

Chapter 2 – Alternatives

Armuchee Ridges Thinning & Restoration Project

Environmental Assessment



Chapter 2 - Alternatives

2.0 INTRODUCTION

Chapter 2 describes and compares the alternatives considered for the Armuchee Ridges Project. It includes a description of the alternative development process, including how public comments help formulate alternatives, alternatives considered but eliminated from detailed study and alternatives considered in detail.

Alternatives were designed with an interdisciplinary team approach considering the size and scope of the project, the purpose and need, unresolved public issues, and the expected environmental impacts. This chapter also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public.

All data values provided in this document are estimated based on the best available data at the time of this analysis.

2.1 ALTERNATIVE DEVELOPMENT PROCESS

Scoping

Scoping is the process of gathering comments about a site-specific proposed federal action to determine the scope of issues to be addressed and for identifying the unresolved issues, which are related to a proposed action (40 CFR 1501.7).

In November 2005, the Forest initiated an effort to identify opportunities across the Conasauga Ranger District, previously known as the Armuchee-Cohutta Ranger District, which would be consistent with vegetation management objectives identified in the Chattahoochee-Oconee National Forests Land and Resource Management Plan (Forest Plan). Referred to as the Armuchee-Cohutta Large Scale Assessment (LSA), this effort focused on identifying forest health and vegetation restoration activities.

The public was invited to participate in the LSA process in April 2006. Several public meetings were held, including field trips. Interest generated at the field trips resulted in additional trips to Experimental Forests to discuss topics such as oak regeneration, silvicultural treatments, riparian area management, prescribed fire, and water quality. Additional public meetings were held in September 2006 to present the results of the LSA.

The opportunities identified in the LSA were presented for scoping to the public as the Armuchee-Cohutta Thinning and Restoration projects in December 2006. Eleven (11) responses were received as a result of the scoping process.

Issues Used to Formulate Alternatives

The purpose of soliciting comments during the scoping period is to determine whether there are any significant issues based on the proposed action. An issue is generally a point of discussion, considered in determining the final unresolved issues. Not all issues are significant issues.

Issues are significant because of the extent of their geographic distribution, the duration of their effects, or the intensity of interest or resource conflict. Once identified, the significant issues are used to formulate alternatives, prescribe mitigation measures, or analyze the environmental effects. Identified significant issues determine the scope (40 CFR 1508.25) of the environmental analysis. The disposition of comments received during the scoping period is found in Appendix 4. The unresolved issue is described below.

Issue: Harvesting of Mature Oak

Issue Statement: Harvesting as proposed would remove mature oaks causing an impact to wildlife habitat by reducing hard mast production.

Background: Fruits and nuts from trees provide important forage for wildlife species and are referred to as mast. Oak trees are an important source of hard mast in the Armuchee Ridges project area. This project includes proposals to restore species such as longleaf pine and shortleaf pine, which are not tolerant of shade. In order to achieve restoration objectives, mature oak trees would need to be removed because they create shade. Concerns were raised that harvesting as proposed would remove enough mature oak to impact mast production, which would have a negative impact on wildlife habitat.

Measurement: Changes in mast production (acres of mature mast-producing hardwoods)

2.2 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

During initial planning and scoping, several alternatives to the Proposed Action were suggested and considered. The following is a summary of alternatives considered by the interdisciplinary team but eliminated from detailed study, along with the rationale for dismissal.

A. Scoping Proposal: In December 2006, the Conasauga Ranger District released a scoping letter for the “Armuchee Ridges Thinning and Restoration Project”. The letter requested input on projects designed to improve forest health, restore native vegetation communities, and improve wildlife habitat over the next 5-10 years on the Conasauga Ranger District. The entire original proposal was not brought forward in this EA to simplify cumulative effects analysis and to allow for further review of proposed projects on the Cohutta side of the District. The District Ranger determined that the projects located on the Cohutta side in the original proposal were not ripe for decision. Therefore, the original proposal was eliminated from detailed study.

