of the stream side management areas. By adhering to Revised Forest Plan Design Criteria, no direct effects to floodplain function are expected.

Indirect Effects:
By adhering to Revised Forest Plan Design Criteria, no indirect effects to floodplain function are expected. This is supported from monitoring results and modeling efforts discussed under the Soils section, pages 35 and 42-47.

Cumulative Effects:
By adhering to Revised Forest Plan Design Criteria, no cumulative effects to floodplain function are expected. This is supported from monitoring results and modeling efforts discussed under the Soils section, pages 35 and 42-47.

- Alternative C: No Herbicide Use - Direct, Indirect & Cumulative Effects

The impacts from this alternative would be the same as those described for Alternative B with the exception of no herbicide would be used in riparian areas.

Wildfire Hazards and Fuels Accumulation

Present Conditions

Site specific fuel loads for the Smith Mountain Project area have not been determined, however, based on site observations and lack of fire history, it has been determined that the areas selected for prescribed burning do not meet the desired conditions of the Forest Plan. The main community types on the ONF are Ozark-Ouachita shortleaf pine-oak forest, Ozark-Ouachita dry-mesic oak forest and Ozark-Ouachita shortleaf pine-bluestem woodland (LANDFIRE 2010), henceforth referred to as pine-oak forest, oak forest, and pine woodland, respectively. LANDFIRE's Existing Vegetation Type (EVT) layer for the Continental US (LANDFIRE 2010) was used to select transect locations within planned burn units in 2010 and 2011. Forty Brown's transects were

established within each community type throughout the forest for a total of 120 transects. Each transect was 50 feet long, permanently marked with rebar at each end and followed Brown's protocol (Brown 1974). A ten factor prism was used to obtain basal area and species composition of trees at the origin of each transect. The plot design was developed to measure fuel consumption on prescribed fires on the Ouachita National Forest of Arkansas in 2010. These plots were established to measure pre and post burn fuel loads. Fuels tallied were unattached (dead and down) woody fuel that bisects the transect line. Current average fuel loads for the forest are 9.5 – 14.6 tons/acre (Average of 12.0 tons/acre).

February through April and July through August are the times of the year with the highest percentage of wildfires. The months of September through December have a slightly lower percentage of fires. The forest as a whole experiences an average of 120 to 150 fires per year, burning an average 3,000 acres per year. Nearly 80 percent of the fires are controlled at less than 10 acres, and less than 3 percent exceed 100 acres (Caffin, Robertson, Miller, 2001). Historically, large fires have occurred when the wind was blowing out of the south, with a majority of the large fires spreading to the northwest. There have been no prescribed burns conducted within the project area over the past five years. There is a concern that management actions such as timber harvest, pre-commercial thinning, and site preparation may cause an increase in the accumulation of fuels and result in an increased risk from wildfire.

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
Under Alternative A, no management actions that would produce slash, such as timber harvest, pre-commercial thinning, and site preparation would occur. Some increased accumulation of fuels would occur naturally. However, there would be no increase in accumulation of fuels from the proposed management activities.

Indirect Effects:
There are no indirect effects of Alternative A specific to management activities increasing fuel loading, thus increasing the risks from wildfire.

Cumulative Effects:
There are no cumulative effects of Alternative A specific to management activities increasing fuel loading, thus increasing the risks from wildfire.

- Alternative B: Smith Mountain Watersheds Resource Management Project - Direct, Indirect & Cumulative Effects

Direct Effects:
Under Alternative B, slash would be produced from timber harvests, wildlife stand improvements, pre-commercial thinning and site preparation activities. This slash would add to the fuel loading within the project area.

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

A summary of the type and size of slash that would result from the other activities listed below.

FUEL LOADING PRODUCED BY ALTERNATIVE B (TABLE 3.9)

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

In addition to slash, the site preparation activities and release activities proposed in Alternative B would result in an increase of standing dead fuels. These fuels would act as ladder fuels in the presence of fire, and could facilitate crown fires.

Indirect Effects:
As a result of management activities slash, woody debris and standing dead fuels could accumulate and increase fuel loading across the project area. The increased fuel loading and presence of ladder fuels could increase wildfire activity.

Cumulative Effects:
As a result of management activities, slash, woody debris and standing dead fuels could accumulate and increase fuel loading across the project area. However, proposed fuel reduction and site preparation burns would reduce the increased fuel loading resulting from management actions where they occur.

- Alternative C: No Herbicide Use - Direct, Indirect & Cumulative Effects

The effects of Alternative C would be the same as those listed under Alternative B above.

Effects of Prescribed Fire on Fuels and Wildfire Hazard

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
Under Alternative A, no prescribed burning would be proposed in the project area. Therefore, no reduction in fuel loading would occur from this Alternative.

Indirect Effects:
In the absence of prescribed fire, the fine fuels, small, and large fuels would continue to accumulate on the forest floor. In the event of a wildfire, fuel loading would be higher, increasing the risks of damage to natural resources and property from wildfires.

Cumulative Effects:
The perpetuation of no prescribed burning over time would allow fuels to accumulate, and through time the risks of damage from wildfires would continue to escalate.

- Alternative B: Smith Mountain Resource Management Project -Direct, Indirect & Cumulative Effects

Direct Effects:
Due to the parameters under which prescribed burns are implemented, the burns prescribed under Alternative B are expected to consume the 1-hour and 10 hour lag fuel moisture size class fuels. Little to no consumption is expected for larger fuel classes. If the objectives of the prescribed burning were met, fuel loading would be reduced by 3 to 4.25 tons per acre. It could be expected that prescribed burning in the project area would reduce fuels within this range.

Indirect Effects:
In the event of a wildfire, the reduction of fuel loading resulting from prescribed burning would reduce the risk of damage to resources and property.

Cumulative Effects:
Alternative B proposes to prescribe burn approximately 9,500 acres at 3-7 year intervals. This schedule of burning would maintain a level of fuel reduction through time and therefore reduce the risk of wildfire's damage to resources. With reduction of fuel loads, wildfires will be easier to control, thus reducing the risk to private property.

- Alternative C: No Herbicide Use - Direct, Indirect & Cumulative Effects

The effects of Alternative C would be the same as those listed under Alternative B above.

Transportation & Infrastructure

Present Conditions

National Transportation Management Rule (36 CFR 212, Subpart B, Designation of Roads, Trails, and Areas for Motor Vehicle Use) - The Federal Register Notice (73 FR 74689) for the final travel management directives was published on December 9, 2008. The directives became effective January 8, 2009. The highlights of that rule are as listed:

- The rule requires each national forest or ranger district to designate those roads, trails, and areas open to motor vehicles.
- Designation will include class of vehicle and, if appropriate, time of year for motor vehicle use. A given route, for example, could be designated for use by motorcycles, OHVs, or street-legal vehicles.
- Once designation is complete, the rule will prohibit motor vehicle use off the designated system or inconsistent with the designations.
- Designation decisions will be made locally with public input and in coordination with state, local and tribal governments.
- Designations will be shown on a motor vehicle use map. Use inconsistent with the designations will be prohibited.

The National Travel Management Rule (Travel Rule) requires that public motor vehicle use be confined to designated roads, trails, areas and camping or game retrieval corridors. Cross-country travel inconsistent with these designations is not allowed. On January 4, 2010, a *Decision Notice and Finding of No Significant Impact* was signed by the Forest Supervisor to implement the Travel Management Project on the Ouachita National Forest (USDA FS 2010). These areas are identified on the Motorized Vehicle Use Map (MVUM) and can be obtained at any District Ranger office. Any changes to the travel status of roads must be analyzed and approved with appropriate environmental documentation.

As a response to this rule and increasing evidence of resource damage from motorized use, the Ouachita National Forest has designated where motorized vehicles, including street legal vehicles and a wide variety of off-highway vehicles (OHVs) can be legally operated. Appendix D shows a table of current status and proposed status for roads within the Smith Mountain Project Area. Maps indicating the current and proposed road status can be found in Appendix F.

The Smith Mountain Resource Management project area is located approximately 4 miles south of Mount Ida, Arkansas in Montgomery County. Main access into the project area is supplied by County Roads 26 (Liberty Rd), FS208 (Smokey Hollow Rd), State Highway 27 and State Highway 8.

The Smith Mountain Resource Management project area is primarily comprised of the Collier Creek-Caddo River Huc-6 level watersheds and encompasses approximately 25,597 acres of privately owned and Forest Service lands. Approximately 75.7 miles of roads are open (either yearlong or seasonally) and 25.4 miles are closed throughout the project area. Open Road Density (ORD) is calculated by converting the acres within the project area into square miles (total acres/640 acres) and then dividing that figure into the linear measure of open roads within the project area. Any open road, regardless of jurisdiction, contributes to a project areas open road density. The ORD for the Smith Mountain project area is currently 1.9 miles per square mile. Many of the open roads within the project area are under county or state jurisdiction and cannot be closed because they serve as important travel ways for people and goods. This limits the opportunity for road management on Forest Service lands and hinders the ability to reduce ORD. Appendix D outlines all current and proposed changes to the travel management plan.

The principle resources served by the roads within the project area are access to private residences/lands, recreation and timber management. The road system is used primarily by private residences and hunters. Other user includes OHV riders and those driving for pleasure.

There is a concern that management actions may require permanent access through road construction and/or reconstruction and management actions may result in the closure of open roads that provide access for recreational activities. The open road density of the project area exceeds the Revised Forest Plan objectives of .75 mile per square mile for MA 17.

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

<u>Direct Effects:</u>
No activities are proposed under Alternative A, therefore there would be no direct effects to access within the project area, and there would be no direct effects to the open road density. Open Road Density would remain unchanged.

Indirect Effects:
No activities are proposed under Alternative A, therefore there would be no indirect effects to access within the project area, and there would be no indirect effects to the open road density. Open Road Density would remain unchanged.

Cumulative Effects:
No activities are proposed under Alternative A, therefore there would be no cumulative effects to access within the project area, and there would be no cumulative effects to the open road density. Open Road Density would remain unchanged.

- Alternative B: Smith Mountain Resource Management Project –Direct, Indirect & Cumulative Effects

Direct Effects:
Alternative B would result in approximately 72.7 miles of open system (either yearlong or seasonally) roads and 31.5 miles of closed roads, of which includes the addition of.58 miles of special use roads (two segments). These two roads would be designated as closed with access only by special use permit and named W50 and W50A. Three roads were incorrectly mapped on the MVUM and will be corrected when the new one is published. (1) Road C39D actually begins at C39 instead of 208 and is approximately .1 mile long. (2) Road C54 actually terminates .1 of a mile north of Road 208. (3) C54A is actually .9 of a mile, begins at Road 208 and ends on private. See maps in Appendix F.

After this decision, approximately 3.7 miles will change from open to closed, .7 miles will change from closed to open and .58 miles not previously designated on the MVUM map but are present on the ground would be added (designated as closed), resulting in ORD of 1.82 miles per square mile.

The management activities proposed would require approximately 14 miles of pre-haul road maintenance, 8 miles of system road reconstruction, and 8 miles of temporary road construction in order to meet resource management needs, protect environmental resources and provide for reasonable and safe access. These numbers are based on worse case scenarios and not all roads may be built or reconstructed. See Proposed Harvest Area map in Appendix F.

Indirect Effects:
Restricting access could result in an increase in illegal road use by OHV riders, or increase OHV use in other parts of the district. Additionally, a reduction in dumping along closed roads may occur.

Cumulative Effects:
Restricting access could result in an increase in illegal road use by OHV riders, or increase OHV use in other parts of the district. Open road density would increase by .31 miles per square mile.

- Alternative C: No Herbicide Use - Direct, Indirect & Cumulative Effects

The effects of Alternative C would be the same as those listed under Alternative B above.

Vegetation

Present Conditions

The Smith Mountain Resource Management project area is comprised of approximately 25,597 acres of Forest Service and private lands. Approximately 15,061 acres are federally (Forest Service) owned lands and the remaining 10,536 acres are owned by various private or non-federal entities. Of the 15,061 acres of Forest Service lands pine forest types total 8,162 acres or 53.5% of the area, pine/hardwood forest types total 1455 acres or 9.5% of the area. Hardwood forest types total 4,731 acres or 31% of the area, and hardwood/pine forest types total 879 acres or 5.8% of the remaining area. Forest Service lands are classified as suitable or unsuitable for timber production. Within the project area approximately 8,549 acres are classified as unsuitable for timber production due to excessive slope, lack of access, or poor site conditions. The remaining 6,747 acres are suitable for timber production. Approximately 235 acres actually fall outside the watershed boundary but were included in harvest plans to maintain the integrity of the stand, creating a discrepancy when comparing total acres. There are approximately 218 acres or 3.2% of early seral or seedling/sapling habitat, which are calculated using only suitable lands. Calculating all land (suitable and unsuitable) within the project area, the largest age class is the 81-90 years, at 37%; 76% of the area is older than 70 years of age. Less than two percent of the area is in the 0-10 year age class. There are 647 acres (4.2%) of mature growth hardwood types (older than 100 years), and 3,177 acres (21%) of mature growth pine types (older than 80 years) in the project area. These numbers are depicted in the table below.

FOREST TYPE BY AGE CLASS (TABLE 3.10)

Age Class			Forest Type[1]											
			Pine			Pine-Hardwood			Hardwood-Pine			Hardwood		
Years	Acres*	% of Total	Acres*	% of Type	% of Total	Acres*	% of Type	% of Total	Acres*	% of Type	% of Total	Acres*	% of Type	% of Total
0-10	201	1.3	201	100	1.3									
11-20	653	4.3	598	92	3.9				27	4.1	.12	28	4.3	.18
21-30	1,244	8.2	1,226	99	8							18	2.8	.12
31-40	863	5.7	683	79	4.5	124	14.4	.8				56	6.5	.37
41-50	131	.9	100	76	.5	31	23.7	.2						
51-60	103	.7	88	85	.6							15	14.6	.1
61-70	380	2.5	176	46	1.2	14	3.7	.09	157	41.3	1.0	33	8.7	.22
71-80	3,331	22	1,913	57	12.5	174	5.2	1.1	141	4.2	.9	1,103	33.1	7.2
81-90	5,589	37	2,265	41	14.9	611	10.9	4	400	7.2	2.6	2,313	41.4	15.2
91-100	1,710	11.2	580	34	3.8	477	27.9	3.1	135	7.9	.9	518	30.3	3.4
101-110	599	3.9	137	23	.9				19	3.2	.12	443	74	2.9
111-120	48	.3	48	100	.3									
120+	375	2.5	147	39	1	24	6.4	.16				204	54.4	1.3
Admin	23	.2												
Total	15,250**		8,162		53.5	1,455		9.5	879		5.8	4,731		31

1 - Pine: At least 70% of the dominant and co-dominant crowns are softwoods
Pine/Hardwood: 51-69% of the dominant and co-dominant crowns are softwoods
Hardwood/Pine: 51-69% of the dominant and co-dominant crowns are hardwoods
Hardwood: At least 70% of the dominant and co-dominant crowns are hardwoods
* Acres are total stand acres, not treated acres. Treated acres to be determined on site and will be fewer
**Total acres differ from total project because some stand boundaries fall outside watershed boundary

Hardwood stands, primarily oak-hickory, generally occur on north-facing slopes of greater than 35% slope, and streamside zones. Midstory and understory associates on north aspects include flowering dogwood, red maple, eastern hophornbeam, sweetgum and blackgum. Species found on slopes less than 35% on north aspects are flowering dogwood, vacciniums, rusty blackhaw and witch hazel.

Pines usually dominate southern aspects. Midstory and understory associates include oaks and hickories, flowering dogwood, blackgum, and vacciniums. Species often found on ridge tops include grasses, forbs, serviceberry, eastern redcedar, blackjack oak and hickories.

Non-Native Invasive Species (NNIS). An invasive species is identified as "[a] species that can move into an area and become dominant either numerically or in terms of cover, resource use, or other ecological impacts. An invasive species may be native or non-native" (USDA-Forest Service 2005a p. 132; USDA-Forest Service 2005b p. 172). Several non-native invasive plant species have been identified throughout the Project Area. These species include, but are not limited, to Chinese privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), Mimosa (*Albizia julibrissin*), Autumn olive (*Elaeagnus umbellata*) and Multiflora rose (*Rosa multiflora*).

Traditional methods of controlling nuisance NNIS vegetation within and surrounding ponds have proven unsuccessful or impracticable. With Forest Supervisor approval, the use of approved aquatic labeled herbicides would be used to control invasive or nuisance aquatic vegetation.

Effects of Management Activities on Early Seral Habitat

There is a lack of early seral habitat within the watershed. Forest health and stand vigor is declining or at risk due to advanced stand age and overcrowded or densely stocked stands.

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
Alternative A proposes no management activities that would result in the creation of additional early seral habitat within the watershed. No direct effects on forest health and stand vigor would occur. The only early seral habitat existing would be powerline and road ROW's.

Indirect Effects:
In the absence of fire or other vegetation management activity, trees would grow in and grow up and shade out shrubs, forbs and grasses and reduce their quantities. In the absence of management activities such as thinning and regeneration harvests, forest health would be at risk due to increased potential for pest infestations such as the Southern pine beetle.

Cumulative Effects:
As discussed in the indirect effects section, there is a potential for trees to grow in. Over time, with no implementation of vegetation management, the amount of trees would increase, and the area of land in early seral habitat would decrease from the current 3.2% to less than 1%. Forest health and stand vigor would continue to decline.

- Alternative B: Smith Mountain Resource Management Project –Direct, Indirect & Cumulative Effects

Direct Effects:
The amount of early seral habitat within the watershed of suitable acres would increase by approximately 670 acres (from less than 3% to 10% through the year 2020) through regeneration harvests, wildlife stand improvements and wildlife opening maintenance.

Under Alternative B, diseased, damaged and suppressed trees would be removed through commercial thinning activities on approximately 2,321 acres of pine stands. This would have an immediate positive effect on the health of these stands. Activities such as woodland stand development (642 acres), and overstory mast development (434 acres) would also result in reduced basal areas and improved stand health. Dormant season, low intensity prescribed burning top-kills woody stems of three inches and less. This would hinder the in-growth of trees and maintain existing early seral habitat. Grass production should increase during the first year after a dormant season burn.

Indirect Effects:
By reducing stand densities through thinning, stand vigor would improve.

Cumulative Effects:
With repeated prescribed burning, existing early seral habitat would be retained over time. Forest pests usually attack older, weaker trees, and are less damaging to trees that are growing vigorously. Increased stand vigor would result in increased resistance to forest pests such as Southern pine beetle.

- Alternative C: No Herbicide Use - Direct, Indirect & Cumulative Effects

The effects of Alternative C would be the same as those listed under Alternative B above.

Effects of Management Activities on Age Class Diversity

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
No activities are proposed under Alternative A, therefore there would be no change to age class structure within the project area, except the current age structure would naturally shift from 0-10 year-old would become 11-20, etc. over time.

Indirect Effects:

No activities are proposed under Alternative A, therefore there would be no change to age class structure within the project area, and no indirect effects age class diversity.

Cumulative Effects:
In the absence of natural disturbance, through time the current age classes would retain the same distribution in relation to one another, but the distribution would be increasingly skewed to the older age classes.

- Alternative B: Smith Mountain Resource Management Project -Direct, Indirect & Cumulative Effects

Direct Effects:
Approximately 136 acres of the 71-80 year age class of pine, 286 acres of the 81-90 year age class of pine and 48 acres of the 91-100 year age class of pine would shift to the 0-10 year age class through even-aged regeneration harvests. Sixteen acres of 0-10 year age class pine and hardwood forest types would be maintained through wildlife opening maintenance activities and four 1-acre openings created.

Indirect Effects:
No indirect effects to age class diversity would occur.

Cumulative Effects:
No cumulative effects to age class diversity would result from Alternative B because there are no other past, present, or foreseeable future actions within the analysis area that would affect age class diversity.

- Alternative C: No Herbicide Use - Direct, Indirect & Cumulative Effects

The effects of Alternative C would be the same as those listed under Alternative B above.

Effects of Management Activities on Mature Growth

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
No management activities would occur under Alternative A, therefore no direct effects on mature growth would occur.

Indirect Effects:
No management activities would occur under Alternative A, therefore no indirect effects on mature growth would occur.

Cumulative Effects:
In the absence of natural disturbance or active management, the forest would continue to age, moving more pine and hardwood acreage into mature growth.

