

Chapter 3 – Affected Environment

Armuchee Ridges Thinning & Restoration Project

Environmental Assessment



Chapter 3 – Affected Environment

This chapter summarizes the existing condition of physical, biological, and social resources in the Armuchee Ridges area and explains how they may be affected by proposed project alternatives. It describes the direct, indirect, and cumulative environmental consequences of implementing proposed alternatives (40 CFR 1508.7-1508.8). Direct effects are those environmental consequences that are caused by the action and occur at the same time and place. Indirect effects are the environmental consequences that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Cumulative effects are the consequences to the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes the other actions. The methodologies used to evaluate effects are briefly mentioned in each section. More details may be found in resource reports in the project file.

3.1 PRESENCE OR ABSENCE OF RESOURCES

The following resources are not present in the Armuchee Ridges project area; wild and scenic rivers, ecologically critical areas; coastal zone; research natural areas; State or National parks; conservation areas; other areas of ecological, scenic or aesthetic importance; prime farmlands, wetlands or wilderness. There are also no Native American concerns associated with proposed activities or minority and low-income populations that would be adversely affected.

Historic or cultural resources and floodplains exist in the project area. These resources would not be adversely impacted by any of the alternatives because the areas would be avoided (see Heritage effects and Soils report). The effects to migratory birds and threatened, endangered, and sensitive species are documented later in this chapter. None of the alternatives are expected to result in short or long term adverse effects to these species population viability.

3.2 PAST, PRESENT AND REASONABLY FORESEEABLE FUTURE ACTIONS

Table 3-1 displays the known past, present, and reasonably foreseeable future actions on National Forest lands within the Armuchee Ridges watersheds that may contribute cumulatively to the direct and indirect effects of proposed Armuchee Ridges project activities. The beginning year is 1993. Table 3-1 lists the actions and associated information that have taken place in each watershed.

Table 3-1: Past, present and reasonably foreseeable future actions within the Armuchee Ridges Project Area

Watershed (HUC #)	Activity	Years Implemented	Acres Affected	Past	Present	Reasonably Foreseeable
031501030104	Tweeddale #10 Rx Burn	1998	186	X		
	Tweeddale #31 Rx Burn	2008-2012	205			X
	Bow Creek#19 Rx Burn	2002	349	X		
031501030301	Wildlife Rx Burn #24	1994	47	X		
	Wildlife Rx Burn #25	1994	46	X		
	Wildlife Rx Burn #20	1995	111	X		
	Wildlife Rx Burn #17	1995	33	X		
	Pocket #16 Rx Burn	2000	484	X		
	Pocket #4 Rx Burn	1997	320	X		
	Wildlife Burn #21	1995	153	X		
	Pocket Rx Burn	1997	21	X		
	Lake Marvin #8 Rx Burn	1998	190	X		
	Lake Marvin #6 Rx Burn	1997	134	X		
	Pocket #35 Rx Burn	1993	45	X		
	Johns Creek Timber Sale	2008-2012	275		X	
	Pocket #2 Rx Burn	2008-2012	175			X
	Lake Marvin Rx Burn	2008-2012	130			X
	Pocket #26 Rx Burn	2008-2012	298			X
	Keown Falls Rx Burn	2008-2012	185			X
031501030303	Hidden Creek #3 Rx Burn	1994	10	X		
	Dry Creek Timber Sale	2007	42		X	
	Mill Creek #7 Rx Burn	1999	30	X		
	Mill Creek #4 Rx Burn	2000	23	X		
	Mill Creek #9 Rx Burn	1993	18	X		
	Mill Creek #8 Rx Burn	1993	19	X		
	Pocket #7 Rx Burn	1993	52	X		
	Wildlife Rx Burn #11	1994	41	X		
	Pocket #9 Rx Burn	1993	20	X		
	Furnace Creek #6 Rx Burn	2000	22	X		
	Pocket #32 Rx Burn	1993	41	X		
	Pocket #10 Rx Burn	1993	46	X		