B. Harvesting, But Retaining Mature Oak in Restoration Units: An alternative that would alter the scoping proposal so that no mature oak would be harvested in the stands proposed for longleaf, shortleaf and oak oak/pine restoration was considered. It was determined that this type of silviculture treatment on these sites would not move the stands towards the restoration

objectives, generally due to impacts on the growth and establishment of the planted seedlings. This alternative was eliminated from detailed study because restoration efforts without removing canopy trees, specifically harvesting oaks, on these sites to create an open canopy for restoration would be unsuccessful and an impractical approach to achieve restoration of the desired species.

2.3 ALTERNATIVES GIVEN DETAILED STUDY

The following section gives a description of each alternative given detailed study, including a description of features common to alternatives. The numbers of acres or miles identified for activities have been identified from mapping and should be considered estimates based on available data. Appendix 2 has maps for Alternative 2 and Appendix 3 has maps for Alternative 3.

A. No Action Alternative

The National Environmental Policy Act (NEPA) requires that an EA include a “no action” alternative to serve as a baseline to compare action alternatives. This alternative provides the decision-maker with a clearer basis for a reasoned choice among the alternatives studied in detail. It responds to the interest of individuals who do not want the proposed action to occur on National Forest lands and only want nature to influence change in the project area. It is based on the premise that ecosystems change, even in the absence of active management.

With the No Action Alternative, timber harvest and silvicultural treatments would be deferred at this time. Existing trends would be expected to continue. However, ongoing Forest Service permitted and approved activities would continue in the Armuchee Ridges project area.

Activities such as road maintenance, fire suppression, hunting, fishing, and camping would continue to occur within the project area. Table 3.1 in Chapter 3 displays ongoing and reasonably foreseeable future actions that would be expected to occur under this alternative.

B. Proposed Action - Alternative 2

1. Restoration of mountain longleaf pine and shortleaf pine forests

Approximately 669 acres would be restored to mountain longleaf pine or shortleaf pine under the Proposed Action. This includes an estimated 639 acres of longleaf pine and an estimated 30 acres of shortleaf pine restoration. Approximately 2.5 miles of temporary road would be needed to provide harvesting and planting access for these stands. Table 2-1 summarizes the mountain longleaf and shortleaf pine proposals for Alternative 2, identifying specific locations by compartment and stand.

Vegetation management treatments in these stands would involve harvesting to open up the stand canopy and allow for successful site preparation and planting, allowing for the establishment of mountain longleaf and/or shortleaf pine. Some residual hardwood trees would be retained within the treated areas to provide species diversity within the future stand and to provide a source of mast for wildlife. The featured hardwoods to be retained are oak and hickory and an estimated 10

to 20 square feet of basal area would be left on the site after harvesting. Some stands identified for mountain longleaf or shortleaf restorations are greater than 40 acres in size. The actual treatment acres will be limited to 40 acres to meet Forest Plan Standards.

After harvest and prior to planting, a growing-season prescribed burn would occur in these stands to prepare the site for planting.

Approximately 3 years after planting, a dormant-season prescribed burn would occur in the stands selected for restoration of mountain longleaf to release the seedlings. The stand restored to shortleaf pine would be released through mechanical methods approximately 3 years after planting using chainsaws or brush saws to reduce competing vegetation that is inhibiting the growth of the shortleaf pine.

The expectation is that natural regeneration of oak and other mast-bearing, fire tolerant hardwoods would become established in the stands restored to mountain longleaf and shortleaf pine. The intent is for the future stands to be a mixed pine-hardwood forest type, composed of longleaf or shortleaf pine and a mixture of hardwoods, particularly oak and hickory.

Prescribed burns would take place every 3 to 5 years in these stands to restore the natural fire intervals found in the mountain longleaf and shortleaf pine ecosystems.

2. Restoration and maintenance of oak or oak/pine forests

Restoration and maintenance of oak or oak/pine forests would take place on an estimated 676 acres under Alternative 2. Restoration would occur on an estimated 520 acres and maintenance would occur on an estimated 156 acres. Approximately 2.1 miles of temporary road would be needed to allow harvesting access for these stands. Table 2-2 summarizes the oak or oak/pine forest restoration and maintenance proposals for Alternative 2.