- Alternative B: Smith Mountain Resource Management Project -Direct, Indirect & Cumulative Effects

Direct Effects:
Approximately 711 acres of even-aged regeneration harvest is proposed in mature pine or pine – hardwood forest types (older than 80 years). This would reduce the existing mature growth acreage in pine and pine/hardwood types by 13%, from 45% to 32%. This exceeds the Revised Forests Plan design criteria of 5% of mature growth habitats over the project area.

Indirect Effects:
Mature growth would temporarily be reduced on the 711 acres of even-aged regeneration harvests.

Cumulative Effects:
There would be no cumulative effects to mature growth from Alternative B. Over time, the forest would continue to age, moving more acreage into mature growth. The residual mature growth pine habitat exceeds the Revised Forests Plan design criteria of 5% of mature growth habitats over the project area.

- Alternative C: No Herbicide Use - Direct, Indirect & Cumulative Effects

The effects of Alternative C would be the same as those listed under Alternative B above.

Effects of Management Activities on Retention and Recruitment of Hardwoods

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
No management activities would occur under Alternative A, therefore no direct effects on the retention and recruitment of hardwoods would occur.

Indirect Effects:
No management activities would occur under Alternative A, therefore no indirect effects on the retention and recruitment of hardwoods would occur.

Cumulative Effects:
No management activities would occur under Alternative A, therefore no cumulative effects on the retention and recruitment of hardwoods would occur.

- Alternative B: Smith Mountain Resource Management Project -Direct, Indirect & Cumulative Effects

Direct Effects:
No harvest is proposed in hardwood or hardwood-pine management types. Stands proposed for harvest are pine or pine-hardwood management types. During the regeneration of pine stands, the hardwood sprout/seedling component objective is 10 to 30 percent of stems in hardwoods, primarily oaks and hickories (RLRMP, FR003, p.80). A minimum of 10 percent hardwood would be retained or maintained through the life of the stand where possible. Hardwoods would be removed in regeneration harvest areas through subsequent seedling release treatments. Recruitment of hardwoods within these stands could also be impeded by these activities.

Prescribed fire would remove litter from the ground surface, aiding in the germination of hardwood seeds. In regards to hardwood retention, dormant season burns do not kill rootstocks of hardwoods. Top-killing could occur, but the hardwoods re-sprout. In areas that are managed for a woodland condition, growing season burns will reduce the number of hardwood sprouts and result in a more 'park like' habitat. This will result in a more grass-forb ecosystem that provides habitat for ground nesting birds and small mammals.

Indirect Effects:
No indirect effects to the recruitment and retention of hardwoods would occur from activities proposed in Alternative B. Hardwoods would be maintained throughout the life of each stand in which timber harvesting takes place (RLRMP, FR001, p.80).

Cumulative Effects:
No cumulative effects to the recruitment and retention of hardwoods would occur from activities proposed in Alternative B. Hardwoods would be maintained throughout the life of each stand in which timber harvesting takes place (RLRMP, FR001, p.80).

- Alternative C: No Herbicide Use - Direct, Indirect & Cumulative Effects

The effects of Alternative C would be the same as those listed under Alternative B above.

Effects of Management Activities on Hard Mast Production

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
No management activities would occur under Alternative A, therefore no direct effects on hard mast production would occur.

Indirect Effects:
No management activities would occur under Alternative A, therefore no indirect effects on hard mast production would occur.

Cumulative Effects:
No management activities would occur under Alternative A, therefore no cumulative effects on hard mast production would occur.

- Alternative B: Smith Mountain Resource Management Project -Direct, Indirect & Cumulative Effects

Direct Effects:
Under Alternative B, 434 acres of overstory mast development are proposed. Within these areas, selected hard and soft mast producing trees would be released from competition, thus increasing mast production. Removing hardwoods during site preparation activities could reduce hard mast production.

Indirect Effects:
Under Alternative B, 434 acres of overstory mast development are proposed. Within these areas, selected hard and soft mast producing trees would be released from competition, thus increasing mast production. Woodland stand restoration of 166 acres is proposed that would result in an increase of hard mast production.

As discussed under Effects of Management Activities on Retention and Recruitment of Hardwoods section, hardwoods would be removed in regeneration harvest areas through subsequent site preparation and seedling release treatments. This could reduce hard mast production in the future within these pine stands.

Cumulative Effects:
No cumulative effects on hard mast production are expected to occur because all management activities will follow Forest wide design criteria. Specifically, WF003 and VM004 address hard mast production.

- Alternative C: No Herbicide Use - Direct, Indirect & Cumulative Effects

The effects of Alternative C would be the same as those listed under Alternative B above.

Effects of Management Activities on Non-Native Invasive Species

Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
No management activities would occur under Alternative A, therefore no direct effects on non-native invasive species would occur.

Indirect Effects:
Ongoing activities such road maintenance, off-road vehicle use, and camping could spread existing populations or introduce new populations of NNIS into the project area. Indirectly, the lack of active non-native invasive species control would allow the plants to continue to produce seed and opportunistically spread throughout the area.

Cumulative Effects:
No cumulative effects are expected to occur to NNIS under this alternative.

- Alternative B: Smith Mountain Resource Management Project –Direct, Indirect & Cumulative Effects

Direct Effects:
Under this alternative the populations of NNIS within the project area would be reduced. All identified populations of NNIS across the project area would be treated with a combination of herbicide application and prescribed burning. Monitoring would be performed and a follow-up treatment of herbicides may be necessary to control sprouting. Some areas of exposed mineral soil may be lightly disked and seeded with native warm and cool season grasses and forbs to discourage NNIS establishment. The Forest Botanist has developed a list of recommended seeding mixtures to be used

throughout the Forest. Recommended warm season grasses are little blue stem, switch grass, Indian grass or any native warm season grass or forb. The cool season grasses recommended are annual ryegrass or any native cool season grass or forbs.

Indirect Effects:
Ground-disturbing activities such as timber harvest, road construction, road maintenance, fireline construction, fireline maintenance, and wildlife opening construction could increase the population and spread of non-native invasive species by destroying individual stems which would result in prolific sprouting. They would also provide seedbeds for NNIS germination. Mechanical equipment could also dislodge seeds and transport them to unaffected areas. Implementation of Best Management Practices would reduce the possibility of introducing or spreading non-native invasive plants during project implementation.

Cumulative Effects:
Under this alternative, activities such as road maintenance, off-road vehicle use, camping, and private land management could introduce new populations of NNIS to the project area.

- Alternative C: No Herbicide Use - Direct, Indirect & Cumulative Effects

Direct Effects:
Under this alternative activities to control NNIS would not occur. Because NNIS have a high propensity to sprout, ground disturbing activities could result in increased populations and spread of NNIS across the project area.

Indirect Effects:
The indirect effects would be the same as those listed under Alternative B.

Cumulative Effects:
The cumulative effects would be the same as those listed under Alternative B.

Wildlife, Fisheries & Habitat

Present Conditions

The Revised Forest Plan addresses the fundamental habitat requirements of a diverse array of fish and wildlife populations on National Forest lands in Arkansas and Oklahoma. These habitat requirements include essentials such as adequate sources of forage or prey needed to meet daily energy requirements, ample cover for times of travel and rest and areas conducive to reproduction and rearing of young. Additionally, there are many factors that are unique to groups or individual species across the landscape. The Revised Forest Plan also addresses another vitally important issue related to the long-term sustainability of fish and wildlife populations on the Ouachita National Forest: *the impacts that people, their actions and Forest management practices have on native fish and wildlife populations and their habitats.*

As part of the overall effort to ensure that habitat requirements of all native vertebrates, invertebrates, and plants are considered in the planning, implementation, and monitoring of Forest management

practices, the Revised Forest Plan lists 24 species (Table 3.13) that should adequately address the effects of Forest management practices on fish and wildlife populations and their habitat needs in addition to demand species and species of special interest. These 24 species, termed "**Management Indicator Species**" (MIS), represent a broad array of habitats covering diverse geographic areas within the ONF, as well as inhabiting areas with diverse management objectives.

Management Indicator Species selected for this Project: The entire list of 24 MIS was reviewed and a subset was selected for the actions proposed in this EA for the Smith Mountain Watershed Project Area. The MIS selected includes 6 terrestrial species and 11 fish species. Species not known to occur within the action area, lacking suitable habitat, or not tied to an appropriate evaluation objective were not selected as MIS for the Smith Mountain Watershed Project Area EA, as indicated in the far right column of Table 3.13.

MANAGEMENT INDICATOR SPECIES AND ASSOCIATED PURPOSES (TABLE 3.13)

Common Name	Scientific Name	Primary Reason(s) for Selection	Selected as MIS for Project (Yes/No)
Terrestrial MIS			
Northern bobwhite	*Colinus virginianus*	To help indicate effects of management on public hunting demand and to help indicate effects of management on the pine-oak woodland community	**Yes**
White-tailed deer	*Odocoileus virginianus*	To help indicate effects of management on public hunting demand	**Yes**
Eastern wild turkey	*Meleagris gallapavo*	To help indicate effects of management on public hunting demand	**Yes**
Red-cockaded woodpecker	*Picoides borealis*	To help indicate effects of management on recovery of an Endangered species and to help indicate effects on management of shortleaf pine-bluestem woodland community	**No** (Action area is outside of Management Area 22)
Pileated woodpecker	*Dryocopus pileatus*	To help indicate effects of management on mature forests and snags and snag-dependent species	**Yes**
Scarlet tanager	*Piranga olivacea*	To help indicate effects of management on mature forest communities	**Yes**
Prairie warbler	*Dendroica discolor*	To help indicate effects of management on early successional	**Yes**

Common Name	Scientific Name	Primary Reason(s) for Selection	Selected as MIS for Project (Yes/No)
		component of forest communities	
Ponds and Lakes			
Bluegill	*Lepomis macrochirus*	To help indicate management effects on health of ponds and lakes and demand for recreational fishing	**Yes**
Redear sunfish	*Lepomis microlophus*		**Yes**
Largemouth bass	*Micropterus salmoides*		**Yes**
Arkansas River Valley Streams (Action area occurs outside of the Arkansas River Valley Ecoregion)			
Yellow bullhead	*Ameiurus natalis*	To help indicate effects of management on aquatic habitat and water quality in streams within the Arkansas River Valley Ecoregion	**No**
Central stoneroller	*Campostoma anomalum*		**No**
Redfin darter	*Etheostoma whipplei*		**No**
Green sunfish	*Lepomis cyanellus*		**No**
Longear sunfish	*Lepomis megalotis*	To help indicate effects of management on aquatic habitat and water quality in streams within the Arkansas River Valley Ecoregion	**No**
Gulf Coastal Plain Ecoregion Streams (Action area occurs outside of the Gulf Coastal Plain Ecoregion)			
Pirate perch	*Aphredoderus sayanus*	To help indicate effects of management on aquatic habitat and water quality in streams within the Gulf Coast Plain Ecoregion	**No**
Central stoneroller	*Campostoma anomalum*		**No**
Creek chubsucker	*Erimyzon oblongus*		**No**
Green sunfish	*Lepomis cyanellus*		**No**
Longear sunfish	*Lepomis megalotis*		**No**

Common Name	Scientific Name	Primary Reason(s) for Selection	Selected as MIS for Project (Yes/No)
Ouachita Mountain Ecoregion Streams			
Central stoneroller	*Campostoma anomalum*	To help indicate effects of management on aquatic habitat and water quality in streams within the Ouachita Mountain Ecoregion.	**Yes**
Johnny darter	*Etheostoma nigrum*		**No** (Glover & Mountain Fork Rivers only)
Orangebelly darter	*Etheostoma radiosum*		**Yes**
Redfin darter	*Etheostoma whipplei*		**No** (does not occur in analysis area)
Northern studfish	*Fundulus catenatus*		**Yes**
Northern hog sucker	*Hypentelium nigricans*		**Yes**
Green sunfish	*Lepomis cyanellus*		**Yes**
Longear sunfish	*Lepomis megalotis*		**Yes**
Striped shiner	*Luxilus chrysocephalus*		**Yes**
Smallmouth bass	*Micropterus dolomieu*		**Yes**
Channel darter	*Percina copelandi*		**No** (Glover & Mountain Fork Rivers only)
Forest-wide			
Smallmouth bass	*Micropterus dolomieu*	To help indicate the effects of management on meeting public fishing demand in streams	**Yes**

MIS Forest-wide Trends

The 6 selected terrestrial MIS were modeled using the CompPATS wildlife model to compare predicted future habitat capabilities over the next decade (years 2010-2020) for each of the 3 alternatives evaluated in the Smith Mountain Watershed Project Area EA (Table 3.14). Projected numbers of terrestrial MIS per square mile were compared against the current “pre-existing habitat condition” (year 2010) which will serve as the baseline for the proposed activities.

Response of Selected Management Indicator Species to Alternatives by Decade of Implementation (Table 3.14) – *HABITAT CAPABILITY MODEL*

Alternative & Year	Management Indicator Species					
	Northern Bobwhite	White-tailed Deer	Eastern Wild Turkey	Pileated Wood-pecker	Scarlet Tanager	Prairie Warbler
	Individuals per square mile					
"No Action" Alternative						
-2010	17	16	7	33	29	10
-2020	11	15	7	34	30	3
"Proposed Action" Alternative						
-2010	47	24	9	23	27	74
-2020	15	16	7	33	29	6
"No Herbicides" Alternative						
-2010	47	24	9	23	27	74
-2020	15	16	7	33	29	6

* *It should be noted that this model assumes that all treatments occur within the same year (when, in fact, treatments may occur over the course of the 10 year planning period; therefore, actual habitat capability could differ from the projections presented here).*

Previous Forest-wide trends for the 6 terrestrial and 11 aquatic MIS species selected for the proposed activities within the Smith Mountain Watershed Project Area EA will be discussed individually, based on the FEIS, as well as the Ouachita National Forest Monitoring and Evaluation Report for the Land and Resource Management Plan (USDA Forest Service, 2009). These documents summarize monitoring information for MIS species over the past decade, while providing an assessment of each MIS species' current status and conservation needs.

TERRESTRIAL SPECIES:

Northern bobwhite: In the period between 2000 and 2008, birds heard per stop during quail call counts have varied from a high of 1 bird call per stop in 2005 to a low of 0.45 bird calls per stop in 2008. Over this period of time, the Ouachita region averaged 0.65 bird calls per stop per year. These data indicate a slight increasing trend.

Since 1997, the Forest has conducted bird surveys on over 300 Landbird monitoring points. Bobwhite data recorded through these surveys indicate a stable trend in birds detected over this 12 year period.

The CompPATS habitat capability estimate for the bobwhite has declined slightly, but steadily. Although the creation of early successional habitat is showing a slight upward trend, this habitat creation has not yet reached the Plan objective of 5,500 acres per year.

Breeding Bird Survey data collected over the past 41 years (1966 through 2007) indicate a 3.5 % decline for the Ozark - Ouachita Plateau, a 3.0% decline for Arkansas and a 3.0% decline range-wide. Data for

the more recent time period of 1980 – 2007 shows a greater bobwhite decline of 4.6 % for the Ozark – Ouachita Plateau.

Northern bobwhite landbird point data indicates a decrease in bobwhites; however the habitat capability model for bobwhites indicates increasing habitat capability for the Ouachita National Forest. Declining population trends for the Ozark-Ouachita Plateau region are reported. Regional and range-wide declines are primarily attributed to the loss of habitat on private and agricultural lands and changes in agricultural practices. The Ouachita National Forest has pursued aggressive prescribed fire and forest thinning programs that are providing habitat improvements and it is expected that these management actions will soon positively overcome the downward trends indicated by breeding bird surveys within the forest.

White-tailed deer: Based on annual spotlight survey data collected between 2000 to present, average deer density has varied from a low of 29 deer per square mile in 2001, to 95 deer per square mile in 2008. The average density for the Forest for this period is 46 deer per square mile. This data indicates an increase in deer density on the Forest. This level exceeds Forest Plan objectives of an optimum population of 13.7 deer per square mile.

Deer harvest data indicate an increasing harvest in the counties encompassed by the Forest with the highest harvest year in 2006. Deer harvest has increased from a low of 7,394 in 2002 to over 20,000 in 2006 and now, down to 8,726 in 2008. Deer harvest can be a relative indicator of deer abundance; however, the influence generated from changes in hunting regulations and harvest limits cannot be determined. These data sets are provided by the Arkansas Game and Fish Commission and the Oklahoma Department of Wildlife Conservation.

The stable but decreasing habitat capability for the past three years as estimated by CompPATS may be related to the creation of acres in grass/forb habitat (forest types ages 0-10 years) preferred by deer. Although acres of created early successional habitat have not met the desired Plan levels, deer densities for 2008 are the highest in the last nine years and double the 2000 deer density.

Eastern wild turkey: The number of turkey poults per hen has varied from a low of 1.5 poults per hen in 2008, to a high of 3.5 poults per hen in 2000. Recent brood survey data indicated the average number of poults per hen in 2009 was 1.36 for the Ouachita Region, which is lower than the 2008 data. There is a downward trend for successful turkey reproduction most likely due to wet spring conditions.

Spring turkey harvest has varied from a high of 4,017 birds in 2003 to 1, 872 in 2008. Harvest data for 2009 indicated 2,444 turkeys harvested in the Ouachita Region. The Breeding Bird Survey data for the Ozark-Ouachita Plateau indicate a 2.9 % increase in the turkey population from 1966 to 2007. Overall, habitat capability trends are increasing, with an average habitat capable of supporting 18,370 turkeys, above the Plan projection of 9,177.

The wild turkey trend detected on the Forest landbird point surveys is similar to the drop in harvested birds and poults per hen and is showing a declining trend. Breeding Bird Survey data and turkey habitat capability would indicate an overall positive trend in the turkey population whereas the number of poults per hen, harvest data, and landbird point surveys indicate a downward trend.

Pileated woodpecker: Population trend and habitat capability data are mixed. The Breeding Bird Survey data indicate a slight downward trend of –0.6 % for the period of 1966 – 2007 for the Ozark-Ouachita Plateau but more recent data for the period of 1980-2007 shows an upward trend of +1.0 %. The CompPATS estimates for habitat capability within pine and pine-hardwood forest types indicate an upward trend for the pine and pine-hardwood types on the Forest. The current population density and habitat capability exceed the Forest Plan population objectives. The Pileated woodpecker and its habitat appear to be secure within the Forest.

Scarlet tanager: The Breeding Bird Survey data indicate a nonsignificant increasing trend of + 1.0 % for the period of 1966 – 2007 and + 2.7 % for the time more recent period of 1980 – 2007 for the Ozark-Ouachita Plateau, and a nonsignificant decline of –0.1% throughout its range survey-wide. Data are supporting a conclusion of a nonsignificant increasing population trend within the Ozark-Ouachita Plateau where mature hardwood and mixed types are represented. The scarlet tanager has a nonsignificant increasing population trend within the Ozark and Ouachita Plateau and is secure within its overall range.

Prairie warbler: The Breeding Bird Survey data indicate a significant declining trend for two periods of consideration, –4.6 % for 1966-2007 and –4.0 % for 1980-2007 for the Ozark-Ouachita Plateau, as well as a decline throughout its range survey-wide. CompPATS and landbird point counts also indicated a decline in numbers. Based on the data available, the prairie warbler is in a downward trend. These data are in agreement with the Breeding Bird Survey data and the same downward trend that is indicated throughout its range.

AQUATIC SPECIES:

[Ouachita Mountain Ecoregion Streams]

Central stoneroller: Central stonerollers generally inhabit small to medium streams with cool, clear water and gravel, cobble or exposed bedrock substrates. They are sometimes found in upland impoundments and slow-moving turbid water (Robison and Buchanan 1988). Central stonerollers are common across the Forest, with populations fluctuating from year to year. Many factors, biotic and abiotic, natural and man-caused contribute to these fluctuations. Over time these populations appear to be stable. The conservation of this species across the forest is not in question. Based on Basin Area Stream Surveys (BASS) and other Forest stream surveys, there appear to be no adverse effect on central stoneroller populations as a result of forest management activities.