The stands identified for restoration of oak or oak/pine forests are primarily occupied by planted loblolly and natural Virginia pine, but also have a strong component of oaks. The proposal would transition these stands to an oak or oak/pine forest by reducing the density of loblolly and Virginia pine and introducing prescribed fire into the stands on a regular basis.

The purpose of restoration treatments is to favor existing oaks and other mast-bearing species, allowing them to reach the canopy and maximize mast-production, and to encourage natural oak regeneration. This type of treatment is considered a regeneration harvest because the objective is to regenerate oak seedlings and saplings, although the treatments would have the appearance of a commercial thinning. This treatment would be applied to an estimated 478 acres. The target basal area for the residual stands is an estimated 40 to 60 square feet per acre.

Some stands identified for oak/oak-pine restoration have a component of pine that is not yet merchantable. These stands would be treated by pre-commercial thinning, which would reduce the number of pine and feature oak and other mast-bearing hardwoods. This treatment would be applied to an estimated 42 acres.

Maintenance of oak or oak/pine forests is identified for stands that have a good existing oak component, but require treatment to ensure continued oak dominance. This would be accomplished by commercial thinning an estimated 103 acres with a target basal area for the residual stand as 40 to 60 square feet. In addition, pre-commercially thinning an estimated 130 acres would occur to maintain the oak and oak/pine component.

Dormant season prescribed burning would occur to help reduce competition in the midstory by impacting the fire-intolerant maple and Virginia pine seedlings and saplings. This would help to restore the fire-tolerant species associated with oak/oak-pine ecosystem. Prescribed burns would take place every 4 to 5 years thereafter in these stands to continue the restoration of this native ecosystem.

3. Pine thinning

Pine thinning would take place on an estimated 5,787 acres to improve the health of trees in over-crowded stands to decrease the risk of insect and disease infestation, particularly southern pine beetle. Stands targeted for this treatment have a high component of loblolly pine and/or Virginia pine and range in age from 6-85 years. Table 2-3 summarizes the pine thinning proposals for Alternative 2.

Thinning of pine stands, through a commercial timber sale, would take place on an estimated 5,443 acres. This would be accomplished by reducing the stocking levels by 25-50%. The target basal area for the residual stands is an estimated 60 to 80 square feet per acre. Approximately 18.6 miles of temporary road would be needed to allow harvest access for these stands.

Pre-commercial thinning of stands with tree diameter less than commercial size (5 inches diameter at 4.5 feet high in pine, 6 inches in hardwood) would occur on about 344 acres. Stands identified for pre-commercial thinning would have stocking reduced through mechanical means.

4. Riparian Hardwood Restoration

Riparian hardwood restoration would take place under Alternative 2. This would occur in one 54-acre stand (925007) through mechanical release. Restoration of this native community will take time and this should be considered an initial treatment. The release would target the cutting of upland hardwoods in order to release species such as box elder, maple, river birch, hornbeam, hickory, ash, butternut, black walnut, sweetgum, yellow poplar, blackgum, sycamore, black cherry, water oak, black willow and elm.

5. Riparian Corridor Restoration

Alternative 2 includes the thinning of pine stands that often have pine-dominated riparian corridors, which provide little habitat for riparian associated species. Some riparian corridors in planted loblolly plantations would be treated by commercially thinning the pine trees to an average of 50 square feet of basal area per acre. Opening the stands to 50 square feet of basal area would allow for the establishment or expansion of the existing hardwood component. These

riparian corridors fall within stands already identified for pine thinning. Table 2-3 identifies the stands proposed for pine thinning that have the potential conditions to improve habitat for riparian associated species. Analysis estimates about 528 acres of riparian corridor that could potentially be treated exist within the pine stands selected for thinning.