Orangebelly darter: Orangebelly darters occur in a variety of habitats from small, gravelly, high-gradient streams, to larger more sluggish lowland rivers. This darter is sensitive to the effects of siltation and seems to be most common in clear, gravel cobble-bottomed streams with moderate to high gradient. Orangebelly darters are relatively abundant in the Ouachita National Forest, particularly in the Lower Ouachita Mountain Ecoregion. Population densities appear to fluctuate while remaining relatively stable over time. The conservation of this species across this ecoregion is not in question. Based on BASS and other Forest stream surveys, there appears to be no adverse effect on Orangebelly darter populations from forest management activities.

Northern studfish: Northern studfish occur in the Ozark and Ouachita mountains in clear streams and rivers of moderate to high gradient and permanent flow. It is usually found in quiet, shallow waters along the margins of pools having rock and gravel substrate. Although there appears to be a downward trend in populations of this fish, BASS inventory data and recent surveys indicate that the population may now be increasing. Wide fluctuations of percent occurrence and population densities appear to be common. The conservation of this species is not thought to be in question because of its common occurrence across a wide area. There are no adverse implications for Northern studfish populations as a result of Forest management activities.

Northern hog sucker: The northern hog sucker occurs in clear, permanent streams with gravel or rocky substrate and generally prefers deep riffles, runs, or pools having a current. It is intolerant of pollution, silt and stream channel modification. Based on stream monitoring data, it appears that Northern hog sucker populations on the Ouachita National Forest remain stable. There is no information to suggest that the Northern hog sucker has conservation concerns on National Forest Lands. There are also no indications to suggest that management activities are having a direct or indirect effect on populations of the Northern hog sucker.

Green sunfish: The green sunfish is an adaptable species that occurs in a variety of aquatic habitats and is tolerant of a wide range of ecological conditions, particularly to extremes of turbidity, dissolved oxygen, temperature and flow (Robison and Buchanan 1988). Based on BASS inventory data, it appears that populations of green sunfish fluctuate from year to year. Many factors, biotic and abiotic, natural and man-caused, contribute to these fluctuations. Overall, populations of this sunfish appear to be stable over time. Percent site occurrence and population densities indicate that managed streams and reference streams are similar for green sunfish. There are no indications that green sunfish are increasing as a result of management activities. The conservation of this species is not in question.

Longear sunfish: Longear sunfish occur in a variety of habitats but is most abundant in small, clear, upland streams with rocky bottoms and permanent or semi-permanent flow. It avoids strong current, turbid water and silt substrate. Based on BASS inventory data, populations of longear sunfish fluctuate from year to year, but appear to be stable over time. Percent site occurrence and population densities are similar for this species in managed streams and reference streams. Longear sunfish are commonly distributed throughout much of the Upper and Lower Ouachita Mountain Ecoregions. There appears to be no adverse effect on longear sunfish from Forest management activities. The conservation of this species across these ecoregions is not in question.

Striped shiner: The striped shiner is abundant in the Ozark and Ouachita mountains and seems to prefer small to moderate-sized perennial streams with permanent flow, clear water and rocky or gravel substrate. It occurs in some current, but avoids strong current preferring the pool habitats within the streams. Based on stream surveys and BASS inventory data, there appear to be wide fluctuations in populations of striped shiners on the Forest, with no apparent upward or downward trends. Striped shiners are common throughout the Lower Ouachita Mountain Ecoregion. The conservation of this species in the Ouachita National Forest is not in question. Forest management activities appear to have no adverse effect on striped shiner populations.

Smallmouth bass: The smallmouth bass is mainly an inhabitant of cool, clear mountain streams with permanent flow and rocky bottoms. This species is common only on the southern part of the Ouachita National Forest. The smallmouth bass is less tolerant to habitat alteration than any of the other black basses and is especially intolerant of high turbidity and siltation. BASS data on the Ouachita National Forest indicate that both site occurrence percentages and population densities are similar between reference and managed watersheds. This implies that Forest Service management activities are having no adverse effects on smallmouth bass populations.

[Ponds and Lakes]

Bluegill: Bluegill are found in clear, quiet, warm waters having at least some aquatic vegetation and other cover, but is also found in streams and rivers. The bluegill is found in all drainages across Arkansas and is widely stocked in ponds and lakes (Robison and Buchanan 1988). According to the EIS (USDA FS 2005b), the fisheries in ponds and lakes that are primarily managed by the Forest are in very good condition and the MIS populations are stable.

Redear sunfish: The redear sunfish prefers warm, clear waters without current and with an abundance of stumps, logs, brush, and other aquatic vegetation. The fish is native to all major drainages in Arkansas, and also widely stocked in ponds and reservoirs throughout the state (Robison and Buchanan 1988). According to the EIS (USDA FS 2005b), the fisheries in ponds and lakes that are primarily managed by the Forest are in very good condition and the MIS populations are stable.

Largemouth bass: Largemouth bass are most commonly found in clear, quiet waters in natural and manmade lakes and ponds, and in the backwaters and pools of streams and rivers. It is intolerant of high turbidity and siltation and is often found during most of the day near logs or other cover in deep water. The fish is found in all drainages in Arkansas (Robison and Buchanan 1988). According to the EIS (USDA FS 2005b), the fisheries in ponds and lakes that are primarily managed by the Forest are in very good condition and the MIS populations are stable.

[Forest-wide]

Smallmouth bass: The smallmouth bass is mainly an inhabitant of cool, clear mountain streams with permanent flow and rocky bottoms. This species is common only on the southern part of the Ouachita National Forest. The smallmouth bass is more intolerant to habitat alteration than any of the other black basses, and it is especially intolerant of high turbidity and siltation. BASS data on the Ouachita National Forest indicate that both site occurrence percentages and population densities are similar between reference and managed watersheds. This implies that Forest Service management activities are having no adverse effects on smallmouth bass populations.

Issues

There is a concern that the proposed activities, including diverse timber management practices, wildlife habitat improvements, prescribed burning, herbicide application, and erosion control for watershed protection may impact wildlife and fisheries populations or habitats.

Effects on project MIS

The following ***specific activities*** have been proposed under the Preferred Alternative ("Proposed Action") for implementation within the action area of the Smith Mountain Watershed Project Area and have been grouped as follows:

Vegetation Management Activities:

- Seed tree regeneration harvest -711 acres
- Commercial thinning -2321 acres
- Timber Stand Improvement -125 acres
- Pre commercial thinning - up to 1,053 acres
- Mechanical site preparation for artificial regeneration – up to 572 acres
- Wildlife stand improvements – up to 1,585 acres (includes MSR, WSR, OSD and WSD)
- Woodland restoration-166 acres
- Over Story Development (OSD) -434 acres
- Linear wildlife opening improvements- 1.6 miles (8 acres)
- Wildlife opening construction - 3.5 acres
- Wildlife opening improvement -8 acres
- Non native invasive plant species treatment throughout area

Infrastructure / Road Improvement / Maintenance Activities:

- Temporary road construction - 8 miles
- Pre-haul road maintenance - 14 miles
- Road Reconstruction – up to 8 miles
- Road Closures - 3 miles
- Road Barriers-34 each
- Pond improvements to existing ponds - 12 each
- Watershed improvements - 0.22 miles
- Fish passage barrier removal -34 each
- Fish passage improvement -replace slab with box culvert - 1 each
- Nest box installation -54
- Changes to the MVUM road status

Prescribed Burning Activities:

- Ecosystem/ Site Prep Prescribed/ Wildlife burn– approx. 9,525 acres
- Fire line construction/Reconstruction – 18/13 miles

Each specific activity listed above as part of the "Proposed Action" was evaluated to determine all potential effects to each of the 17 MIS species being considered in this EA. The most likely ***general effects*** from the *specific activities listed above* are as follows:

Vegetation Management Activities:

- Would cause temporary soil disturbance

- Could temporarily increase sedimentation
- Could impact or crush individual plants and animals on the ground directly by heavy equipment operation or tree skidding
- Would create small patches of early successional habitat
- Could impact individual plants on the ground through contact with herbicides, although no herbicides would be applied in close proximity to PETS species

Infrastructure / Road Improvement / Maintenance Activities:

- Would cause temporary soil disturbance
- Could temporarily increase sedimentation
- Could impact individual plants and animals on the ground by heavy equipment operation
- Would provide additional nesting habitat for birds and small mammals
- Would improve amphibian habitat and wildlife water sources
- Would allow fishways to be readily accessible by all migratory fish species in streams

Prescribed Burning Activities:

- Would cause temporary soil disturbance
- Could temporarily increase sedimentation
- Could impact individual plants and animals on the ground by heavy equipment operation
- Could impact individual plants and animals on the ground by exposure to fire

Many of these activities are similar in nature, and more importantly, their effects are similar in nature. This allows us to group and consolidate the specific effects into 7 basic impacts which will be evaluated <u>individually</u> for <u>every</u> MIS being evaluated in this EA:

- **Soil disturbance impacts**
- **Heavy equipment/tree skidding impacts**
- **Sedimentation impacts**
- **Creation/maintenance of early successional habitat impacts**
- **Creation of wildlife nesting habitat impacts (nest boxes)**
- **Prescribed fire impacts**
- **Herbicide impacts**

Following the table of herbicide toxicity ratings, the 7 impacts listed above will be evaluated for the 17 MIS species that occur or may occur within the action area of the Smith Mountain Watershed Project Area.

Herbicide Acute Toxicity Ratings (Table 3.15)

	Terrestrial Invertebrates	***Birds***	***Mammals***	***Fish and Aquatic Invertebrates***
Fluroxpyr	*Relatively non-toxic*	*Practically Non-toxic*	*Low*	*Practically non-toxic to slightly toxic*
Glyphosate	*Relatively non-toxic*	*Slightly toxic*	*Low*	*Practically non-toxic*
Imazapic	*Non-toxic*	*Practically non-toxic*	*Low to practically non-toxic*	*Low*
Imazapyr	*Non-toxic*	*Very low*	*Practically non-toxic*	*Low*
Metsulfuron methyl	*Relatively non-toxic*	*Very low*	*Low*	*Low*
Triclopyr	*Relatively non-toxic*	*Practically non-toxic to slightly toxic*	*Practically non-toxic*	*Practically non-toxic*
Clopyralid	*Relatively non-toxic*	*None*	*Relatively non-toxic*	*Very low*

References: EPA 1993, 1998; SERA 2003, 2004, 2009

MIS "Demand Species" and "Adequate Early Forest Stage Cover", Northern bobwhite

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
No direct effects would result from the No Action Alternative.

Indirect Effects:
Under this alternative, lack of any new management activities could prevent or substantially delay the creation of early successional and open forested habitats needed by this species. The habitat capability model indicates that current quail populations are far below the projected plan levels. Indirectly, habitat for this species would continue to deteriorate resulting in a continued decline as indicated in the Forest trend data. Although declining forest health could promote disease and insect outbreaks, and catastrophic wildfires which would temporarily increase the amount of early successional habitat needed by this species, the periodicity and intensity of these events would be uncertain and may not produce and maintain sufficient early successional habitat within this ecosystem. The current habitat capability for this species is insufficient to meet the minimum population projections in the Forest Plan.

Cumulative Effects:
Cumulatively, this alternative would perpetuate conditions that would keep quail numbers well below plan projections and may eventually jeopardize the viability of this species within this ecosystem. Forest-wide trends indicate a downward trend for this species. Cumulatively, this alternative would likely have a negative impact on the Forest population trend for this species.

Species Trend Effects: The "No Action" alternative would be expected to negatively affect the Forest-wide trend for this species.

- Alternative B – Smith Mountain Resource Management Project- Direct, Indirect & Cumulative Effects

Direct Effects:
Under the proposed activities, heavy equipment, tree skidding, or prescribed fire may crush or burn nests, eggs, or young quail on the ground. Adults are highly mobile and should not be directly impacted. Soil disturbance, sedimentation, creation and maintenance of early successional habitat, and creation of wildlife nesting habitat should not directly affect quail. Although direct contact with herbicides (or feeding on insects and vegetation that have been exposed to herbicides) could potentially harm quail, fluroxpyr and imazapic are considered practically non-toxic to birds (SERA 2009, SERA 2004b), glyphosate is considered no more than slightly toxic to birds (EPA 1993, SERA 2003a), imazypyr and metsulfuron methyl are considered to have very low toxicity to birds (SERA 2004b,c), clopyralid is considered not to be toxic to birds (SERA 2004d), and triclopyr is considered to be practically non-toxic to slightly toxic to birds (SERA 2003b). Based on these toxicity ratings, these 7 herbicides should not have any substantial direct effects on this species. Overall, any negative direct effects would be far outweighed by the beneficial indirect and cumulative effects of this alternative.

Indirect Effects:
Under the proposed activities, quail habitat would be enhanced through the creation of early successional habitat that could be maintained using prescribed fire, heavy equipment operation and associated soil disturbances, and increased openings in the forest canopy following thinning operations. Herbicide applications could help create and maintain additional patches of early successional habitat. These applications could also reduce the amount of non-native invasive plants and promote the growth of native plants that are beneficial to quail. Thinning of forest stands would promote the growth of beneficial ground cover used by quail, increasing foraging and nesting habitat. Sedimentation and nest box construction should have no indirect effects on this ground-nesting terrestrial species. Overall, the indirect effects on quail under this alternative would be very beneficial because of the improved habitat quality in this ecosystem, which currently has very little quality quail habitat.

Cumulative Effects:
Cumulative effects under this alternative would be beneficial due to the creation and maintenance of early successional habitat needed by quail within the Smith Mountain Watershed Project Area. Prescribed fire, herbicide applications, heavy equipment operation and associated soil disturbances, and forest thinnings would all promote and help maintain a mosaic of open forest stands with patches of early successional habitat. Herbicide applications would also be beneficial by reducing non-native invasive plants and reducing the potential for them to spread outside of their current locations and promoting native grasses and forbs needed by this bird. Sedimentation and creation of wildlife nesting habitat for cavity nesters would not have any substantial cumulative effects on quail. Overall, the proposed management activities under this alternative would ensure more quality long-term habitat for this species. With sustained habitat improvements, the quail population may slow its current decreasing trend and possibly increase in this ecosystem. Any such favorable quail population response should also improve hunting and wildlife viewing opportunities for Forest users.

Species Trend Effects: The "Proposed Action" alternative should positively affect the Forest-wide trend for this species.

- Alternative C- No Herbicide Use - Direct, Indirect & Cumulative Effects

Differences between the direct, indirect, and cumulative effects on Northern bobwhite under the "No Herbicides" alternative and those discussed above under the "Proposed Action" alternative *are negligible* overall. Under the "No Herbicides" alternative, the chemical site preparation and release activities would not be accomplished using herbicides, but would be replaced with manual site preparation and release activities. Even though different "tools" would be used (i.e. chainsaws versus herbicides), both methods would result in more open stands and more early successional habitat for quail. Non-native invasive plant treatment would not be accomplished using herbicide under this alternative and non-natives may continue to persist where present. Non-natives may spread outside of their current location and choke out native plants that are beneficial to quail. Although the "No Herbicides" alternative would eliminate the use of herbicides, fluroxpyr and imazapic are considered practically non-toxic to birds (SERA 2009, SERA 2004b), glyphosate is considered no more than slightly toxic to birds (EPA 1993, SERA 2003a), imazypyr and metsulfuron methyl are considered to have very low toxicity to birds (SERA 2004b,c), clopyralid is considered not to be toxic to birds (SERA 2004d), and triclopyr is considered to be practically non-toxic to slightly toxic to birds (SERA 2003b). Given the very low potential for *any* herbicides listed to effect quail, and given the very low numbers of quail presently found within this area, there should be *no substantial differences in direct, indirect, or cumulative effects between the "No Herbicides" and "Proposed Action" alternatives.*

Species Trend Effects: The "No Herbicides" alternative should positively affect the Forest-wide trend for this species.

MIS "Demand Species", White-tailed deer

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
No direct effects would result from this alternative.

Indirect Effects:
Under this alternative, lack of any new management activities could further delay the creation of early successional patches and open forest stands needed as a component of balanced deer habitat. Indirectly, habitat for this species would remain unbalanced, unless natural catastrophic events, such as wildfires, insect/disease outbreaks, or storm damage occurred, creating forest openings and early successional habitat. The periodicity and intensity of such natural events would be uncertain and may not produce and maintain sufficient early successional habitat within this ecosystem.

Cumulative Effects:
The cumulative effect of the "No Action" alternative is that the amount of early successional habitat needed by deer in this ecosystem would remain unbalanced and decline unless created through random natural disasters. As habitat needs decline with no management, so would the number of deer.

However, the deer population is not currently facing any viability issues, and this alternative should have minimal impacts on the forest population trend for this species.

Species Trend Effects: The "No Action" alternative should not affect the Forest-wide trend for this species.

- Alternative B – Smith Mountain Resource Management Project- Direct, Indirect & Cumulative Effects

Direct Effects:
Under the proposed activities, heavy equipment, tree skidding, or prescribed fire may injure or kill young fawns on the ground. Adults are highly mobile and should not be directly impacted. Soil disturbance, sedimentation, creation and maintenance of early successional habitat, and creation of wildlife nesting habitat should not directly affect deer. Although direct contact with herbicides (or feeding on vegetation that has been exposed to herbicides) could potentially harm deer, herbicides fluroxpyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, triclopyr, and clopyralid are considered relatively non-toxic to having low toxicity levels toward mammals (EPA 1993, 1998; SERA 2003, 2004, 2009). Based on these toxicity ratings, these 7 herbicides should not have any substantial direct effects on deer. Overall, any negative direct effects would be far outweighed by the beneficial indirect and cumulative effects of this alternative.

Indirect Effects:
Under the proposed activities, deer habitat would be enhanced through the creation of early successional habitat that could be maintained using prescribed fire, heavy equipment operation and associated soil disturbances, and increased openings in the forest canopy following thinning operations. Herbicide applications could help create and maintain additional patches of early successional habitat and help eliminate non-native invasive plants and promote beneficial native plants important to deer diet. These early successional areas are an important part of balanced deer habitat, providing important herbaceous and woody vegetation needed by deer for foraging. Sedimentation and creation of nest boxes should have no indirect effects on this terrestrial species. Overall, the indirect effects on deer under this alternative would be very beneficial because of the improved habitat quality in this ecosystem, which is currently lacking any substantial early successional habitat.

Cumulative Effects:
Cumulative effects under this alternative would be beneficial due to the creation and maintenance of early successional areas needed as a critical habitat component by deer. Prescribed fire, herbicide applications, heavy equipment operation and associated soil disturbances, and forest thinning would all promote and help maintain a mosaic of open forest stands with patches of early successional habitat. Herbicide applications would also be beneficial by preventing the spread of non-native invasive plant species within and outside of the watershed area. Sedimentation and creation of wildlife nesting habitat would not have any substantial cumulative effects on deer. Overall, the proposed management activities under this alternative would ensure more quality long-term habitat for this species, specifically, a mixture of early successional habitat needed for cover and browsing, as well as the mature mast producing hardwoods needed for fall and winter foraging. With sustained forest health and habitat diversity, the deer population should remain stable or increase with this alternative. The population increase should also improve hunting and wildlife viewing opportunities for Forest users. This

alternative should have a positive effect on the Forest population trend for this species.

Species Trend Effects: The "Proposed Action" should positively affect the Forest-wide trend for this species.

- Alternative C –No Herbicide Use- Direct, Indirect & Cumulative Effects

Differences between the direct, indirect, and cumulative effects on deer under the "No Herbicides" alternative and those discussed above under the "Proposed Action" alternative *are negligible* overall. Under the "No Herbicides" alternative, the chemical site preparation and release activities would not be accomplished using herbicides, but would be replaced with manual site preparation and release activities. Even though different "tools" would be used (i.e. chainsaws versus herbicides), both methods would result in more open stands and more early successional habitat for deer. Non-native invasive plant treatment would not be accomplished using herbicides under this alternative and non-natives may continue to persist where present. Non-natives may spread outside of their current location and choke out native plants that are beneficial to deer. Although the "No Herbicides" alternative would eliminate any herbicide use, fluroxpyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, triclopyr, and clopyralid are considered relatively non-toxic to having low toxicity levels toward mammals (EPA 1993,1998; SERA 2003, 2004, 2009). Given the very low potential for any listed herbicide to effect deer, there should be *no substantial differences in direct, indirect, or cumulative affects between the "No Herbicides" and "Proposed Action" alternatives.*

Species Trend Effects: The "No Herbicides" alternative should positively affect the Forest-wide trend for this species.

MIS "Demand Species", Eastern Wild Turkey

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
No direct effects would result from this alternative.

Indirect Effects:
Under this alternative, lack of any new management activities could further delay the creation of early successional habitat patches and open forest stands needed as a component of balanced turkey habitat. These early successional habitats are needed for bugging and foraging grounds for turkeys, especially young poults. Indirectly, habitat for this species would remain unbalanced, unless natural catastrophic events, such as wildfires, insect/disease outbreaks or storm damage occurred, creating forest openings and early successional habitat. The periodicity and intensity of such natural events would be uncertain and may not produce and maintain sufficient early successional habitat within this ecosystem.

Cumulative Effects:
Under this alternative, the current habitat capability for turkeys would remain at levels just above the minimum projected levels in the Forest Plan. The cumulative effect of the No Action alternative is that the variety of habitat needed would be reduced over the long-term. However, this alternative should have minimal cumulative effects on the Forest population trend for this species due to current Forest

habitat capability levels.

Species Trend Effects: The "No Action" alternative is not likely to impact the Forest-wide trend for this species.

- Alternative B – Smith Mountain Resource Management Project- Direct, Indirect & Cumulative Effects

Direct Effects:
Under the proposed activities, heavy equipment, tree skidding, or prescribed fire may crush or burn nests, eggs, or young turkey poults on the ground. Adults are highly mobile and should not be directly impacted. Soil disturbance, sedimentation, creation and maintenance of early successional habitat, and creation of wildlife nest boxes should not directly affect turkeys. Although direct contact with herbicides (or feeding on insects and vegetation that have been exposed to herbicides) could potentially harm turkeys, fluroxpyr and imazapic are considered practically non-toxic to birds (SERA 2009, SERA 2004b), glyphosate is considered no more than slightly toxic to birds (EPA 1993, SERA 2003a), imazypyr and metsulfuron methyl are considered to have very low toxicity to birds (SERA 2004b,c), clopyralid is considered not to be toxic to birds (SERA 2004d), and triclopyr is considered to be practically non-toxic to slightly toxic to birds (SERA 2003b). Based on these toxicity ratings, these 7 herbicides should not have any substantial direct effects on turkeys. Overall, any negative direct effects would be far outweighed by the beneficial indirect and cumulative effects of this alternative.

Indirect Effects:
Under the proposed activities, turkey habitat would be enhanced through the creation of early successional habitat that could be maintained using prescribed fire, heavy equipment operation and associated soil disturbances, and increased openings in the forest canopy following thinning operations. Herbicide applications could help create and maintain additional patches of early successional habitat, reduce the amount of non-native invasive plants, and promote the growth of native plants that are beneficial to turkeys. Early successional habitat areas are an important part of balanced turkey habitat, providing bugging and foraging grounds for young poults and brushy nesting sites for adults. Sedimentation and creation of nest boxes should have no indirect effects on this terrestrial ground-nesting species. Overall, the indirect effects on turkeys under this alternative would be beneficial due to the improved habitat quality in this ecosystem.

Cumulative Effects:
Cumulative effects under this alternative would be beneficial due to the creation and maintenance of early successional areas needed as a critical habitat component by turkeys. Prescribed fire, herbicide applications, heavy equipment operation and associated soil disturbances, and forest thinnings would all promote and help maintain a mosaic of open forest stands with patches of early successional habitat. Herbicide applications would also be beneficial by reducing non-native invasive plants and promoting native grasses and forbs needed by this bird. Sedimentation and creation of wildlife nest boxes would not have any substantial cumulative effects on turkeys. Overall, the proposed management activities under this alternative would ensure more quality long-term habitat for this species, specifically, a mixture of early successional habitat needed for nesting and poult rearing, as well as the mature forests needed for roosting and hard mast forage production. With sustained forest health and habitat diversity, the turkey population should remain stable or increase with this alternative. The population increase should also improve hunting and wildlife viewing opportunities for Forest users. This alternative should

have a positive effect on the Forest population trend for this species.

Species Trend Effects: The "Proposed Action" should positively affect the Forest-wide trend for this species.

- Alternative C - No Herbicides Use - Direct, Indirect & Cumulative Effects

Differences between the direct, indirect, and cumulative effects on turkeys under the "No Herbicides" alternative and those discussed above under the "Proposed Action" alternative *are negligible* overall. Under the "No Herbicides" alternative, the chemical site preparation and release activities would not be accomplished using herbicides, but would be replaced with manual site preparation and release activities. Even though different "tools" would be used (i.e. chainsaws versus herbicides), both methods would result in more open stands and more early successional habitat for turkey. Non-native invasive plant treatment would not be accomplished using herbicides under this alternative and non-natives may continue to persist where present. Non-natives may spread outside of their current location and choke out native plants that are beneficial to turkeys. Although the "No Herbicides" alternative would eliminate the use of any herbicides, fluroxpyr and imazapic are considered practically non-toxic to birds (SERA 2009, SERA 2004b), glyphosate is considered no more than slightly toxic to birds (EPA 1993, SERA 2003a), imazypyr and metsulfuron methyl are considered to have very low toxicity to birds (SERA 2004b,c), clopyralid is considered not to be toxic to birds (SERA 2004d), and triclopyr is considered to be practically non-toxic to slightly toxic to birds (SERA 2003b). Given the very low potential for any listed herbicide to effect turkeys, there should be *no substantial differences in direct, indirect, or cumulative affects between the "No Herbicides" and "Proposed Action" alternatives.*

Species Trend Effects: The "No Herbicides" alternative should positively affect the Forest-wide trend for this species.

MIS "Adequate Mature Pine Forest Cover," "Adequate Mature Hardwood Forest Cover," and "Snags and Snag Dependent Species", Pileated woodpecker

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
No direct effects would result from this alternative.

Indirect Effects:
Under this alternative, there should be no substantial indirect effects on this woodpecker, given the stability of the mature forests that it inhabits. The Smith Mountain Watershed Project Area contains suitable habitat in its current condition.

Cumulative Effects:
Under this alternative, there should be no substantial cumulative effects on this woodpecker, given the stability of the mature forests that it inhabits and the stable population trend it holds across its overall range. The long-term persistence of this species on the Forest is not in question; population levels far exceed the projected levels in the Forest Plan.

Species Trend Effects: The "No Action" alternative should not affect the Forest-wide trend for this species.

- Alternative B – Smith Mountain Resource Management Project -Direct, Indirect & Cumulative Effects

Direct Effects:
Given the highly mobile nature of these birds, direct effects on individuals are very unlikely under this alternative. Tree felling or heavy equipment may impact nests and eggs of this cavity nester, but the old snags they prefer for nesting are rarely felled or pushed over during management activities. Soil disturbance, heavy equipment operation, tree skidding, prescribed fire, creation and maintenance of early successional habitats, creation of nest boxes, and sedimentation should not have any direct effects on this species. Although direct contact with herbicides (or feeding on insects that have been exposed to herbicides) could potentially harm woodpeckers, fluroxpyr and imazapic are considered practically non-toxic to birds (SERA 2009, SERA 2004b), glyphosate is considered no more than slightly toxic to birds (EPA 1993, SERA 2003a), imazypyr and metsulfuron methyl are considered to have very low toxicity to birds (SERA 2004b,c), clopyralid is considered not to be toxic to birds (SERA 2004d), and triclopyr is considered to be practically non-toxic to slightly toxic to birds (SERA 2003b). Based on these toxicity ratings, these 7 herbicides should not have any substantial direct effects on this species. Overall, there should be no substantial direct effects on this woodpecker under this alternative.

Indirect Effects:
Heavy equipment and fire may cause trees to fall or burn down, but these activities would also help create new snags. Heavy equipment, tree skidding, and prescribed fire may disturb woodpeckers and cause them to move temporarily out of operating areas during these activities. The proposed activities would protect overall forest health. Improving the health and vigor of mature forest stands would produce more open woodlands with faster growing trees. Such habitat is preferred by this species. Creating new snags to meet Forest Plan design criteria under this alternative would also benefit this species since it is snag-dependent. Soil disturbance, sedimentation, creation/maintenance of early successional habitat, and herbicide application should have no indirect effects on this species.

Cumulative Effects:
Under this alternative, management activities would protect the overall health of mature forests preferred by Pileated woodpeckers. Soil disturbance, heavy equipment operation, tree skidding, herbicide application, prescribed fire, creation and maintenance of early successional habitats, creation of wildlife nest boxes, and sedimentation should have no substantial cumulative effects on Pileated woodpeckers. The current population density and habitat capability exceed the Forest Plan population objectives for the Pileated woodpecker and its habitat appears to be secure within the Forest.

Species Trend Effects: The "Proposed Action" alternative should not affect the Forest-wide trend for this species.

- Alternative C –No Herbicide Use- Direct, Indirect & Cumulative Effects

Differences between the direct, indirect, and cumulative effects on this woodpecker under the "No Herbicides" alternative and those discussed above under the "Proposed Action" alternative *are negligible* overall. Under the "No Herbicides" alternative, the chemical site preparation and release activities would not be accomplished using herbicides, but would be replaced with manual site preparation and release activities. Even though different "tools" would be used (i.e. chainsaws versus herbicides), both methods would result in similar vegetation manipulations. These treatments would largely occur outside the preferred habitat of this woodpecker, and neither treatment should have any substantial direct, indirect, or cumulative effects on this bird. Non-native invasive plant treatment would not be accomplished using herbicides under this alternative and non-natives may continue to persist where present and may spread outside of their present locations. Although the "No Herbicides" alternative would eliminate the use of herbicides, fluroxpyr and imazapic are considered practically non-toxic to birds (SERA 2009, SERA 2004b), glyphosate is considered no more than slightly toxic to birds (EPA 1993, SERA 2003a), imazypyr and metsulfuron methyl are considered to have very low toxicity to birds (SERA 2004b,c), clopyralid is considered not to be toxic to birds (SERA 2004d), and triclopyr is considered to be practically non-toxic to slightly toxic to birds (SERA 2003b). Given the very low potential for any listed herbicide to effect this woodpecker, there should be *no substantial differences in direct, indirect, or cumulative affects between the "No Herbicides" and "Proposed Action" alternatives.*

Species Trend Effects: The "No Herbicides" alternative should not affect the Forest-wide trend for this species.

MIS "Adequate Mature Pine Forest Cover" and "Adequate Mature Hardwood Forest Cover", Scarlet tanager

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
No direct effects would result from this alternative.

Indirect Effects:
Under this alternative, there should be no substantial indirect effects on this species, given the stability of the mature forests that it inhabits. The Smith Mountain Watershed Project Area is comprised of suitable habitat for this species in its current condition.

Cumulative Effects:
Under this alternative, there should be no substantial cumulative effects on this tanager, given the stability of the mature forests that it inhabits and the stable population trend it holds across its overall range.

Species Trend Effects: The "No Action" alternative should not affect the Forest-wide trend for this species.

- Alternative B –Smith Mountain Resource Management- Direct, Indirect & Cumulative Effects

Direct Effects:
Under the proposed activities, heavy equipment, tree skidding, or prescribed fire may crush or burn nests, eggs, or young birds on the ground. Adults are highly mobile and should not be directly impacted. Soil disturbance, sedimentation, creation and maintenance of early successional habitat, and creation of wildlife nest boxes should not directly affect this species. Although direct contact with herbicides (or feeding on insects that have been exposed to herbicides) could potentially harm tanagers, fluroxpyr and imazapic are considered practically non-toxic to birds (SERA 2009, SERA 2004b), glyphosate is considered no more than slightly toxic to birds (EPA 1993, SERA 2003a), imazypyr and metsulfuron methyl are considered to have very low toxicity to birds (SERA 2004b,c), clopyralid is considered not to be toxic to birds (SERA 2004d), and triclopyr is considered to be practically non-toxic to slightly toxic to birds (SERA 2003b). Based on these toxicity ratings, these 7 herbicides should not have any substantial direct effects on this species. Overall, there should be no substantial direct effects on this species under this alternative.

Indirect Effects:
Under the proposed activities, heavy equipment, tree skidding, and prescribed fire may disturb tanagers and cause them to move temporarily out of operating areas during these activities. Prescribed fire may cause trees to burn down that may have nests built in them. However, management activities would protect overall forest health. Maintaining the health of mature pine and hardwood stands will ensure long-term habitat availability for this bird species. Soil disturbance, herbicide application, creation and maintenance of early successional habitats, creation of nest boxes, and sedimentation should have no indirect effects on tanagers.

Cumulative Effects:
Under this alternative, management activities would protect the overall health of mature forests preferred by scarlet tanagers. Soil disturbance, heavy equipment operation, tree skidding, herbicide application, prescribed fire, creation and maintenance of early successional habitats, creation of wildlife nest boxes, and sedimentation should have no substantial cumulative effects on this species. The scarlet tanager has a stable population trend across its overall range, and its long-term persistence on the Forest is not in question.

Species Trend Effects: The "Proposed Action" alternative should not affect the Forest-wide trend for this species.

- Alternative C - No Herbicide Use- Direct, Indirect & Cumulative Effects

Differences between the direct, indirect, and cumulative effects on this tanager under the "No Herbicides" alternative and those discussed above under the "Proposed Action" alternative *are negligible* overall. Under the "No Herbicides" alternative, the chemical site preparation and release activities would not be accomplished using herbicides, but would be replaced with manual site preparation and release activities. Even though different "tools" would be used (i.e. chainsaws versus herbicides), both methods would result in similar vegetation manipulations. These treatments would largely occur outside the preferred habitat of this tanager, and neither treatment should have any substantial direct, indirect, or cumulative effects on this bird. Non-native invasive plant treatment would

not be accomplished using herbicides under this alternative and non-natives may continue to persist where present. Non-native plants may spread outside of their current location and choke out native plants. Although the "No Herbicides" alternative would eliminate the use of any herbicides, fluroxpyr and imazapic are considered practically non-toxic to birds (SERA 2009, SERA 2004b), glyphosate is considered no more than slightly toxic to birds (EPA 1993, SERA 2003a), imazypyr and metsulfuron methyl are considered to have very low toxicity to birds (SERA 2004b,c), clopyralid is considered not to be toxic to birds (SERA 2004d), and triclopyr is considered to be practically non-toxic to slightly toxic to birds (SERA 2003b). Given the very low potential for any listed herbicide to effect this bird species, there should be *no substantial differences in direct, indirect, or cumulative affects between the "No Herbicides" and "Proposed Action" alternatives.*

Species Trend Effects: The "No Herbicides" alternative should not affect the Forest-wide trend for this species.

MIS "Adequate Early Forest Stage Cover", Prairie Warbler

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
No direct effects would result from this alternative.

Indirect Effects:
Under this alternative, lack of any new management activities could prevent or substantially delay the creation of early successional and open forested habitats needed by this species. Indirectly, habitat for this species would continue to deteriorate resulting in a continued decline as indicated in the Forest trend data for this warbler. Although declining forest health could promote disease and insect outbreaks, and catastrophic wildfires which would temporarily increase the amount of early successional habitat needed by this species, the periodicity and intensity of these wildfires would be uncertain and may not produce and maintain sufficient early successional habitat within this ecosystem.

Cumulative Effects:
Cumulatively, this alternative would perpetuate conditions that could keep prairie warbler populations on a downward trend, possibly even jeopardizing the viability of this species within this ecosystem. This loss in numbers of prairie warblers is being observed Forest-wide. Cumulatively, this alternative would likely have a negative impact on the Forest population trend for this species.

Species Trend Effects: The "No Action" alternative would be expected to negatively affect the Forest-wide trend for this species.

- Alternative B –Smith Mountain Resource Management Project- Direct, Indirect & Cumulative Effects

Direct Effects:
Under the proposed activities, heavy equipment, tree skidding, or prescribed fire may crush or burn nests, eggs, or young birds on the ground. Adults are highly mobile and should not be directly impacted. Soil disturbance, sedimentation, creation and maintenance of early successional habitat, and creation of

wildlife nest boxes should not directly affect this species. Although direct contact with herbicides (or feeding on insects that have been exposed to herbicides) could potentially harm warblers, fluroxpyr and imazapic are considered practically non-toxic to birds (SERA 2009, SERA 2004b), glyphosate is considered no more than slightly toxic to birds (EPA 1993, SERA 2003a), imazypyr and metsulfuron methyl are considered to have very low toxicity to birds (SERA 2004b,c), clopyralid is considered not to be toxic to birds (SERA 2004d), and triclopyr is considered to be practically non-toxic to slightly toxic to birds (SERA 2003b). Based on these toxicity ratings, these 7 herbicides should not have any substantial direct effects on this species. Overall, there should be no substantial direct effects on this species under this alternative.

Indirect Effects:
Under the proposed activities, prairie warbler habitat would be enhanced through the creation of early successional habitat that could be maintained using prescribed fire, heavy equipment operation and associated soil disturbances, and increased openings in the forest canopy following thinning operations. Herbicide applications could help create and maintain additional patches of early successional habitat. Thinning of forest stands would promote the brushy understory used by this species for nesting and foraging habitat. Sedimentation and creation of nest boxes should have no indirect effects on this terrestrial species. Overall, the indirect effects on this species under this alternative would be very beneficial because of the improved habitat quality in this ecosystem.

Cumulative Effects:
Cumulative effects under this alternative would be beneficial due to the creation and maintenance of early successional habitat needed by this warbler, and presently very low in this ecosystem. Prescribed fire, herbicide applications, heavy equipment operation and associated soil disturbances, and forest thinnings would all promote and help maintain a mosaic of open forest stands with patches of early successional habitat. Sedimentation and creation of wildlife nest boxes would not have any substantial cumulative effects on warblers. Overall, the proposed management activities under this alternative would ensure more quality long-term habitat for this species. With sustained habitat improvements, the prairie warbler population should increase. The population increase should also improve wildlife viewing opportunities for Forest users. This alternative should have a positive effect on the Forest population trend for this species.

Species Trend Effects: The "Proposed Action" alternative should positively affect the Forest-wide trend for this species.

- Alternative C - No Herbicides- Direct, Indirect & Cumulative Effects

Differences between the direct, indirect, and cumulative effects on this warbler under the "No Herbicides" alternative and those discussed above under the "Proposed Action" alternative *are negligible* overall. Under the "No Herbicides" alternative, the chemical site preparation and release activities would not be accomplished using herbicides, but would be replaced with manual site preparation and release activities. Even though different "tools" would be used (i.e. chainsaws versus herbicides), both methods would result in more open stands and more early successional habitat for prairie warblers. Non-native invasive plant species would not be treated with herbicides under this alternative and may continue to persist and possibly spread outside of current locations. Although the "No Herbicides" alternative would eliminate the use of herbicides, fluroxpyr and imazapic are

considered practically non-toxic to birds (SERA 2009, SERA 2004b), glyphosate is considered no more than slightly toxic to birds (EPA 1993, SERA 2003a), imazypyr and metsulfuron methyl are considered to have very low toxicity to birds (SERA 2004b,c), clopyralid is considered not to be toxic to birds (SERA 2004d), and triclopyr is considered to be practically non-toxic to slightly toxic to birds (SERA 2003b). Given the very low potential for any listed herbicide to effect this bird species, there should be *no substantial differences in direct, indirect, or cumulative affects between the "No Herbicides" and "Proposed Action" alternatives.*

Species Trend Effects: The "No Herbicides" alternative should positively affect the Forest-wide trend for this species.

[Fisheries & Aquatic Habitat]

MIS "Ouachita Mountain Ecoregion Streams", Central stoneroller, Orangebelly darter, Northern studfish, Northern hog sucker, Green sunfish, Longear sunfish, Striped shiner, Smallmouth bass

The "No Action" Alternative A would have no appreciable direct, indirect, or cumulative effects on stream habitats or the associated MIS (*Ouachita Mountain Ecoregion Streams*) due to the lack of active management. Protection is the only "management" undertaken within these systems of the Smith Mountain Watershed Project Area.

The "Proposed Action" and "No Herbicides" Alternatives would have no appreciable direct, indirect, or cumulative effects on stream habitats (*Ouachita Mountain Ecoregion Streams*) and the associated aquatic MIS. All streams would be protected under the Revised Forest Plan from the direct effects of logging, road construction, wildlife habitat improvement activities, and prescribed burning activities. Indirect effects of soil disturbance, creation/maintenance of early successional habitat, and sedimentation caused by these activities may lead to temporary sedimentation reaching streams in the area. However, these activities would largely take place outside of streamside management areas (SMA). Any effects would be minimal given the habitat conservation measures established in the Forest Plan and FEIS (USDA 2005a, b). Heavy equipment may be used to improve aquatic species upstream access to allow for fish passage of migratory fish species. There should be no substantial soil disturbance or sedimentation resulting from heavy equipment use given the conservation measures in the Forest Plan and FEIS (USDA 2005 a, b) that would be followed for this type of work. The improvement of fish access outweighs any short-term impacts from heavy equipment use and associated disturbances. The stream banks would be stabilized after fish passageways are complete.