6. Summary of Alternative 2

The following series of tables displays the activities that would take place under Alternative 2. The 54-acres hardwood stand (925007) is described previously and is not included in the tables. Maps of Alternative 2 can be found in Appendix 2.

Table 2-1: Alternative 2, Mountain Longleaf and Shortleaf Pine Restoration Summary

Compartment	Stand	Acres	Proposed Treatment	Additional Activities	Compartment	Stand	Acres	Proposed Treatment	Additional Activities
922	27	37	R (LL)	GB, P, DB	933	12	36	R (LL)	GB, P, DB
923	14	43	R (LL)	GB, P, DB	935	18	142	R (LL)	GB, P, DB
924	18	16	R (LL)	GB, P, DB	935	35	11	R (LL)	GB, P, DB
924	19	21	R (LL)	GB, P, DB	946	5	39	R (LL)	GB, P, DB
924	43	18	R (LL)	GB, P, DB	946	7	18	R (LL)	GB, P, DB
932	11	57	R (LL)	GB, P, DB	946	8	42	R (LL)	GB, P, DB
933	1	60	R (LL)	GB, P, DB	946	17	19	R (LL)	GB, P, DB
933	7	80	R (LL)	GB, P, DB	946	29	30	R (SL)	GB, P, MR, DB
Total Shortleaf/Longleaf Restoration				669 Acres					

R = Regeneration Harvest, GB = Growing Season Burn, P = Plant, DB = Dormant Season Burn, MR = Mechanical Release, (LL) = Longleaf Restoration, (SL) = Shortleaf Restoration

Table 2-2: Alternative 2, Oak and Oak/Pine Restoration or Maintenance

Compartment	Stand	Acres	Proposed Treatment	Additional Activities	Compartment	Stand	Acres	Proposed Treatment	Additional Activities
916	16	14	CT (M)	DB	918	56	180	R (R)*	NR**
917	32	12	CT (M)	DB	922	35	56	R (R)*	DB, NR
917	22	13	PCT (M)	DB	927	28	42	R (R)*	DB, NR
939	9	33	CT (M)	DB	927	4	10	PCT (R)	DB, NR
939	39	44	CT (M)	DB	935	7	25	R (R)*	DB, NR
952	21	28	PCT (M)	DB	943	4	167	R (R)*	DB, NR
952	25	12	PCT (M)	DB	943	27	32	PCT (R)	DB, NR
917	8	8	R (R)*	DB, NR					
Total Oak/O-Pine Restoration and Maintenance				676 Acres					

* These stands are targeted for regeneration harvest because the intent is to regenerate oak, but they will have the appearance of a commercial thinning.

** This stand fall within an existing prescribed burning unit. Burning is not identified as an activity, but natural hardwood regeneration is expected.

R = Regeneration Harvest, PCT = Pre-Commercial Thinning, CT = Commercial Thinning, DB = Dormant Season Burn, NR = Natural Regeneration (M) = Maintenance, (R) = Restoration

Chapter 2 - Alternatives

Table 2-3: Alternative 2, Pine Thinning

Compartment	Stand	Acres	Proposed Treatment	Additional Activities	Compartment	Stand	Acres	Proposed Treatment	Additional Activities
915	2	76	CT	PRCT	918	37	8	CT	PRCT
	7	60	CT	PRCT	922	29	32	PCT	
	10	13	CT	PRCT	923	16	22	CT	
	11	109	CT	PRCT		17	37	CT	PRCT
	16	13	CT		924	12	137	CT	
	24	17	CT	PRCT		13	20	CT	PRCT
916	4	217	CT	PRCT		14	21	CT	
	6	65	CT	PRCT		22	44	CT	
	13	50	CT	PRCT		36	7	CT	PRCT
	20	34	CT	PRCT	39	247	CT	PRCT	
	21	23	CT	PRCT	925	1	165	CT	PRCT
	22	79	CT	PRCT		3	98	CT	
	23	24	CT			11	36	CT	PRCT
	29	102	CT	PRCT		12	87	CT	PRCT
	35	73	CT	PRCT		15	46	CT	PRCT
	36	89	CT	PRCT		16	37	CT	
38	47	CT	PRCT	14		50	CT		
917	1	30	CT			22	42	CT	PRCT
	3	14	CT	PRCT		28	29	CT	
	10	13	CT			31	149	CT	PRCT
	11	23	CT		35	183	CT	PRCT	
	13	15	CT		44	10	CT	PRCT	
	14	14	CT		927	3	171	CT	PRCT
	17	9	CT	PRCT		7	19	CT	
	34	7	CT	PRCT		9	16	CT	PRCT
	12	14	PCT	PRCT		10	83	CT	PRCT
	19	6	PCT			11	19	CT	
21	10	PCT	PRCT	14		26	CT	PRCT	
918	15	99	CT	PRCT		17	44	CT	PRCT
	34	21	CT	PRCT		36	14	CT	PRCT
	35	59	CT	PRCT		37	45	CT	PRCT

Chapter 2 - Alternatives

Table 2-3: Alternative 2, Pine Thinning (Continued)

Compartment	Stand	Acres	Proposed Treatment	Additional Activities	Compartment	Stand	Acres	Proposed Treatment	Additional Activities	
928	2	65	CT	PRCT	931	24	39	CT		
	6	30	CT			25	14	CT		
	21	49	CT			26	18	CT		
	26	36	CT			28	7	CT		
	32	46	CT			32	32	CT		
	38	12	CT			34	17	CT		
	41	41	CT			35	30	CT		
	44	33	PCT			39	52	CT		
	43	13	CT	PRCT		42	101	CT		
929	7	32	CT	PRCT		44	20	CT		
	8	11	CT			932	4	80	CT	
	11	17	CT	PRCT			7	8	CT	
	12	99	CT	PRCT			17	13	CT	
931	1	56	CT	PRCT			18	72	CT	
	3	21	CT		12		37	PCT		
	4	40	CT		933	21	70	CT	PRCT	
	5	33	CT			31	13	CT		
	8	65	CT	PRCT		49	34	CT	PRCT	
	9	18	CT	PRCT		50	9	CT		
	10	48	CT			54	27	CT		
	11	51	CT			10	35	PCT		
	12	6	CT			19	35	PCT		
	15	75	CT			23	48	PCT	PRCT	
	17	43	CT			47	24	PCT		
	18	20	CT			52	23	PCT		
	19	21	CT			53	30	PCT		
	21	19	CT		939	38	30	CT		
	22	8	CT			940	4	41	CT	
					7		27	CT		

Table 2-3: Alternative 2, Pine Thinning (Continued)

Compartment	Stand	Acres	Proposed Treatment	Additional Activities	Compartment	Stand	Acres	Proposed Treatment	Additional Activities
940	9	38	CT		946	30	31	CT	PRCT
	17	28	CT			40	62	CT	PRCT
943	8	19	CT			42	17	PCT	
	23	30	CT		952	7	11	CT	
	31	5	CT			9	35	CT	
946	16	42	CT			11	53	CT	
	27	41	CT		916	3	12	CT	PRCT
Total Pine Thinning				5,787 Acres					

CT = Commercial Thinning, PCT = Pre-Commercial Thinning, PRCT = Potential Riparian Corridor Treatment

Table 2-4: Alternative 2, Summary of Treatments

Treatment	Total Acres
Regeneration Harvest*	1,147
Commercial Thinning	5,469
Pre-Commercial Thinning	704
Mechanical Release**	84
Planting	669
Natural Regeneration	520
Growing Season Burn	669
Dormant Season Burn	1,165
Total Commercial Timber Harvest	6,616
Total Stand Acres Treated	7,186
Temporary Roads	23 miles

*Includes 478 acres of Oak/Oak-Pine Restoration that is identified as regeneration harvest but will have the appearance of a commercial thinning.

**Includes 54-acre Riparian Hardwood Restoration

Implementation of Alternative 2 would result in the development and offer of several timber sales which would take place over an estimated 5-10 year period. Table 2-5 displays an approximate schedule of sale areas that might be offered. To meet Forest Service requirements these proposed “sale areas” would likely be sold through several separate timber sales.