Only aquatic registered herbicides may be used in SMAs. No other herbicides would be used in SMAs and therefore, streams and fish would be protected from effects of these herbicides. Approved, aquatic registered herbicides are considered low to practically non-toxic to fish. Herbicides would be applied directly to vegetation and not to the water. If any herbicide did reach water, it would be after a rain event. In that case, only some herbicide may reach the water and since these herbicides are approved for aquatic areas, any effects would be minimal. Herbicide use would not affect the Forest-wide trend for any of these aquatic species.

The greatest concern from prescribed burns on aquatic environments is sediment deposition into the aquatic ecosystems. As discussed previously in the Soils section of this Chapter, the Forest Plan (USDA FS 2005a) identifies maximum allowable soil loss thresholds. Using the Universal Soil Loss Equation (USLE) to predict the quantity of soil loss associated with common Forest management practices, activities from the "Proposed Action" alternative fell within the accepted soil loss rates. The model predicts the amount of soil loss resulting from these activities would be below the maximum allowable soil loss for all timeframes. Therefore, no cumulative effects on aquatic habitat are expected from the "Proposed Action" and "No Herbicides" Alternatives.

MIS "Ponds and Lakes", Bluegill, Redear sunfish, Largemouth bass

The "No Action" Alternative A would have no appreciable direct, indirect, or cumulative effects on pond and lake habitats or the associated MIS (*Ponds and Lakes*) due to the lack of active management. Protection is the only "management" undertaken within these systems of the Smith Mountain Watershed Project Area.

The "Proposed Action" and "No Herbicides" Alternatives would have no appreciable direct, indirect, or cumulative effects on pond and lake habitats (*Ponds and Lakes*) and the associated aquatic MIS. These species would be protected from the direct and indirect effects of heavy equipment operation, prescribed fire, and creation of additional nesting habitat. Wood duck boxes may be placed around ponds for birds, but this would not affect fish or their habitat. Ponds and lakes by nature act as early successional habitat patches because they are open areas. The areas around ponds would continue to be maintained and kept in early successional habitat around pond edges. Maintenance of ponds should not create any substantial soil disturbance or sediment. Under the "Proposed Action", approved, aquatic registered herbicides may be used to control invasive, exotic plants around or on ponds. All herbicides are considered low to practically non-toxic toward fish. The "Proposed Action" and "No Herbicide" Alternatives would be overall beneficial by allowing increased fishing access and maintenance around ponds. The "No Herbicide" Alternative would prevent the treatment of invasive/exotic plant species in and around ponds.

MIS "Forest-wide", Smallmouth bass

The "No Action" Alternative would have no appreciable direct, indirect, or cumulative effects on stream habitats or the associated MIS (*Forest-wide*) due to the lack of active management. Protection is the only "management" undertaken within the Smith Mountain Watershed Project Area. The No Action Alternative should not have any effect on meeting public fishing demand in streams within the Smith Mountain Watershed.

The "Proposed Action" and "No Herbicides" Alternatives would have no appreciable direct, indirect, or cumulative effects on smallmouth bass. These alternatives should not have any effect on meeting public fishing demand in streams within the Smith Mountain Watershed Project Area. All streams would be protected under the Revised Forest Plan from the direct effects of logging, road construction, wildlife habitat improvement activities, and prescribed burning activities. Indirect effects of soil disturbance, creation/maintenance of early successional habitat, and sedimentation caused by these activities may lead to temporary sedimentation reaching streams in the area. However, these activities would largely take place outside of SMAs. Any effects would be minimal given the habitat conservation measures

established in the Forest Plan and FEIS (USDA 2005a, b). Heavy equipment may be used to improve aquatic species upstream access to allow for fish passage of migratory fish species. There should be no substantial soil disturbance or sedimentation resulting from heavy equipment use given the conservation measures in the Forest Plan and FEIS (USDA 2005 a, b) that would be followed for this type of work. The improvement of fish access outweighs any short-term impacts from heavy equipment use and associated disturbances. The stream banks would be stabilized after fish passageways are complete.

Only aquatic registered herbicides may be used in SMAs. No other herbicides would be used in SMAs and therefore, streams and fish would be protected from effects of these herbicides. Approved, aquatic registered herbicides are considered practically non-toxic to fish. Herbicides would be applied directly to vegetation and not to the water. If any herbicide did reach water, it would be after a rain event. In that case, only some herbicide may reach the water and since these herbicides are approved for aquatic areas, any effects would be minimal. Herbicide use would not affect the Forest-wide trend for this aquatic species.

The greatest concern from prescribed burns on aquatic environments is sediment deposition into the aquatic ecosystems. As discussed previously in the Soils section of this Chapter, the Forest Plan (USDA FS 2005a) identifies maximum allowable soil loss thresholds. Using the Universal Soil Loss Equation (USLE) to predict the quantity of soil loss associated with common Forest management practices, activities from the "Proposed Action" alternative fell within the accepted soil loss rates. The model predicts the amount of soil loss resulting from these activities would be below the maximum allowable soil loss for all timeframes. Therefore, no cumulative effects on aquatic habitat and smallmouth bass are expected from the "Proposed Action" and "No Herbicides" Alternatives.

Proposed, Threatened, Endangered and Sensitive Species (PETS) and Habitats

Present Conditions

This discussion documents the possible effects of the proposed actions, including diverse timber management practices, wildlife habitat improvements, prescribed burning, herbicide application, and erosion control for watershed protection on known and potential populations and habitat of the Ouachita National Forest (ONF) Proposed, Endangered, Threatened (USDI FWS 1999), and Sensitive (PETS) species. This discussion is based on the Biological Evaluation (BE), an attachment to this EA and incorporated by reference (USDA Forest Service 2010), which is in accordance with direction given in Forest Service Manual 2672.43 (USDA Forest Service, 2005e). All of the PETS species known to occur on the Caddo-Womble Ranger District (CWRD) have been considered for evaluation in this discussion and were evaluated and/or inventoried according to Forest Service Manual 2672.43 (USDA Forest Service, 2005e). The BE lists all of the ONF PETS species and indicates whether or not each is known to occur within the action area of the Smith Mountain Project Area. The status of each species within the CWRD and within the action area is based on known surveys, literature review, the Revised Forest Plan, the FEIS, and information as cited in the BE. Additionally, USDA Forest Service personnel, including the District Wildlife Biologist and Wildlife Technicians, conducted site inspections within the Smith Mountain Project Area to identify resource needs and look for PETS species and potential PETS habitat. As expressed in the BE for each PETS species listed, additional surveys are not needed at this time to provide more definitive information to improve upon the determination of effects on the evaluated PETS species.

Based on Arkansas Natural Heritage Commission records, FS personnel field observations, and other pertinent information as cited in the BE, 10 PETS species are known to occur or may potentially occur within the action area of the Smith Mountain Project Area (Table 3.16**).**

PETS species that occur or potentially occur on the project area (TABLE 3.16)

	Common Name	Scientific Name	Status
1	Arkansas fatmucket mussel	*Lampsilis powellii*	T
2	Paleback darter	*Etheostoma pallididorsum*	S
3	Caddo madtom	*Noturus taylori*	S
4	Diana fritillary	*Speyeria diana*	S
5	Bald eagle	*Haliaeetus leucocephalus*	S
6	Eastern small-footed bat	*Myotis leibii*	S
7	Waterfall's sedge	*Carex latebracteata*	S
8	Ozark chinquapin	*Castanea pumila ozarkensis*	S
9	Small's woodfern	*Dryopteris X australis*	S
10	Southern lady-slipper	*Cypripedium kentuckiense*	S

T – Federally 'Threatened' species
S – Forest Service 'Sensitive' species

There is 1 Federally listed species that may occur within the action area, the Arkansas fatmucket mussel. The 9 remaining species are considered Sensitive by the USFS, and this group is composed of 2 fish species, 1 butterfly species, 1 bird species, 1 bat species, and 4 plant species.

Issues. There is a concern that the proposed activities, including diverse timber management practices, wildlife habitat improvements, prescribed burning, herbicide application, and erosion control for watershed protection may impact PETS or PETS habitats.

Effects on PETS: The impacts to each of the 10 PETS species, by each of the 3 Alternatives ("No Action", "Proposed Action" and "No Herbicides") are summarized below. Refer to the BE (*Appendix E*) for more detailed discussions on the life history, distribution, and other relevant information for each of the 10 evaluated PETS species.

Species Information, Effects and Determination of Effects

Many of the proposed management activities are similar in nature, and more importantly, their effects are similar in nature. (See MIS section above for specific activities and resulting general effects). This allows us to group and consolidate the specific effects into seven basic types of effects which will be evaluated <u>individually</u> for <u>every</u> PETS species being evaluated in the BE:

- **Soil disturbance impacts**
- **Heavy equipment/tree skidding impacts**
- **Sedimentation impacts**
- **Creation/maintenance of early successional habitat impacts**
- **Creation of wildlife nesting habitat impacts**
- **Prescribed fire impacts**
- **Herbicide impacts**

These 7 impacts will be evaluated below for the 10 PETS species that occur or may occur within the action area.

PETS Species "Arkansas Fatmucket Mussel"

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects-
No direct effects would result from this alternative.

Indirect Effects-
Under the "No Action" alternative, overstocked forests could result in periods of dense canopy closure, followed by disease, insect outbreaks, and catastrophic wildfires. Catastrophic wildfires could result in soil disturbance and lead to excessive amounts of sediment reaching streams within the action area. Large amounts of sediment could reduce the quality of mussel habitat and reduce populations of this already Threatened mussel. Water quality should return to pre-catastrophic wildfire levels over time.

Cumulative Effects-
Under the "No Action" alternative, declining forest health could result in disease and insect outbreaks, catastrophic wildfires, and very diverse canopy conditions throughout the action area. Periodicity and intensity of these catastrophic events would be unpredictable under the "No Action" approach. Cumulative effects under this alternative should be minimal given that these catastrophic events are unpredictable and if they do occur, water quality should recover. In the event of a catastrophic event, mussel populations may decline more rapidly. The mussel is already Federally Threatened and populations are consistently declining.

- Alternative B –Smith Mountain Resource Management- Direct, Indirect & Cumulative Effects and Determination of Effects

Direct Effects-
There should be no direct effects from heavy equipment/tree skidding, prescribed fire, soil disturbance, sedimentation, creation/maintenance of early successional habitat, and creation of wildlife nesting habitat. Herbicide applications will be conducted according to all applicable "Herbicide Use" Conservation Measures (HU001 – HU018) summarized in the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b). Given these conservation measures, mussels should be protected from herbicide applications and any associated direct effects.

Indirect Effects-
Soil disturbance, sedimentation, and creation/maintenance of early successional habitat should not indirectly affect this species due to its aquatic habitat and that no heavy equipment or tree skidding would occur near the river where mussels could occur. Prescribed fire would be lit so that fire would back down into riparian areas and would lead to minimal amounts of soil disturbance or sedimentation and should not affect mussels or their habitat. Prescribed fire may be beneficial by preventing catastrophic wildfires in the future that may lead to excessive amounts of sedimentation reaching the river. Given conservation measures established under the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b), this mussel should also be protected from indirect effects related to herbicide applications (see "*Direct Effects"* section above). There should be no indirect effects to mussels from the proposed activities resulting in creation/maintenance of early successional habitat or creation of wildlife nesting habitat.

Cumulative Effects-
Under the proposed activities, management actions would protect overall forest health, maintaining quality habitat in riparian areas, and preventing catastrophic wildfires. Soil disturbance, heavy equipment use/tree skidding, sedimentation, creation/maintenance of early successional habitat, creation of wildlife nesting habitat, and prescribed fire should not have any cumulative effects on this species. Given conservation measures established under the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b), this mussel should be protected from herbicide applications and should not experience any cumulative effects associated with herbicides. Overall, the net cumulative effects could be beneficial, due to maintenance and restoration of quality habitat under the proposed activities.

Determination of Effects: *The proposed activities should have "no effect" on the Arkansas fatmucket mussel. Management activities would not occur within 0.25-mile of potential aquatic habitat for this species and over 1.0- mile from any previously documented location for this mussel. Overall, the proposed activities would help sustain quality habitat for this species.*

- Alternative C - No Herbicides- Direct, Indirect & Cumulative Effects

Differences between the direct, indirect, and cumulative effects on this mussel species under the "No Herbicides" alternative and those discussed above under the "Proposed Action" alternative are negligible overall:

Direct Effects-
The "No Herbicides" alternative, the site preparation/release activities would not be accomplished using herbicides and would be replaced with manual/mechanical site preparation and release activities such as chainsawing. Treatment of non-native invasive plant species with herbicide would also not be accomplished under this alternative. Although this alternative would eliminate the use of fluroxpyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, triclopyr, and clopyralid, these herbicides are considered only slightly toxic to practically non-toxic to aquatic invertebrates when applied according to registered label directions (EPA 1993, 1998; SERA 2003, 2004, 2009; see *Appendix B* of the BE for specific toxicity ratings). The "No Herbicides" alternative would prevent any accidental spills of herbicide near streams.

Indirect Effects-
The "No Herbicides" alternative would eliminate the use of fluroxpyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, triclopyr, and clopyralid to treat non-native invasive plant species and conduct site preparation/release activities. However, these herbicides are considered slightly toxic to practically non-toxic to aquatic invertebrates when applied according to registered label directions (EPA 1993, 1998; SERA 2003, 2004, 2009; see *Appendix B* of the BE for specific toxicity ratings). Any indirect effects from herbicides to mussels would be eliminated under this alternative.

Cumulative Effects-
Under the proposed activities, management actions would protect overall forest health and provide long-term, mesic, closed-canopy habitat in streamside management areas. Any cumulative effects from the proposed activities would be minimal given that most management activities would take place outside of this species' preferred habitat. Overall, the net cumulative effects would be beneficial, due to maintenance of quality habitat under the proposed activities.

PETS Species "Paleback Darter and Caddo Madtom"

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects-
No direct effects would result from this alternative.

Indirect Effects-
Under the "No Action" alternative, overstocked forests could result in periods of dense canopy closure, followed by disease, insect outbreaks, and catastrophic wildfires. Catastrophic wildfires could result in soil disturbance and lead to excessive amounts of sediment reaching streams within the action area. Although large amounts of sediment could reduce the quality of fish habitat and reduce fish populations, water quality and fish populations should return to pre-catastrophic wildfire levels over time.

Cumulative Effects-
Under the "No Action" alternative, declining forest health could result in disease and insect outbreaks, catastrophic wildfires, and very diverse canopy conditions throughout the action area. Periodicity and intensity of these catastrophic events would be unpredictable under the "No Action" approach. Cumulative effects under this alternative should be minimal given that these catastrophic events are unpredictable and if they do occur, fish populations should be able to recover over time.

- Alternative B –Smith Mountain Resource Management- Direct, Indirect & Cumulative Effects and Determination of Effects

Direct Effects-
Reconstruction of vehicle crossings using heavy equipment may be used in streams to improve upstream fish passage at points currently blocked by poorly designed or poorly maintained crossings. Heavy equipment use in streams may crush individual fish. Best management practices and habitat conservation measures established in the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b) for streamside management areas (SMAs) would provide significant protection for fish. Fire from prescribed burning should not directly affect these species, given that they would be protected by the

aquatic nature of their habitat. There should be no direct effects from tree skidding, soil disturbance, sedimentation, creation/maintenance of early successional habitat, and creation of wildlife nesting habitat. Herbicide applications will be conducted according to all applicable "Herbicide Use" Conservation Measures (HU001 – HU018) summarized in the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b). Given these conservation measures, fish should be protected from herbicide applications and any associated direct effects.

Indirect Effects-
Under the proposed activities, management actions would protect overall forest health. Heavy equipment use, tree skidding, and prescribed fire may indirectly cause soil disturbance and lead to temporary sedimentation reaching streams in the action area. These activities would largely take place outside of SMAs. However, any such effects should be minimal given the habitat conservation measures established in the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b) for streamside management areas. Some soil disturbance and sedimentation may result from any fish passage work using heavy equipment. The improvement of fish access outweighs any short-term impacts from heavy equipment use and associated disturbances. Prescribed fire may be beneficial by preventing catastrophic wildfires in the future that may lead to excessive amounts of sedimentation reaching streams. Given conservation measures established under the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b), these fish should also be protected from indirect effects related to herbicide applications (see "*Direct Effects"* section above). There should be no indirect effects to fish from the proposed activities resulting in creation/maintenance of early successional habitat or creation of wildlife nesting habitat.

Cumulative Effects-
Under the proposed activities, management actions would protect overall forest health, provide long-term, mesic, closed-canopy habitat in streamside management areas, and improve fish passage. Soil disturbance, heavy equipment operation, tree skidding, prescribed fire, creation and maintenance of early successional habitat, sedimentation, and creation of additional wildlife nesting habitat within the action area would largely occur outside of this species' preferred habitat; therefore, any negative cumulative effects would be minimal. Given conservation measures established under the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b), these fish should be protected from herbicide applications and should not experience any cumulative effects associated with herbicides. Overall, the net cumulative effects would be beneficial, due to maintenance of quality habitat under the proposed activities and improvement of fish passage.

Determination of Effects: *The proposed activities "may impact individuals but is not likely to cause a trend to federal listing or loss of viability" for the paleback darter and Caddo madtom. Impacts on these species would be minimal due to the relatively small area of SMAs that would be impacted by the proposed activities. Overall, the cumulative effects under the proposed activities would be beneficial, due to improved fish passage, protection of forest health, watershed restoration, and prevention of catastrophic wildfires.*

- Alternative C - No Herbicides- Direct, Indirect & Cumulative Effects

Differences between the direct, indirect, and cumulative effects on these fish species under the "No Herbicides" alternative and those discussed above under the "Proposed Action" alternative are negligible overall:

Direct Effects-
Under the "No Herbicides" alternative, the site preparation/release activities would not be accomplished using herbicides and would be replaced with manual/mechanical site preparation and release activities such as chainsawing. Non-native, invasive plant treatment using herbicides would also be eliminated under this alternative. Although the "No Herbicides" alternative would eliminate the use of fluroxpyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, triclopyr, and clopyralid, these herbicides are considered only slightly toxic to practically non-toxic to fish and aquatic invertebrates when applied according to registered label directions (EPA 1993, 1998; SERA 2003, 2004, 2009; see *Appendix B* of the BE for specific toxicity ratings). The "No Herbicides" alternative would prevent any accidental spills of herbicide near streams.

Indirect Effects-
The "No Herbicides" alternative would eliminate the use of fluroxpyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, triclopyr, and clopyralid to treat non-native invasive plant species and conduct site preparation/release activities. However, these herbicides are considered only slightly toxic to practically non-toxic to fish and aquatic invertebrates when applied according to registered label directions (EPA 1993, 1998; SERA 2003, 2004, 2009; see *Appendix B* of the BE for specific toxicity ratings). Any indirect effects from herbicides would be eliminated under this alternative.

Cumulative Effects-
Under the proposed activities, management actions would protect overall forest health and provide long-term, mesic, closed-canopy habitat in streamside management areas. Any cumulative effects from the proposed activities would be minimal given that most management activities would take place outside of this species' preferred habitat. Overall, the net cumulative effects would be beneficial, due to maintenance of quality habitat under the proposed activities.

PETS Species "Diana Fritillary"

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects-
No direct effects would result from this alternative.

Indirect Effects-
If "No Action" is taken within the action area, forest health would likely decline due to overstocking of trees. Initially, dense canopy closure could cause a decrease in herbaceous plants needed for nectar food sources and egg-laying sites used by this species. However, overstocked forests could promote disease and insect outbreaks, and catastrophic wildfires which would eventually open the forest canopy. If such

openings were created, this would temporarily promote a flush of herbaceous growth used by this species.