Table 2-5: Alternative 2 - Possible Timber Sale Schedule

Year	Sale Area	Acres	Compartments
2008	Dry Slough	1161	922, 931, 932
2009	North Pocket	984	917, 927-929, 939
2010	Taylor Ridge	1128	932, 933, 935, 946
2011	Furnace Valley	622	915-917
2012	East Armuchee Creek	723	925
2013	East Strawberry Mountain	1263	918, 923-925
2014	Furnace Creek	562	916
2015	Hidden Creek	743	928, 940, 943, 952

C. Alternative 3- Minimize Harvest of Mature Oak

The intent of Alternative 3 is to address the issue identified during the scoping period that relates to harvesting of mature oaks in the project area. Treatments to achieve the restoration of mountain longleaf and shortleaf pine, and the oak-oak/pine restoration and maintenance proposals have the potential to remove mature oak trees from the stands in order to implement silvicultural treatments needed to meet restoration or maintenance objectives. The objective of the pine thinnings is to remove of a portion of the pine component in the stands, not mature oak; although an incidental number of mature oak would be expected to be harvested during thinning activities as part of logging operations. In addition, the riparian hardwood restoration proposal would not result in a large portion of mature oak being removed from the stand.

To minimize harvesting of mature oaks, proposed treatments in Alternative 3 would follow the same prescription in the stands identified for pine thinning and the stand identified for riparian hardwood restoration as described under Alternative 2- Proposed Action. The stands proposed for restoration of longleaf pine, shortleaf pine, and oak oak/pine would be dropped.

In summary, Alternative 3 would include the 54-acres riparian hardwood restoration and the pine thinning summarized in Table 2-3: Alternative 2, Pine Thinning. Table 2-6 provides a summary of Alternative 3.

Table 2-6: Alternative 3, Summary of Treatments

Treatment	Total Acres
Regeneration Harvest	0
Commercial Thinning	5,443
Pre-Commercial Thinning	344
Mechanical Release*	54
Planting	0
Natural Regeneration	0
Growing Season Burn	0
Dormant Season Burn	0
Total Commercial Timber Harvest	5,443
Total Stand Acres Treated	5,841
Temporary Roads	19 miles

*Riparian Hardwood Restoration

Implementing Alternative 3 would also require the offering of several timber sales over a period of an estimated 5-10 years. Table 2-7 provides an approximate schedule for offering in “sale areas”. To meet Forest Service requirements these proposed “sale areas” would likely be sold through several separate timber sales.

Table 2-7: Alternative 3, Possible Timber Sale Schedule

Year	Sale Area	Acres	Compartments
2008	Dry Slough	1011	922, 931, 932
2009	North Pocket	835	917, 927-929, 939
2010	Taylor Ridge	626	932, 933, 935, 946
2011	Furnace Valley	609	915-917
2012	East Armuchee Creek	723	925
2013	East Strawberry Mountain	985	918, 923-925
2014	Furnace Creek	548	916
2015	Hidden Creek	743	928, 940, 943, 952

2.4 Features Common to All Action Alternatives

A. Design Features and Mitigation Measures

Features common to all action alternatives are listed in Table 2-8. The items displayed below provide an overview of important aspects of the project that would be implemented to address soils and water resources, riparian corridors, heritage resources, non-native invasive species, vegetation management, and visual quality. In addition to the items listed below, the action alternatives would be implemented in accordance with Georgia Best Management Practices, Forest Service Timber Sale Contracts (2400-6T, 2400-3T, 2400-13T), and Forest Plan Standards. The design features and mitigation measures listed below for regeneration harvests would not apply to Alternative 3.