Cumulative Effects-
Under this alternative, forest health would likely decline due to overstocking of trees. The long-term cycling of canopy closure from overstocked stands, followed by disease and insect outbreaks, and catastrophic wildfires, could lead to unpredictable increases and decreases in suitable habitat for this species over time. Periodicity and intensity of these events would be unpredictable under the "No Action" approach.

- Alternative B –Smith Mountain Resource Management Project- Direct, Indirect & Cumulative Effects and Determination of Effects

Direct Effects-
Under the proposed activities, heavy equipment, tree skidding, or prescribed fire may impact larva and eggs on the ground by crushing or burning individuals. Adults are highly mobile and should not be directly impacted. Soil disturbance, sedimentation, creation and maintenance of early successional habitat, and creation of wildlife nesting habitat should not have any direct effects on this species. Although herbicide application could potentially harm larva and eggs on the ground or adults making contact with treated vegetation, clopyralid, fluroxpyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, and triclopyr are considered non-toxic to relatively non-toxic toward terrestrial invertebrates when applied according to registered label directions (SERA 2003, 2004, 2009; see *Appendix B* of the BE).

Indirect Effects-
Under the proposed activities, the proposed management actions would protect overall forest health and promote a flush of beneficial herbaceous growth, especially in areas where prescribed fire or heavy equipment has reduced competition, disturbed soils, and created or maintained early successional habitats often containing plants preferred by this butterfly. Increases in herbaceous cover would provide greater foraging and reproduction opportunities for this species. Sedimentation should have no indirect effects on this terrestrial species which does not depend on aquatic systems for survival. Creation of wildlife nesting habitat should have no indirect effects on this non-nesting species. Although herbicide use could temporarily reduce the abundance of herbaceous vegetation used by this butterfly, herbicide treatments would target non-native plants, and not the plants these butterflies prefer. Herbicide treatments would not likely persist for greater than 12 months and would cover less than < 1% of this species' available habitat within the Forest.

Cumulative Effects-
Under the *Preferred Alternative*, soil disturbance from heavy equipment operation, tree skidding and creation and maintenance of additional early successional habitat through mechanical means and prescribed fire would help sustain growth of beneficial herbaceous plants. These activities would provide more and better long-term habitat for this species. Sedimentation within the action area should have no cumulative effect on this terrestrial species, and increased nesting habitat should have no cumulative effects on this non-nesting species. Given that the herbicides clopyralid, fluroxpyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, and triclopyr are considered non-toxic to relatively non-toxic toward terrestrial invertebrates when applied according to registered label directions (SERA

2003, 2004, 2009; see *Appendix B* of the BE), cumulative effects should be negligible within the action area, which represents a very small fraction of this species' available habitat Forest-wide (< 1% of available habitat).

Determination of Effects: *The proposed activities "may impact individuals but is not likely to cause a trend to federal listing or loss of viability" for the Diana fritillary. Overall, the benefits from increased foraging and reproductive habitat created indirectly and maintained cumulatively under the Preferred Alternative outweigh any negative direct effects on this species.*

- Alternative C - No Herbicides- Direct, Indirect & Cumulative Effects

Differences between the direct, indirect, and cumulative effects on this butterfly species under the "No Herbicides" alternative and those discussed above under the "Proposed Action" alternative are negligible overall:

Direct Effects-
The "No Herbicides" alternative would eliminate the use of fluroxpyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, triclopyr, and clopyralid to treat non-native invasive plant species and conduct site preparation/release activities. However, these herbicides are considered non-toxic to relatively non-toxic toward terrestrial invertebrates when applied according to registered label directions (SERA 2003, 2004, 2009; see *Appendix B* of the BE). Under the "No Herbicides" alternative, negative direct effects on larva and eggs may be reduced by not using herbicides.

Indirect Effects-
As an indirect effect under the "No Herbicides" alternative, habitat availability for this butterfly species may be increased by not using herbicides which could temporarily kill beneficial vegetation used for foraging and reproduction. However, these reduced impacts would be equally offset by the damage mechanical release activities could do to the same beneficial vegetation used by this species. The non-native invasive plant treatment using herbicides would not occur under this alternative and in some areas, non-native plants may continue to expand and choke out beneficial native vegetation if herbicides are not used.

Cumulative Effects-
The overall cumulative effects on this butterfly species were considered beneficial, but negligible, due to the very limited area of habitat impacted under the "Proposed Action" alternative, which included the use of herbicides (see "Proposed Action" section above). It would be logical and consistent to conclude that the "No Herbicides" alternative would likewise also have negligible cumulative effects. The area proposed for herbicide treatment represents a very small fraction of this species' available habitat Forest-wide (< 1% of available habitat).

PETS Species "Bald Eagle"

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects-
No direct effects would result from this alternative.

Indirect Effects-
If "No Action" is taken within the action area, forest health would likely decline due to overstocking of trees. Overstocked forests could promote disease and insect outbreaks, and catastrophic wildfires which could reduce the amount of suitable roosting and potential nesting trees within the area. However, since no known nesting or roosting locations are within the action area, it is unlikely that such activities would cause any disturbance to bald eagles.

Cumulative Effects-
Under this alternative, forest health would likely decline due to overstocking of trees. Although bald eagles are not known to currently use the action area, the "No Action" alternative may prevent bald eagles from using the action area in the future if suitable roosting and nesting trees are lost due to disease and insect outbreaks, or catastrophic wildfires.

- Alternative B –Smith Mountain Resource Management Project- Direct, Indirect & Cumulative Effects and Determination of Effects

Direct Effects-
Under the proposed activities, heavy equipment operation, tree skidding, and prescribed fire should not have any negligible direct effects on bald eagles because they are highly mobile animals and would leave the area during activities if present. Although direct contact with herbicides (or carrion that have been exposed to herbicides) could potentially harm eagles, fluroxpyr and imazapic are considered practically non-toxic to birds (SERA 2009, SERA 2004b), glyphosate is considered no more than slightly toxic to birds (EPA 1993, SERA 2003a), imazypyr and metsulfuron methyl are considered to have very low toxicity to birds (SERA 2004b,c), clopyralid is considered not to be toxic to birds (SERA 2004d), and triclopyr is considered to be practically non-toxic to slightly toxic to birds (SERA 2003b). Based on these toxicity ratings, these 7 herbicides should not have any substantial direct effects on this species. Soil disturbance, creation and maintenance of early successional habitat, sedimentation, and creation of wildlife nesting habitat would not have any direct effects on the bald eagle.

Indirect Effects-
The use of heavy equipment, tree skidding, and prescribed fire may disturb wintering bald eagles and cause them to move temporarily from roosting and foraging areas. Heavy equipment or prescribed fire may also remove or burn down some suitable nesting and roosting trees. However, since no known nesting or roosting locations are within the action area, it is unlikely that such activities would cause any disturbance to bald eagles. Soil disturbance, creation and maintenance of early successional habitat, sedimentation, creation of wildlife nesting habitat, and herbicide application would not indirectly affect the bald eagle.

Cumulative Effects-
No substantial cumulative effects on bald eagles are expected from soil disturbance, heavy equipment operation, tree skidding, sedimentation, creation and maintenance of early successional habitat, creation of wildlife nesting habitat, prescribed fire, and herbicide application. Bald eagles are highly mobile and would move from the action area if disturbed during land management activities. Ultimately, the cumulative effects from protecting overall forest health would protect potential nesting and roosting habitat for the bald eagle.

Determination of Effects: *The proposed activities should have "no impact" on the bald eagle. The action area does not contain any current nesting and roosting habitat for this species, and the occurrence of eagles within the action area is likely limited to occasional individuals flying over. Management activities would ultimately be beneficial to this bird by protecting overall forest health. Given these factors, the proposed activities should not affect eagles or their habitats.*

- Alternative C - No Herbicides- Direct, Indirect & Cumulative Effects

Differences between the direct, indirect, and cumulative effects on this bird species under the "No Herbicides" alternative and those discussed above under the "Proposed Action" alternative are negligible overall:

Direct Effects-
This alternative would eliminate any chance for bald eagles to come in contact with fluroxpyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, triclopyr, and clopyralid. However, these herbicides are considered non-toxic to slightly toxic to birds when applied according to registered label directions (EPA 1993, 1998; SERA 2003, 2004, 2009; see *Appendix B* of the BE).

Indirect Effects-
See Alternative B section above for indirect effects.

Cumulative Effects-
No substantial cumulative effects on bald eagles are expected from the "No Herbicide" alternative. Bald eagles are highly mobile and would move from the action area if disturbed during any of the no-herbicide related proposed actions.

PETS Species "Eastern Small-footed bat"

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects-
No direct effects would result from this alternative.

Indirect Effects-
If "No Action" is taken within the action area, forest health would likely decline due to overstocking of trees. Dense forest stands would limit the amount of bat use in such stands because they do not provide the open flight space that bats prefer. Overstocked forests could promote disease and insect outbreaks, and catastrophic wildfires which could reduce the amount of suitable roosting trees within the area.

Insect outbreaks would provide more forage for bats and catastrophic wildfires could open up the forest canopy and provide better flight space for bats.

Cumulative Effects-
Under this alternative, forest health would likely decline due to overstocking of trees. The "No Action" alternative may limit bats from using the action area in the future if dense forest stands continue to persist without management and suitable roosting trees are lost due to catastrophic wildfires. Overall habitat required for this species would continue to decline.

- Alternative B –Smith Mountain Resource Management Project- Direct, Indirect & Cumulative Effects and Determination of Effects
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Direct Effects-
Under the proposed activities, tree felling and prescribed fire may crush or burn individuals roosting in trees. However, this activity is unlikely to impact bats because they are highly mobile. Timber harvesting and prescribed fire would only impact bats if conducted during warm months when bats may be using trees as roosting sites. Hibernating bats would not be impacted by these proposed activities. Heavy equipment operation, tree skidding, creation/maintenance of early successional habitat, soil disturbance, sedimentation, and creation of nesting habitat should not have any direct effects on this species at any time of the year when these activities may occur. Although direct contact with herbicides (or insects that have been exposed to herbicides) could potentially harm bats, the herbicides fluroxpyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, triclopyr, and clopyralid are considered relatively non-toxic to having low toxicity levels toward mammals (EPA 1993,1998; SERA 2003, 2004, 2009; see *Appendix B* of the BE). Based on herbicide toxicity ratings, these 7 herbicides should not have any substantial direct effects on this species.

Indirect Effects
Under the proposed activities, small patches of early successional habitat would be created or maintained through the use of tree removal, heavy equipment, herbicide applications, and prescribed fire. Open areas would increase flight space for bats and increase sunlight on the forest floor, increasing herbaceous growth for bats' insect prey (Taylor 2006). An increase in herbaceous growth would increase prey diversity and abundance. Improvements to habitat could increase the overall fitness of individual bats, possibly reducing susceptibility to WNS. Temporary soil disturbance from heavy equipment use, motor vehicles, tree skidding and prescribed fire would also help to promote beneficial herbaceous growth and increase the abundance and diversity of insects. Although prescribe fire may eliminate some snags for roosting, fire would also create new roost trees for bats. Creation of nesting habitat may indirectly benefit this species by providing additional summer roosting habitat through the placement of bat boxes in the project area. Sedimentation should not have any indirect effects on this terrestrial species.

Cumulative Effects
Under the proposed activities, heavy equipment, motor vehicles, and prescribed fire resulting in temporary soil disturbance events and creation/maintenance of small patches of early successional habitat would help sustain herbaceous plant growth and increase prey diversity and abundance. Thinning would also help create and maintain early successional habitat and promote beneficial herbaceous growth for prey and improve flight space for bats. These activities would provide more and

better long-term habitat for this species, possibly improving the overall fitness of individual bats and reducing their susceptibility to WNS. Based on toxicity ratings for herbicides (see ***Appendix B***), herbicide application is not expected to have any substantial cumulative effects on this bat species should any direct contact occur. Creation of nesting habitat is not expected to have any substantial cumulative effects on this bat, but may benefit this species by providing additional roosting habitat through the placement of bat boxes. Sedimentation and should not have any cumulative effects on this terrestrial species.

Determination of Effects: *The proposed activities "may impact individuals but is not likely to cause a trend to Federal listing or loss of viability" for the eastern small-footed bat. The benefits from improved foraging habitat indirectly created or maintained cumulatively under the proposed activities outweigh any negative direct effects on this species.*

- Alternative C - No Herbicides- Direct, Indirect & Cumulative Effects

Differences between the direct, indirect, and cumulative effects on this bat species under the "No Herbicides" alternative and those discussed above under the "Proposed Action" alternative are negligible overall:

Direct Effects-
This alternative would eliminate any chance for bats to come in contact with fluroxpyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, triclopyr, and clopyralid. However, these herbicides are considered relatively non-toxic to having low toxicity levels toward mammals when applied according to registered label directions (EPA 1993, 1998; SERA 2003, 2004, 2009; see *Appendix B* of the BE).

Indirect Effects-
See Alternative B section above for indirect effects.

Cumulative Effects-
No substantial cumulative effects on bats are expected from the "No Herbicide" alternative.

PETS Species "Waterfall's Sedge"

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects-
No direct effects would result from this alternative.

Indirect Effects
Under the "No Action" alternative, overstocked forests could result in periods of dense canopy closure, followed by disease, insect outbreaks, and catastrophic wildfires. Following these catastrophic events, many forested stands would exhibit a very open canopy throughout the action area. Given that this plant responds to disturbance, indirect effects would likely be beneficial, but very minor due to the small size of the action area compared to Forest-wide habitat acreage available for this plant.

Cumulative Effects-
Under the "No Action" alternative, declining forest health could result in disease and insect outbreaks, catastrophic wildfires, and very diverse canopy conditions throughout the action area. Periodicity and intensity of these catastrophic events would be unpredictable under the "No Action" approach. Cumulative effects on Waterfall's sedge, which prefers moderate disturbances, should be minimal, however, given the small size of the action area compared to Forest-wide habitat acreage available for this plant.

- Alternative B –Smith Mountain Resource Management Project- Direct, Indirect & Cumulative Effects and Determination of Effects

Direct Effects-
Under the proposed activities, heavy equipment, tree skidding, or prescribed fire may crush or burn individual plants on the ground. Fireline maintenance, temporary road construction, wildlife opening construction/maintenance, and pond construction could be detrimental to Waterfall's sedge by uprooting individual plants following extreme soil disturbance. Given that this plant occurs in diverse habitats, most of which are outside the normal operating limits of land management activities, any direct effects should not be substantial. Soil disturbance, sedimentation, creation and maintenance of early successional habitat, and creation of wildlife nesting habitat should not have any critical direct effects on this species as these activities would largely occur outside of its preferred habitat. Herbicides should not directly impact this species because all areas within the Smith Mountain Project Area containing known locations of Waterfall's sedge have been removed from consideration for herbicide treatment. In the remainder of the action area, herbicide applications will be conducted according to all applicable "Herbicide Use" Conservation Measures (HU001 – HU018) summarized in the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b). Given these conservation measures, Waterfall's sedge should be protected from herbicide applications and any associated direct effects. Overall, any direct effects from the proposed activities on this species would be minimal due to the small area of habitat that would be impacted by the proposed activities.

Indirect Effects-
The proposed activities would indirectly create and maintain small patches of early successional habitat and a more open forest canopy, beneficial to this species which responds to moderate disturbances. Given that this plant occurs in diverse habitats, most of which are outside the normal operating limits of land management activities, these indirect effects should be negligible. Sedimentation and creation of wildlife nesting habitat should have no indirect effects on this terrestrial plant species. Given conservation measures established under the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b), this plant should be protected from indirect effects related to herbicide applications (see "*Direct Effects"* section above).

Cumulative Effects-
Under the proposed activities, management actions would result in creation and maintenance of small patches of early successional habitat, localized soil disturbances from heavy equipment, tree skidding and prescribed fire, and patches of open forest canopy, all of which are beneficial to this plant species. These cumulative effects are expected to be minimal, however, given the comparatively small area of habitat that would be impacted by the proposed activities. Sedimentation and creation of wildlife nesting habitat should have no cumulative effects on this terrestrial plant species, and conservation

measures established under the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b) would protect Waterfall's sedge from any cumulative herbicide impacts.

Determination of Effects: *The proposed activities "may impact individuals but is not likely to cause a trend to federal listing or loss of viability" for Waterfall's sedge. Given that this plant occurs in diverse habitats, most of which are outside the normal operating limits of land management activities, any negative direct, indirect, or cumulative effects should not be substantial. In the small fraction of this species' habitat where disturbances may occur as a result of the proposed activities, the overall effects are expected to be beneficial to the long-term viability of this Sensitive species, which responds to moderate disturbances.*

- Alternative C - No Herbicides- Direct, Indirect & Cumulative Effects

Differences between the direct, indirect, and cumulative effects on this Sensitive plant species under the "No Herbicides" alternative and those discussed above under the "Proposed Action" alternative are negligible overall:

Direct Effects-
Since all areas within the Smith Mountain Project Area containing known locations of Waterfall's sedge have been removed from consideration for herbicide treatment following compliance with all applicable "Herbicide Use" Conservation Measures (HU001 – HU018) summarized in the Revised Forest Plan and FEIS, direct effects on this plant species would be the same under both the "Proposed Action" and "No Herbicides" alternatives. Overall, any direct effects from the proposed activities on this species would not result from herbicide use and would be minimal due to the small area of habitat that would be impacted by the proposed activities.
Indirect Effects-
Acknowledging that there were no substantial indirect effects on this plant species under the "Proposed Action" alternative, which included the use of herbicides, the "No Herbicides" alternative would likewise be expected to have no substantial indirect effects on this species.

Cumulative Effects-
Given that the cumulative effects on this Sensitive plant were negligible under the "Proposed Action" alternative, which included the use of herbicides, it would be logical and consistent to conclude that the "No Herbicides" alternative would likewise have negligible cumulative effects. This plant occurs in diverse habitats, most of which are outside the normal operating limits of land management activities, and this factor provides additional protection from any substantial cumulative management effects.

PETS Species "Ozark Chinquapin"

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects-
No direct effects would result from this alternative.

Indirect Effects-
Under this alternative, forest health would likely decline due to overstocking of trees, which could promote disease and insect outbreaks, and catastrophic wildfires. These factors could create large forest openings, beneficial to this species which responds well to openings, increased sunlight, and a reduction in competition.

Cumulative Effects-
Under this alternative, forest health would likely decline due to overstocking of trees, which could promote disease and insect outbreaks, and catastrophic wildfires. These factors could create large beneficial forest openings in the short-term, but lack of a managed prescribed burn program could cause a long-term loss of these beneficial openings. Periodicity and intensity of these catastrophic events would be unpredictable under the "No Action" approach.

- Alternative B –Smith Mountain Resource Management Project- Direct, Indirect & Cumulative Effects and Determination of Effects

Direct Effects-
Under the proposed activities, heavy equipment, tree skidding, or prescribed fire may crush or burn individual plants on the ground. These activities may damage vegetative portions of plants, but this would not affect roots or stumps from which sprouts form. Fireline maintenance, temporary road construction, and wildlife opening construction/maintenance could be detrimental to Ozark chinquapin by uprooting individual plants following extreme soil disturbance; therefore these activities would be conducted such that the routes and sites selected avoid intersecting these easily identifiable/recognizable Sensitive plants. Sedimentation, increased wildlife nesting habitat, and increased early successional habitat should not directly affect this plant species. Herbicides should not directly impact this species because all areas within the Smith Mountain Project Area containing known locations of Ozark chinquapin have been removed from consideration for herbicide treatment. In the remainder of the action area, herbicide applications will be conducted according to all applicable "Herbicide Use" Conservation Measures (HU001 – HU018) summarized in the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b). Given these conservation measures, Ozark chinquapin should be protected from herbicide applications and any associated direct effects. Overall, any direct effects from the proposed activities on this species would be minimal due to the small area of habitat that would be impacted by the proposed activities.

Indirect Effects-
The proposed activities would indirectly create small patches of early successional habitat and a more open forest canopy, beneficial to this species which responds well to openings, increased sunlight, and a reduction in competition. According to NatureServe (2009), recent experiments suggest that chinquapins respond favorably to canopy thinning through increased sprouting, flowering and fruit production. In the short-term, localized soil disturbance from heavy equipment operation/tree skidding and prescribed fire activities may indirectly affect this plant, but may ultimately stimulate growth of new sprouts also, based on chinquapin study plots currently being monitored on the CWRD. Sedimentation and creation of additional wildlife nesting habitat should have no indirect effects on this terrestrial plant species. Given conservation measures established under the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b), this plant should be protected from indirect effects related to herbicide applications (see "*Direct Effects"* section above).