Table 2-8: Design Features and Mitigation Measures for Action Alternatives

Resource	Design Feature/Mitigation Measure
Soil and Water	Temporary roads would be constructed on previous exiting routes (old woods roads or skid trails) where possible to minimize the need for new temporary road construction.
	Temporary roads would follow the general contour as practical and will generally not exceed sustained grades over 10%.
	The travel way of temporary roads would generally not exceed 12-14 feet except at turnouts and landings.
	Drainage structures, such as outsloping and waterbars, would be installed along temporary roads when the use of the road is no longer needed.
	Once the temporary roads are no longer needed, they would be closed to normal vehicle traffic and so that illegal ATV use is discouraged. The closures may include such things as the installation of an earthen barrier, re-contouring, placement of logging debris along the road surface, or placement of boulders.
	Skid trails will be closed at their junction with landing sites by placing slash on the skid trail in order to discourage illegal ATV use.
	Log landings and skid trail locations would be evaluated and approved by the Forest Service prior to harvesting in order to ensure that they are placed in locations with adequate drainage and away from sensitive soils or riparian areas.
	Skidding and decking would be limited to designated and approved routes along ridges and gentle slopes to protect sensitive soils. Skidding would not be allowed on sustained slopes over 35%.
	Operation of ground-based equipment would only be allowed when soils are dry. Soil moisture would be assessed during harvest operations to determine periods when equipment should be halted to minimize compaction and rutting.
	Skid trails, log landings, temporary roads, or other areas of exposed soil, would be seeded and fertilized as soon as practical after harvest activities have been completed in to restore vegetative cover and reduce the potential for erosion.
	Water bars would be installed on skid trails and temporary roads at the completion of the project to minimize the potential for erosion.
	Compacted soils on skid trails, temporary roads, and log landings would be ripped or tilled in areas of detrimental soil compaction to maintain soil quality standards and increase water infiltration.
Sensitive soils discovered during timber sale layout would be protected by restricting access or activities in these areas.	
Riparian Areas	Skidding would not occur within riparian corridors, except for at designated crossings.

Resource	Design Feature/Mitigation Measure
	<p>No heavy equipment, other than mechanical fellers, would be allowed to operate within the riparian corridors (MP 11) during harvest activities. The exception to this would be at designated crossings.</p> <p>Harvest activities in riparian corridors would take place under dry soil conditions.</p>
Heritage Resources	<p>Heritage resource protection would be implemented through phased compliance. Heritage resource surveys would be conducted for the annual program of work as this project progresses through the next 5-10 years. This phased compliance is documented in a Programmatic Agreement signed by the State Historic Preservation Office, the Eastern Band of Cherokee Indians, and the Forest Service.</p> <p>Heritage resources subject to direct or indirect effects resulting from the activities associated with this project would be avoided and protected from project effects.</p> <p>Heritage resource sites would have a minimum protective buffer of 50 feet. The buffer would be marked on the ground and excluded from project activities.</p>
Non-native Invasive Species (NNIS)	<p>Equipment cleaning would be required in order to minimize the spread of NNIS and to minimize the potential to introduce new NNIS to the area.</p> <p>Skidding through known populations of NNIS should be avoided, where possible, to reduce the potential for spread.</p> <p>Many of the known populations of NNIS in the project area are within riparian corridors. Skidding in riparian corridors is prohibited, except for at designated crossings, to minimize the potential for spread.</p> <p>A rare plant population exists within one stand identified for pine thinning, which also contains known populations of NNIS. The rare plant population will be protected from NNIS infestation through excluding this area from harvesting. This will be accomplished with the use of a buffer where equipment and harvesting will be prohibited.</p>
Vegetation Management	<p>Even-aged regeneration harvests would be limited to 40 acres in size.</p>
Visual Quality	<p>Measures which be applied to all alternatives to protect the visual quality of the Armuchee Ridges area are located in Appendix 5 of this EA.</p>

B. Monitoring and Evaluation

Monitoring and evaluation would occur under Alternatives 2 and 3. Monitoring and evaluation are separate, sequential activities. Monitoring involves collecting data by observation or measurement. Evaluation involves analyzing and interpreting monitoring data. Data will be collected according to Forest Service policy and direction.