Cumulative Effects-
Cumulative effects from the proposed activities would result in creation of small forest openings and patches of early successional habitat, which are beneficial to this plant species. Soil disturbance from heavy equipment operation/tree skidding would be temporary in nature and would not add to cumulative effects as these activities would be conducted such as to avoid this plant. Prescribed fire, as proposed under the *Preferred Alternative*, should be beneficial to chinquapins by reducing competition and stimulating growth and intensive resprouting. Loss of the natural fire regime has led to successional change that has negatively affected regeneration and growth in chinquapin (NatureServe 2009). Sedimentation and creation of additional wildlife nesting habitat should have no cumulative effects on this terrestrial plant species. Given conservation measures established under the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b), this plant should be protected from cumulative effects related to herbicide applications.

Determination of Effects: *The proposed activities "may impact individuals but is not likely to cause a trend to federal listing or loss of viability" for Ozark chinquapin. Given conservation measures established under the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b), any negative direct effects on this species are outweighed by positive indirect effects such as intensive resprouting and increased growth resulting from increased canopy openings and prescribed fire. Cumulative effects promote long-term viability of this Sensitive plant species under the Preferred Alternative.*

- Alternative C - No Herbicides- Direct, Indirect & Cumulative Effects

Differences between the direct, indirect, and cumulative effects on this Sensitive plant species under the "No Herbicides" alternative and those discussed above under the "Proposed Action" alternative are negligible overall:

Direct Effects-
Since all areas within the Smith Mountain Project Area containing known locations of Ozark chinquapin have been removed from consideration for herbicide treatment following compliance with all applicable "Herbicide Use" Conservation Measures (HU001 – HU018) summarized in the Revised Forest Plan and FEIS, direct effects on this plant species would be the same under both the "Proposed Action" and "No Herbicides" alternatives. Overall, direct effects would not come from herbicides and would be limited to activities that may damage vegetative portions of plants, but this would not affect roots or stumps from which sprouts form.

Indirect Effects-
Acknowledging that there were no substantial negative indirect effects on this plant species under the "Proposed Action" alternative, which allowed for the use of herbicides, the "No Herbicides" alternative would likewise be expected to have no substantial negative indirect effects on this species. This plant would likely benefit from moderate habitat disturbances caused by the proposed activities.

Cumulative Effects-
The "No Herbicides" alternative would be expected to have the same positive cumulative effects anticipated under the "Proposed Action" alternative, which differs only in allowing for the use of herbicides. Overall positive cumulative effects would be expected, including intensive chinquapin

resprouting and increased growth resulting from increased canopy openings and reduced understory competition.

PETS Species "Small's Woodfern and Southern Lady-slipper"

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects-
No direct effects would result from this alternative.

Indirect Effects-
Under this alternative, overstocked forests could promote disease, insect outbreaks, and catastrophic wildfires. These factors could potentially result in a more open canopy along streamside management areas, decreasing the amount of mesic, closed-canopy habitat preferred by these plants.

Cumulative Effects-
Under this alternative, declining forest health could result in disease and insect outbreaks, catastrophic wildfires, and could potentially result in a decrease in the amount of mesic, closed-canopy habitat preferred by these plants. Periodicity and intensity of these catastrophic events would be unpredictable under the "No Action" approach.

- Alternative B –Smith Mountain Resource Management Project- Direct, Indirect & Cumulative Effects and Determination of Effects

Direct Effects-
Under the proposed activities, heavy equipment, tree skidding, or prescribed fire may crush or burn individual plants on the ground. Fireline maintenance or temporary road construction could be detrimental to these plants by uprooting individual plants following extreme soil disturbance. However, such impacts are not likely due to conservation measures established under the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b) for SMAs and seeps/springs preferred by these plants. Such areas are protected from heavy equipment operation, and are generally too wet to sustain intense fires. Soil disturbance, sedimentation, creation and maintenance of early successional habitat, and creation of additional wildlife nesting habitat should not have any substantial direct effects on these species as these activities would occur outside of their preferred habitat. Herbicides should not directly impact these species because all areas within the Smith Mountain Project Area containing known locations of these plant species have been removed from consideration for herbicide treatment. In the remainder of the action area, herbicide applications will be conducted according to all applicable "Herbicide Use" Conservation Measures (HU001 – HU018) summarized in the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b). Given these conservation measures, ferns and lady-slippers should be protected from herbicide applications and any associated direct effects. Overall, any direct effects from the proposed activities on these species would be minimal due to the relatively small area of habitat that would be impacted by the proposed activities.

Indirect Effects-
Under the proposed activities, management actions would protect overall forest health. Indirect effects from the proposed activities would be minimal due to the conservation measures established under the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b) for streamside management areas and seeps/springs preferred by these species. Minimal areas of mesic habitat would be impacted by soil disturbance, heavy equipment operation, tree skidding, prescribed fire, creation and maintenance of early successional habitat, sedimentation, and creation of additional wildlife nesting habitat. Such activities would largely occur outside of these species' preferred habitat. Given conservation measures established under the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b), these plants should also be protected from indirect effects related to herbicide applications (see "*Direct Effects"* section above).

Cumulative Effects-
Under the proposed activities, management actions would protect overall forest health and provide long-term, mesic, closed-canopy habitat in streamside management areas and seeps/springs preferred by these plants. Soil disturbance, heavy equipment operation, tree skidding, prescribed fire, creation and maintenance of early successional habitat, sedimentation, and creation of additional wildlife nesting habitat within the action area would largely occur outside of these species' preferred habitat; therefore, any negative cumulative effects would be minimal. Given conservation measures established under the Forest Plan (USDA FS 2005a) and FEIS (USDA FS 2005b), these plants should be protected from herbicide applications and should not experience any cumulative effects associated with herbicides. Overall, the net cumulative effects would be beneficial, due to maintenance of quality habitat under the proposed activities.

Determination of Effects: *The proposed activities "may impact individuals but is not likely to cause a trend to federal listing or loss of viability" for Small's woodfern and southern lady-slipper. Impacts on these species would be minimal due to the relatively small area of mesic habitat that would be impacted by the proposed activities. Overall, the cumulative effects under the proposed activities would be beneficial, due to protection of forest health and sustenance of long-term, mesic, closed-canopy habitat in streamside management areas and seeps/springs preferred by these species.*

- Alternative C - No Herbicides- Direct, Indirect & Cumulative Effects

Differences between the direct, indirect, and cumulative effects on these Sensitive plant species under the "No Herbicides" alternative and those discussed above under the "Proposed Action" alternative are negligible overall:

Direct Effects-
Since all areas within the Smith Mountain Project Area containing known locations of Small's woodfern and southern lady-slipper have been removed from consideration for herbicide treatment following compliance with all applicable "Herbicide Use" Conservation Measures (HU001 – HU018) summarized in the Revised Forest Plan and FEIS, direct effects on these plant species would be the same under both the "Proposed Action" and "No Herbicides" alternatives. Any direct effects, as discussed in the "Proposed Action" alternative section, would not result from herbicide applications, but rather from heavy equipment operation, skidded trees, or prescribed fire crushing or burning individual plants on the ground. However, such impacts are not likely due to conservation measures established under the

Revised Forest Plan and FEIS for streamside management areas and seeps/springs preferred by these plants.

Indirect Effects-
Acknowledging that Small's woodfern and southern lady-slipper locations will not be treated with herbicides due to conservation measures under the Revised Forest Plan and FEIS, indirect effects on these plant species would be the same under both the "Proposed Action" and "No Herbicides" alternatives. Indirect effects on these species from proposed actions other than herbicide treatment would be minimal due to the relatively small area of mesic habitat that would be impacted by these proposed activities.

Cumulative Effects-
Given that the cumulative effects on these Sensitive plant species were not substantial under the "Proposed Action" alternative, which included the use of herbicides, it would be logical and consistent to conclude that the "No Herbicides" alternative would likewise have negligible cumulative effects. Overall, the net cumulative effects would be beneficial, due to maintenance of quality habitat under the proposed activities.

Economy

Cattle, swine and poultry production, along with mining and tourism make up the economy of Montgomery County. Sixty-three percent of the county is national forest land with the federal government being a stable employer. The local timber industry depends on National Forest land for a source of raw material. In 2009, the average median household income for Montgomery County was $32,238. The Arkansas Covered Employment and Earnings annual report of 2008 shows earnings from agriculture, forestry, fishing, hunting and mining totaled $2,224,013 in Montgomery County. (Department of Workforce Services, Labor Market Information)

Payments to Counties

On October 3, 2008, the Secure Rural Schools and Community Self-Determination Act of 2000 was reauthorized as part of Public Law 110-343. The new Secure Rural Schools Act has some significant changes. To implement the new law, the Forest Service requested that states and counties with national forest lands to elect one of the following options for annual payments from the U.S. Treasury for Fiscal Years 2008 through 2011:

- A share of the State's 25-percent 7-year rolling average payment.
- A share of the Secure Rural Schools State (formula) payment.

Montgomery County contains approximately 334,355 acres of National Forest System Lands, and has elected to receive the Secure Rural Schools State (formula) payment. In 2009, Montgomery County received a total of $1,290,493.88 in funds under this payment option. Beginning in Fiscal Year 2012, payments to all States will be made using the 7-year rolling average payment. (All Service Receipts-Payment Reports 2010)

The local or county economy has benefited from previous timber harvesting *(and gas or minerals?)* activities on the Cold Springs Ranger District, which have supplied raw material to the local timber industry. Montgomery County has elected the "formula payment option "under the Secure Rural Schools and Community Self Determination Act (Public Law 110-343), which is partially funded by proceeds from timber sales; however, since the formula itself is not tied to current or prior year timber sales, this topic is outside the scope of this proposal and is eliminated from further discussion.

Project Financial Efficiency

Under Alternative B and Alternative C there would be both costs and revenues associated with the sale of timber. Costs include activities that are directly associated with timber management (site preparation, timber sale administration, road maintenance, etc.). Revenues are generated from the sale of timber. A computer program called Quick-Silver 6 was used to evaluate the financial efficiency of each alternative; these results are displayed in Table 3.15 below. The detailed costs, revenues, and the complete Quick-Silver 6 analysis report are in the Smith Mountain Watersheds Resource Management Project file.

COMPARISON BY FINANCIAL EFFICIENCY (TABLE 3.15)

Cost/Income Activities	Alternative A $	Alternative B $	Alternative C $
Present Value of Revenues[1]	0	1,192,551	1,092,278
Present Value of Costs[2]	0	(1,011,047)	(1,014,947)
Present Net Value[3]	0	181,505	77,331
Revenue/Cost Ratio[4]	N/A	1.18	1.08

1- Present Value of Revenues – The sum of all revenues discounted at some interest rate.
2- Present Value of Costs – The sum of all costs discounted at some interest rate.
3- Net Present Value – The sum of the present value of the revenues minus the sum of the present value of the costs.
4- Revenue/Cost Ratio – Present value of revenues divided by the present value of costs.

The Present Net Value and Revenue/Cost Ratio are highest for Alternative B. Costs for manual activities are higher than with the use of herbicides under Alternative C.

Public Health and Safety

Present Conditions

Refer to the present conditions described in the Air Quality section and the Water Resources & Quality section of this chapter. There is a concern that prescribed burning and the application of herbicides may cause hazards to human health and safety.

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
The prescribed burning and the application of herbicides prescribed in Alternative B would not take place under Alternative A. Therefore, there would be no direct effect to public health and safety specific to these activities under Alternative A.

Indirect Effects:
Under the No Action alternative, controlled fuel reductions burns would not take place. This could pose a risk to public health and safety in the form of an increase in the likelihood and intensity of wildfires occurring within the area and spreading to private or other populated areas. Under the No Action Alternative there would be no application of herbicides; therefore, there would be no indirect effects to public health and safety in regards to the application of herbicides.

Cumulative effects:
Under the No Action alternative, controlled fuel reductions burns would not take place. This could pose a risk to public health and safety in the form of an increase in the likelihood and intensity of wildfires occurring within the area and spreading to private or other populated areas. Under the No Action Alternative there would be no application of herbicides; therefore, there would be no cumulative effects to public health and safety in regards to the application of herbicides.

- Alternative B: Smith Mountain Resource Management Project – Direct, Indirect & Cumulative Effects

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

Accidents or other unforeseen events might occur during herbicide transportation, mixing, and application. Public safety in and around areas of herbicide use is a high priority concern. Measures are taken to help ensure that the general public does not come in contact with herbicides, which would eliminate the risk entirely. These include posting warning signs on areas that have been treated; selectively targeting vegetation that needs to be controlled rather than using broadcast application; establishing buffer zones of non-treatment around private property, streams, roads, and hiking trails; carefully transporting only enough herbicide for one day's use; mixing it on site away from private land, open water, or other sensitive areas; properly maintaining and operating equipment (e.g. no leaks); and having good accident pre-planning and emergency spill plans in place. Enforcement and administration will be effective in reducing the risk of accidental contamination to humans or the environment. In the event of an accidental spill, the Emergency Spill Plan (Forest Service Manual 2109 Chapter 30) would be followed. The Plan contains procedures for spill containment and cordoning-off of the spill area. These measures along with others given in the RLRMP are incorporated into contracts and through good enforcement and administration would be effective in reducing the risk of accidental contamination of humans or the environment.

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

Herbicide applications were monitored for effectiveness in protecting water quality over a five-year period on the Ouachita NF (Clingenpeel, 1993). The objective was to determine if herbicides are present in water in high enough quantities to pose a threat to human health or aquatic organisms. From 1989 through 1993, 168 sites and 348 water samples were analyzed for the presence of herbicides. Of those samples, 69 had detectable levels of herbicide. No concentrations were detected that would pose a significant threat to human health or aquatic organisms.

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

SERA Human Health and Ecological Risk Assessments were used to analyze the risks associated with the seven herbicides proposed under this Alternative. Project specific SERA worksheets were completed for glyphosate, imazapyr, imazapic, triclopyr, mutsulfuron methyl, clopyralid and fluroxpyr.

Project specific SERA worksheets (version 4.06) were completed for glyphosate at the maximum prescribed rate of 2 pounds of active ingredient per acre. The lower application volume is 5 gallons per acre, central application volume is 10 gallons per acre, and upper application volume is 25 gallons per acre. Hazard Quotients are at acceptable levels (less than 1) for all exposure scenarios except for the following: The risk characterization of acute/accidental exposures to water consumption, accidental spill for a child at upper level applications, and consuming contaminated vegetation for an adult female at upper level applications.

Project specific SERA worksheets (version 4.06) were completed for imazapyr at the maximum prescribed rate of 0.75 pounds of active ingredient per acre. The lower application volume is 5 gallons per acre, central application volume is 10 gallons per acre, and upper application volume is 20 gallons per acre. All Hazard Quotients are at acceptable levels (less than 1) for all worker exposure scenarios and all general public exposure scenarios.

Active ingredient imazapic may be used at a rate of 0.10 pounds/acre under this analysis. It will generally be applied as a foliar application to the non-native invasive species. Typical exposures to imazapic do not lead to estimated doses that exceed a level of concern. For workers, no exposure scenarios, acute or chronic, generate a level of concern even at the upper ranges of estimated doses. For members of the general public, the upper limits for hazard quotients are below a level of concern except for the accidental spill of a large amount (> 200 gallons) of imazapic into a very small pond. Immediate consumption of water from this pond would reach a level of concern (SERA 2004a, pgs 3-22 to 3-24.). Measures are taken to help ensure that these accidental spills do not happen and that the general public does not come in contact with herbicides. For example, by establishing buffer zones of non-treatment around private property, and streams; carefully transporting only enough herbicide for one days use; mixing it on site away from private land, open water or other sensitive areas; properly maintaining and operating equipment (e.g. no leaks); and having good accident preplanning and emergency spill plans in place.

Project specific SERA worksheets (version 4.06) were completed for triclopyr-amine formulation at the maximum prescribed rate of 2 pounds of active ingredient per acre. The lower application volume is 5 gallons per acre, central application volume is 21.5 gallons per acre, and upper application volume is 40

gallons per acre. Hazard Quotients are at acceptable levels (less than 1) for all exposure scenarios except for the following: general exposure for 8 hours of application per day for a backpack worker treating 1 acre per hour. The Hazard Quotient can be reduced to an acceptable level for backpack workers applying triclopyr-amine formulation by limiting application to 7 hours a day, or reducing the area treated to 0.625 acres per hour. Hazard Quotients are at acceptable levels (less than 1) for all exposure scenarios except the following: acute (short term) exposures for the direct spray of a whole child at upper level applications; the direct spray of an adult female's feet and lower legs at central and upper level applications; vegetation contact by an adult female wearing shorts and t-shirt at central and upper level applications; the consumption of contaminated fruit by an adult female at upper level applications; the consumption of contaminated vegetation by an adult female at lower, central and upper level applications; and water consumption from an accidental spill by a child at upper level applications; Chronic (longer term) exposures for the consumption of contaminated vegetation by an adult female at central and upper level applications.

Project specific SERA worksheets (version 4.06) were also completed for triclopyr-ester formulation at the maximum prescribed rate of 0.76 pounds per acre. The lower application volume is 5 gallons per acre, central application volume is 21 gallons per acre, and upper application volume is 40 gallons per acre. Hazard Quotients are at acceptable levels (less than 1) for all exposure scenarios except for the following: accidental/incidental exposure of workers to contaminated gloves for 1 hour, general exposure for 8 hours of application per day for a backpack worker treating 1 acre per hour. The Hazard Quotient can be reduced to an acceptable level for backpack workers applying triclopyr-ester formulation by limiting application to 7 hours a day, or reducing the area treated to 0.625 acres per hour. Hazard Quotients are at acceptable levels (less than 1) for all exposure scenarios except the following: acute (short term) exposures for the direct spray of a whole child at upper level applications; the direct spray of an adult female's feet and lower legs at central and upper level applications; vegetation contact by an adult female wearing shorts and t-shirt at central and upper level applications; the consumption of contaminated fruit by an adult female at upper level applications; the consumption of contaminated vegetation by an adult female at lower, central and upper level applications; and water consumption from an accidental spill by a child at upper level applications; Chronic (longer term) exposures for the consumption of contaminated vegetation by an adult female at central and upper level applications.

The project analysis calls for the potential use of 0.03 pounds/acre of metsulfuron methyl to be used for treatment of NNIS. In the SERA Final Report for the Risk Assessment on metsulfuron methyl they used a typical application rate of 0.03 pounds/ acre. The rate of 0.03 pounds/acre of active ingredient was used in the risk analysis spreadsheets. At this rate the spreadsheets indicate the use of Metsulfuron methyl does not pose any identifiable hazard to workers or the general public in Forest Service applications. The effects to birds, mammals, fish and invertebrates are expected to be minimal from the use of metsulfuron methyl (Executive Summary, SERA risk assessment for metsulfuron methyl). The model does show that adverse effects on aquatic plants are plausible. This would be under a scenario where the herbicide reaches a static body of water either through runoff or percolation. For bodies of water that are flowing (e.g. streams) phytotoxic concentrations are likely to be transient and have little impact on any plant species. It is not anticipated that adverse effects on aquatic algae would result from exposure to metsulfuron methyl at application rates used by the Forest Service (Executive Summary, SERA risk assessment for metsulfuron methyl).

The project analysis calls for the potential use of 0.35 pounds/acre of clopyralid to be used for treatment of NNIS. In the SERA Final Report for the Risk Assessment on clopyralid they used a typical application rate of 0.35 pounds/ acre. The rate of 0.35 pounds/acre of active ingredient was used in the risk analysis spreadsheets. At this rate the spreadsheets indicate the use of clopyralid does not pose any identifiable hazard to workers or the general public in Forest Service applications. Also at this rate the model asserts that minimal effects associated with the toxicity of clopyralid can be anticipated in terrestrial or aquatic animals from the use of this compound in Forest Service applications (Executive Summary, Sera risk assessment for clopyralid). The model does show that adverse effects on aquatic plants are plausible. This would be under a scenario where the herbicide reaches a static body of water either through runoff or percolation. For bodies of water that are flowing (e.g. streams) phytotoxic concentrations are likely to be transient and have little impact on any plant species. It is not anticipated that adverse effects on aquatic algae would result from exposure to clopyralid at application rates used by the Forest Service (Executive Summary, SERA risk assessment for clopyralid).

The project analysis calls for the potential use of 0.5 pounds/acre of fluroxypyr to be used for treatment of NNIS. In the SERA Final Report for the Risk Assessment on fluroxypyr they used a typical application rate of 0.5 pounds/ acre. The rate of 0.5 pounds/acre of active ingredient was used in the risk analysis spreadsheets. At this rate the spreadsheets indicate the use of fluroxypyr does not pose any identifiable hazard to workers or the general public in Forest Service applications. Also at this rate the model asserts that minimal effects associated with the toxicity of fluroxypyr can be anticipated in terrestrial or aquatic animals from the use of this compound in Forest Service applications (Executive Summary, SERA risk assessment for fluroxypyr-MHE). The model does show that adverse effects on aquatic plants are plausible. This would be under a scenario where the herbicide reaches a static body of water either through runoff or percolation. For bodies of water that are flowing (e.g. streams) phytotoxic concentrations are likely to be transient and have little impact on any plant species. It is not anticipated that adverse effects in aquatic algae would result from exposure to fluroxypyr at application rates used by the Forest Service (Executive Summary, SERA risk assessment for fluroxypyr).

- Alternative C: No Herbicide Use - Direct, Indirect & Cumulative Effects

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

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

Scenic Resources

Present Conditions

Scenic Integrity Objectives (SIOs) are desired levels of excellence based on physical and sociological characteristics of an area. They refer to the degree of acceptable alterations to the landscape character. SIOs range from very high to low. The SIOs occurring within the project area are very high, high, medium, and low. Less than one acre timber harvest activities or prescribed burning are proposed within very high SIO areas. Approximately 152 acres of regeneration and commercial thinning harvests and

1,473 prescribed burning activities are proposed within high SIO areas. These SIOs are defined as follows:

Very High: Generally provides for only for ecological changes in natural landscapes and complete intactness of landscape character in cultural landscapes.

High: Human activities are not visually evident to the casual observer. Activities may only repeat attributes of form, line, color, and texture found in the existing landscape character.

Moderate: Landscapes appear slightly altered. Noticeable human-created deviations must remain visually subordinate to the landscape character being viewed.

Low: Landscapes appear moderately altered. Human-created deviations begin to dominate the valued landscape character being viewed but borrow from valued attributes such as size, shape, edge effect, and pattern of natural openings, vegetative type changes, or architectural styles outside the landscape being viewed.

The Region 8 scenery treatment guide provides recommended techniques to achieve Scenic Integrity Objectives and Landscape Character. Consultation with the Ouachita Forest Landscape Architect was performed for this project.

Open roads MG9, MG26, MG 225, C39D, C52, C53A, 208, 47130 and 177W fall within moderate to high scenic integrity objectives. Where commercial timber operations fall along adjacent to these roads, the following treatments will be implemented.

- Trees should be selectively removed to improve scenery within high use areas. Stems should be cut to within 6 inches of the ground within the immediate foreground (within 100 ft) where practicable.

- Slash should be treated to within an average of 2 feet to the ground when visible within 100 feet on either side of roads.

- During temporary road construction or permanent road construction/reconstruction within these stands, slash and root wads should be eliminated or removed from view in the immediate foreground (within 150 ft) to the extent possible.

- Flowering and other visually attractive trees and understory shrubs are favored when leaving vegetation.

- For areas with a moderate to high SIO, root wads and other unnecessary debris should be removed or placed out of sight within 150 feet of key viewing areas.

- For areas with a moderate to high SIO, leave tree marking or unit boundary is applied so as not to be visible within 100 feet of concern level 1 and 2 roads.

- For areas with a moderate to high SIO, log landings, roads, and bladed skid trails should be located out of view, when possible, to avoid bare mineral soil being seen from concern level 1 and 2 roads.

- Utility rights-of-ways are located and maintained to conform with natural-appearing patterns of vegetation to the extent possible.

- The visual impact of roads and constructed firelines should be blended so they remain subordinate to the existing landscape character in size, form, line, color, and texture.

- Openings should be organically shaped. Edges should be shaped and/or feathered where appropriate to avoid a shadowing effect in the cut unit.

- Cut and fill slopes are revegetated to the extent possible.

There is a concern that prescribed burning, timber harvest, and site preparation activities may compromise the scenic integrity of the project area.

➢ Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
By not implementing the proposed activities, this Alternative would not alter scenic integrity.

Indirect effects:
Scenic quality may be compromised by not implementing harvest activities in this area. Densely stocked stands result in reduced vigor or health, which increases an areas susceptibility to insects and disease. Infestations could result in tree death, negatively impacting visual quality.

In the event of a catastrophic wildfire, crown fires, or those that sweep through the canopy create a visible change to the landscape. Snags would appear as black, brown, and gray "skeletons". Other trees would show burn scars. Burn scars on tree trunks or "torched trees" remain visible for a long time. Understory vegetation would quickly green up, however the standing burned vegetation would remain.

Cumulative effects:
No cumulative effects are expected from implementation of this alternative. The changes in the landscape would continue to appear natural to the observer.

➢ Alternative B: Smith Mountain Resource Management Project – Direct, Indirect, and Cumulative Effects

Direct effects:
Proposed modified seedtree regeneration harvests would reduce the stand basal area and create a visible linear edge along the surrounding forest. The number of trees removed from a typical thinning usually creates a minimal change in the forest form. Few, if any, linear edges occur. Pine needles in slash turn a distinctive red-orange color and the wood becomes gray. Hardwood slash does not change color, but

tends to be noticeable in early spring and in late fall. Understory vegetation helps screen slash from view.

Proposed site preparation would result in a loss of midstory and understory vegetative screening, and produce slash on the forest floor. Because these activities target hardwoods, a loss of spring and fall colors would be evident. Although the application of herbicides may coincide with the seasonal browning of leaves in autumn, standing dead vegetation may be evident for two or three years after application.
Changes in color and texture would result from exposed soil in roads, skid trails, and firelines. Prescribed fires that burn along the ground tends to create short-term color changes. Prescribed burning would temporarily reduce the amount of understory vegetation, allowing for greater viewing depth into the forest. Burning would create a charred appearance on tree trunks and the forest floor. These effects would diminish in three to six months due to regrowth of vegetation on the forest floor, as well as natural leaf shedding. The landscape would regenerate within 1 to 2 years following the disturbance, allowing greening-up and limiting far distant views into the landscape.

Changes in color and texture would also result from exposed soil in temporary roads and skid trails. During active logging operations, harvest equipment and log truck activity would be noticeable.

Indirect effects:
By implementing the proposed harvest activities, thus increasing the vigor or health of the trees, may reduce the negative impacts to visual quality that could result from insects and disease.

By implementing the prescribed burning blocks, the detrimental effects to visual quality resulting from catastrophic fire are diminished. Namely, the chance of a crown fire is diminished that could result in dead overstory trees and large burn scars on remaining live trees.

Cumulative effects:
No cumulative effects would result from Alternative B. Scenic Integrity Objectives would be met.

- Alternative C: No Herbicide Use– Direct, Indirect, and Cumulative Effects

The effects of Alternative C would be the same as those listed under Alternative B above with the exception of the effects of herbicide application.

Climate Change

Effects of proposed actions on climate change

Forests play a major role in the global carbon cycle by storing carbon in live plant biomass (approximately 50% of dry plant biomass is carbon), in dead plant material and in soils. Forests contain three-fourths of all plant biomass on earth, and nearly half of all soil carbon. The amount stored represents the balance between absorbing CO_2 from the atmosphere in the process of photosynthesis and releasing carbon into the atmosphere through live plant respiration, decomposition of dead organic matter, and burning of biomass (Krankina and Harmon, 2006).

Through the process of photosynthesis, carbon is removed from the atmospheric pool. About half the carbon absorbed through photosynthesis is later released by plants through respiration as they use their own energy to grow. The rest is either stored in the plant, transferred to the soil where it may persist for a very long time in the form of organic matter, or transported through the food chain to support other forms of terrestrial life. When plants die and decompose, or when biomass or its ancient remains in the form of fossil fuels are burned, the original captured and stored carbon is released back to the tmosphere as CO_2 and other carbon-based gases. In addition, when forests or other terrestrial ecosystems are disturbed through harvesting, conversion, or natural events such as fires, some of the carbon stored in the soils and organic matter, such as stumps, snags, and slash, is oxidized and released back to the atmospheric pool as CO_2. The amount released varies, depending on subsequent land use and probably rarely is more than 50% of the original soil store (Salwasser, 2006). As forests become older, the amount of carbon released through respiration and decay can exceed that taken up in photosynthesis, and the total accumulated carbon levels off. This situation becomes more likely as stands grow overly dense and lose vigor. Wildfires are the greatest cause of carbon release from forests. At the global scale, if more carbon is released than is captured and stored through photosynthesis or oceanic processes, the concentration of carbon dioxide (CO_2) builds in the atmospheric pool. However, the greatest changes in forest sequestration and storage over time have been due to changes in land use and land use cover, particularly from forest to agriculture and more recently changes are due to conversions from forest to urban development, dams, highways, and other infrastructure (Malmsheimer, Heffernan, Brink, et al.).

- Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
No management activities would occur under Alternative A, therefore no direct effects on greenhouse gases (GHG) emissions and carbon cycling would occur.

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

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

- Alternative B: Smith Mountain Resource Management Project – Direct, Indirect, and Cumulative Effects

Direct Effects:
The proposed harvest operations would result in a release of carbon and reduce carbon storage in the forest both by removing organic matter (trees) and by increasing heterotrophic soil respiration. However, much of the carbon that is removed is offset by storage in forest products. Forest management that includes harvesting provides increased climate change mitigation benefits over time because wood-decay CO_2 emissions from wood products are delayed (Malmsheimer, Heffernan, Brink, et al.). Prescribed burning activities, although a carbon neutral process, would release CO_2, other green house gases, and particulates into the atmosphere. However, implementing the proposed prescribed burns on a 3 to 7 year cycle would reduce fuel loading and could be expected to reduce fire intensity and severity as well.

Indirect Effects:
Indirectly, implementation of the proposed actions would increase the overall health, vitality and growth within the project area, reduce the susceptibility to insects and disease, as well as reduce fuel accumulations and lower the risk for a catastrophic wildfire from occurring in the project area. This would serve as a way to increase carbon storage within the project area and mitigate carbon accumulation in the atmosphere.

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

- Alternative C: No Herbicide Use– Direct, Indirect, and Cumulative Effects

The effects of Alternative C would be the same as those listed under Alternative B above.

Effects of Climate Change on the Proposed Project

For some management proposals, climate change may affect the project. For example: the effects of decreased snowfall on a ski area expansion proposal at a marginal geographic location, such as a southern aspect or low elevation. However, for the Smith Mountain Resource Management Project, no direct, indirect, or cumulative effects from climate change on the proposal are anticipated.

Recreation Resources

Present Conditions

Possible mixes or combinations of activities, settings, and probable experience opportunities are arranged along a spectrum, or continuum. This continuum is called the Recreation Opportunity Spectrum (ROS) and is divided into six classes. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs. The following ROS class is present in the project area:

Roaded Natural: Area characterized by a predominantly natural or natural appearing environment with a low probability of experiencing isolation from the sights and sounds of man. Interaction between users may be low to moderate, but with evidence of other users prevalent. Conventional motorized use is provided for in construction standards and design of facilities. Opportunities for both motorized and non-motorized forms of recreation may be provided.

Semi-Primitive Non-Motorized: The Semi-Primitive area identified as Sharptop Walk-in Turkey Area falls partially within the Smith Mountain project area. The Recreation Opportunity Spectrum for this area is identified as Semi-Primitive Non-Motorized. This area should be characterized by a predominantly natural or natural-appearing environment of 2,500 or more acres. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present but is subtle. Motorized use is prohibited during turkey hunting season and limited to seasonal use during other times of the year. There is a moderately high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility and self-reliance through the application of woodsman and outdoor skills in an environment that offers challenge and risk.

The primary recreational activities occurring within the project area are OHV use, camping at dispersed campsites, hunting (deer, turkey, squirrel, etc.), hiking along old roads and driving for pleasure.

Alternative A: Deferred Harvest (No Action) - Direct, Indirect & Cumulative Effects

Direct Effects:
No management activities would occur under Alternative A, therefore no direct effects on recreation resources would occur.

Indirect Effects:
No management activities would occur under Alternative A, therefore no indirect effects on recreation resources would occur.

Cumulative Effects:
No management activities would occur under Alternative A, therefore no cumulative effects on recreation resources would occur.

- Alternative B: Smith Mountain Watersheds Resource Management Project – Direct, Indirect, and Cumulative Effects

Direct Effects:
Immediate or direct effects to the recreation resource would include a disturbance in the recreation experience by the sights, sounds, and smells of management activities such as logging operations and prescribed burning.

In order to reduce soil erosion and sedimentation, approximately 3 miles of system roads would be closed. Approximately 14.78 miles would be changed from seasonally closed to open yearlong. This

provided additional access to traverse, and would increase the availability of roads used for driving pleasure and by hunters.

There are approximately 308 acres of modified seed tree regeneration harvests, 2,321 acres of commercial thinning, 572 acres of site preparation with herbicides, 9,532 acres of ecosystem prescribed burns, 18 miles of fireline construction, 13 miles of fireline reconstruction, 8 miles of system road reconstruction, 8 miles of temporary road construction, 14 miles of pre-haul maintenance, 3 miles of road closures, 34 road barriers, 12 wildlife ponds to be maintained, 34 fish passage reconstruction, fifty four nest boxes erected, 16 acres of wildlife opening maintenance, 434 acres of overstory mast development and 166 acres of woodland stand restoration proposed within the project area. Noise from logging and road construction, as well as increased dust, would be a temporary disturbance while management activities are being performed. All road construction and reconstruction segments within this management area would be closed following completion of management activities. Results from the harvest and thinning operations would result in increase wildlife viewing and harvest opportunities.

Indirect Effects:
Black stems from prescribed burning activities may detract from the visual quality of the area. Road closures could displace hunters and OHV riders. Within Management Area 17 Sharptop Walk-In Turkey Area, modified seed tree regeneration treatments would show the greatest evidence of human disturbance. Activities associated with these regeneration harvests such as site preparation and release could increase the probability of visitors experiencing the sights and sounds of humans and temporarily detract from the overall tranquility of the area.

Cumulative Effects:
Management activities within Management Area 17 Sharptop Walk-In Turkey Area, could detract somewhat from the natural appearance of the landscape and detract from a visitors feeling of isolation from the sights and sounds of humans.

- Alternative C: No Herbicide Use– Direct, Indirect, and Cumulative Effects

The effects of Alternative C would be the same as those listed under Alternative B above.

Chapter 4

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James	Augustin	Mr. & Mrs.
George	Badger	Trust Fund
Don	Baker	County Judge
Deborah	Balicki	
Gene	Bankston	
Raymond	Beal	
John	Bell	
Alfred	Bell	Mr. and Mrs.
John	Berry	Quapaw Tribe of Oklahoma
Steven	Berry	
James	Bibler	Bibler Bros. Lumber Co.
Alvin	Black	Montgomery County Judge
Mark	Black	Rising Hopes Trust
Michael	Black	Mr. and Mrs.
Jewell	Bohannan	
Ricky	Bowden	
Clifford	Brewer	
Jeanne	Briggs	
Al	Brooks	Mr. & Mrs.
Samuel	Bruck	
Phil	Buck	
Don	Burrow	
Larry	Byers	Mr. and Mrs.
Robert	Cast	Caddo Tribe of Oklahoma
Ronnie	Chambers	
Angelo	Collins	Mr. and Mrs.
Richard	Cox	Cox Trust
Patti	Crawford	
Samuel	Crawford	Trust
Jim	Crouch	Jim Crouch Associates
Clifton	Darrell	
Frankie	Davis	
Frances	Dobbs	Montgomery County Advisory Committee (MCAC)
Mark	Donham	RACE/Heartwood
David	Doty	

Kenneth	Driggers	
Ann	Early	
Vannie	Edwards	Mr. and Mrs.
Delbert	Elredge	Mr. and Mrs.
Cloe Dell	Entricken	Trust
James	Fecho	Mr. and Mrs.
Jose	Figueroa	
Gary	Fox	MCAC
Gary	Freeland	Mr. and Mrs.
Lyle	Gaston	Mr. and Mrs.
Al	Gathright	MCAC
Gary	Gatlin	
Steve	Gill	C&W Communications
Richard	Gordon, Jr.	
Ben	Graves	Estate
Susan	Gray	
Arnold	Habig	LOCFC
Wayne	Harrell	Entergy
Bob	Hatton	MCAC
Pam	Holmes	Entergy
Barbara	Holt	
Barbara	Holt	
Thomas	Horn	Trust
Betty	Horne	
Allen	Howard	
Oscar	Howell	
Fred	Irizarry	
Lemoin	Jackson	
Thomas	Jones	Mr. and Mrs.
Daniel	Josephson	
Cindy	Kidd	
J.D.	Krouse	MCAC
Basil	Kyriakakis	
Harry	Laird, Jr.	
Mike	Lenard	MCAC
William	Leslie	
Nel	Lorenz	
Justin	Martin	
Tamara	Martin	Quapaw Tribe of Oklahoma
Art	McCants	Travis Lumber Company
Bobby	McCord	Mr. and Mrs.
James	McCormick	
Janet	McRae	
Van	Meeker	
Kenneth	Morris	Mr. and Mrs.
	Mulberry Group	Trust

Tonya	Mullenix	Don Burrow Life Estate
Fred	Nauman	Centerpoint
John	Nelson	Trust
Joe	Nix	
James	Norman	
Cindy	Osborne	Arkansas Natural Heritage Commission
Marc	Oudin	Mr. and Mrs.
Linda	Palmer	AT&T
LaRue	Parker	Caddo Indian Tribe of OK
Eddie	Parker	
Danny	Paul	Centerpoint
Eddie	Pettis	U.S. Army Corps of Engineers
Russell	Pierce	Mr. and Mrs.
Linda	Pittman	c/o Kimberly Ellis
Louise	Ponder	
Donald	Ponder	
Rod	Powell	Mr. and Mrs.
Randy	Presley	Dept. of Information Systems
Mike	Price	MCAC
Gregory	Pyle	Chief, Choctaw Nation of Oklahoma
Norbert	Rappold	Rev.
Kathy	Reecer	
Ronnie	Richardson	
Todd	Robbins	Mr. and Mrs.
Tim	Robbins	
Clarence	Rodriquez	AGFC
Fredrick	Rose	Trust
Danny	Rowland	
Karisa	Rumsey	
Lenn	Ryals	
Terry	Scott	
Terry	Scott	Mr. and Mrs.
Walter	Scroggs	Mr. and Mrs.
Kenny	Sells	Land and Timber, Inc
Paul	Shepard	
Jerry	Shields	
Jack	Sliemers	
Carl	Smith	
Shirley	Smith	MCAC
Jacquelyn	Smith	
Aaron	Sparks	
Richard	Speairs	
David	Spurling	MCAC
Paul	Spurling	MCAC
Jon Alan	Standridge	MCAC
Richard	Stokes	U.S. Army Corps of Engineers

Emma T.	Suarez	Pacific Legal Foundation
JT	Thompson, Jr.	
Bo	Vincent	
	Vines	Living Trust
Robert	Wagner	
Wade	Walker	Arkansas Game & Fish Commission
Jim	Watson	
Oscar	Webb	Mr. and Mrs.
Terrell	Weeks	Mr. and Mrs.
Robbie	Wetterman	
Charline	White	MCAC
Gary	Whitehouse	Mr. and Mrs.
Jerry	Williams	
Stephen	Williams	Mr. and Mrs.
Carrie	Wilson	NAGPRA Program, Quapaw Tribe
Lisa	Wilson	Bates Communication
Richard	Wright	
Stuart	Zove	Crystal Heaven Mining Co.

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Appendices

(A) List of Harvest Activities by Compartment and Stand
(B) List of All Other Activities by Compartment and Stand
(C) Forest Classifications
(D) MVUM chart
(E) Biological Evaluation
(F) Project Maps
- **Project Location/Boundary**
- **Management Areas**
- **Watersheds**
- **Wildlife**
- **Harvest Activities (silviculture)**
- **MVUM (current and proposed)**
- **Prescribed Burning**