Two types of monitoring will be conducted on the Armuchee Ridges Project areas:

- 1) **Implementation:** Did we do what we said we would do in project areas? Were activities implemented as planned and meet the desired conditions?
- 2) **Effectiveness:** Were the planned activities and mitigations effective in meeting goals and objectives, and the proposed action?

The main goal of monitoring and evaluation is to assess project implementation and compliance with Forest Plan direction. It provides a reporting system so the Forest Supervisor, District Ranger, Forest Staff; and the public can openly follow the success or failure of a project and implementation of the Forest Plan.

Monitoring is conducted by various resource areas involved in project activities. Monitoring methodologies or protocols are established by each resource area with requirements for the sample size, method and frequency of collection, data recording & filing, and assessment.

The Armuchee Ridges Project Monitoring Plan is displayed in Appendix 5. Monitoring items are listed by resource area, identified as implementation or effectiveness, have a stated objective, and a source of protocols. Monitoring items identified specifically for regeneration harvest would not be applicable to Alternative 3.

2.5 COMPARISON OF ALTERNATIVES

Table 2-9 provides a summary and comparison of the alternatives considered in detail in the environmental assessment. Chapter 3 of this document contains a detailed discussion of the potential impacts by resource.

Table 2-9: Comparison of Alternatives

Item	Measurement	Alternative 1: No Action	Alternative 2: Proposed Action	Alternative 3: Minimize Harvest of Mature Oak
PURPOSE AND NEED (OBJECTIVES)				
Improve Forest Health	Acres of Pine Stands Treated with Thinning	0	5787	5787
Restore Native Mountain Longleaf and Shortleaf Pine Forests	Acres of Stands Regenerated to Longleaf/Shortleaf	0	669	0
Restore and Maintain Native Oak and Oak/Pine Forests	Acres of Stands Treated to Restore or Maintain Oak/Pine	0	676	0
Restore Native Riparian Hardwood Old Growth	Acres of Riparian Hardwoods Released	0	54	54
Improve Habitat for Riparian Associated Species	Acres of Potential Riparian Corridor Treatment	0	528	528
Acres Improved for Wildlife Habitat	Total Acres of Treatment	0	7,186	5,841
ISSUES USED TO DEVELOP ALTERNATIVES				
Harvesting Mature Oak	Acres of Mature Oak Stands Impacted	0	669	0

Table 2-10: Comparison of Treatment Acres by Alternative

Item	Alt 1	Alt 2	Alt 3
MOUNTAIN LONGLEAF AND SHORTLEAF PINE FOREST RESTORATION (669 Acres)			
Regeneration Harvest	0	669	0
Growing Season Burning	0	669	0
Dormant Season Burning	0	669	0
Planting	0	669	0
Mechanical Release	0	30	0
OAK AND OAK/PINE FOREST RESTORATION AND MAINTENANCE (676 Acres)			
Commercial Thinning (Maintenance)	0	103	0
Pre-Commercial Thinning (Maintenance)	0	53	0
Regeneration Harvest (Restoration)	0	478	0
Pre-Commercial Thinning (Restoration)	0	42	0
Dormant Season Burning	0	496	0
Natural Regeneration	0	520	0
PINE THINNING FOR FOREST HEALTH (5,787Acres)			
Commercial Thinning	0	5,443	5,443
Pre-Commercial Thinning	0	344	344
Potential Riparian Corridor Treatment	0	528	528
RIPARIAN HARDWOOD RESTORATION (54 Acres)			
Mechanical Release	0	54	54
TOTAL TREATMENT SUMMARY			
Regeneration Harvest	0	1,147	0
Commercial Thinning	0	5,469	5,443
Pre-Commercial Thinning	0	704	344
Mechanical Release	0	84	54
Planting	0	669	0
Natural Regeneration	0	520	0
Growing Season Burn	0	669	0
Dormant Season Burn	0	1,165	0
Total Acres of Commercial Harvest	0	6,616	5,443
Total Stand Acres Proposed for Treatment	0	7,186	5,841
Miles of Temporary Roads	0	23 miles	19 miles