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Watershed (HUC #)	Activity	Years Implemented	Acres Affected	Past	Present	Reasonably Foreseeable
031501030303	Pocket #25 Rx Burn	1993	55	X		
	Wildfire Burn #23	1994	51	X		
	Pocket #21 Rx Burn	1993	13	X		
	Wildlife Rx Burn #20	1994	26	X		
	North Dicks Creek #7 Rx Burn	2008-2012	115			X
	Pinnacle #11 Rx Burn	2008-2012	190			X
	Pocket #26 Rx Burn	2008-2012	377			X
	Keown Falls Rx Burn	2008-2012	344			X
	Pocket #20 Rx Burn	1993	14	X		
	Furnace Creek #2 Rx Burn	1993	33	X		
	Pocket # 11 Rx Burn	1999	492	X		
	Hidden Creek #13 Rx Burn	2008-2012	260			X
	Hidden Creek #31 Rx Burn	2008-2012	190			X
	Pocket #35 Rx Burn	1993	45	X		
	North Dicks Ridge Rx Burn	1997	80	X		
03150103401	Narrows #3 Rx Burn	1993	10	X		
	Narrows #4 Rx Burn	1993	46	X		
	Narrows #14 Rx Burn	1999	318	X		
	Narrows #15 Rx Burn	1999	362	X		
	Narrows #17 Rx Burn	2008-2012	400			X
	Narrows #18 Rx Burn	2008-2012	355			X
	1600 Tract #2 Rx Burn	2008-2012	295			X
031501030402	Kartah Dell #20 Rx Burn	2000	997	X		
	Jenkins Gap #21 Rx Burn	2002	455	X		
031501030501	Ponder Creek #1 Rx Burn	2000	619	X		
	Ponder Creek #2 Rx Burn	1997	44	X		
	Rocky Ridge #4 Rx Burn	1999	206	X		
	Rocky Ridge #2 Rx Burn	2003	294	X		
	Smith Gap #3 Rx Burn	2003	281	X		
	Smith Gap #5 Rx Burn	1999	246	X		
	Strawberry #5 Rx Burn	1996	30	X		

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	Strawberry #12 Rx Burn	2002	48	X		
031501030502	Dry Creek Timber Sale	2007	3		X	
	Strawberry #12 Rx Burn	2002	300	X		
	Dry Creek #8 Rx Burn	1995	60	X		
	Wildlife Rx Burn #9	1994	80			
	Strawberry #5 Rx Burn	1997	75	X		
Watershed (HUC #)	Activity	Years Implemented	Acres Affected	Past	Present	Reasonably Foreseeable
031501030502	Ruff Creek #24 Rx Burn	1999	74	X		
	Taylor Ridge #10 Rx Burn	2002	396	X		
	Dry Slough #11 Rx Burn	2003	409	X		
	Narrows #5 Rx Burn	1993	35	X		
	Hammond Gap #11 Rx Burn	1998	114	X		
	Dry Creek #11 Rx Burn	1993	19	X		
	Wildlife Rx Burn #4	1994	45	X		
	Dry Creek #18 Rx Burn	1999	19	X		
	Wildlife Rx Burn #5	1994	60	X		
	Wildlife Rx Burn #6	1994	27	X		
	Strawberry #19 Rx Burn	2008-2012	120			X
	Strawberry #21 Rx Burn	2008-2012	295			X
	Hammond Gap # 14 Rx Burn	2008-2012	280			X
	1600 Tract #1 Rx Burn	2008-2012	480			X
	Narrows #17 Rx Burn	2008-2012	45			X
	Mt. Joy #22 Rx Burn	2008-2012	70			X
031501030504	Dry Creek Timber Sale	2007	54		X	
	Arthur Willie #15 Rx Burn	2000	70	X		
	Dry Creek #17 Rx Burn	1999	213	X		
	Wildlife Burn #7	1994	30	X		
	Dry Creek #2 Rx Burn	1995	32	X		
	Dry Creek #7 Rx Burn	1998	82	X		
	Wildlife Rx Burn #3	1994	70	X		

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	Wildlife Rx Burn #2	1994	24	X		
	Mt. Joy #13 Rx Burn	2000	294	X		
	Fishers Chapel # 1 Rx Burn	1994	44	X		
	Arthur Willie Rx Burn	Planned /Approved	144			X
	East Armuchee Rx Burn	Approved 2006	325			X
	Dry Creek #23 Rx Burn	Approved 2006	195			X
	Wildlife Opening Maintenance	Ongoing			X	X
	System Road Maintenance	Ongoing			X	X
	Recreational activities including hiking, biking, horseback riding, driving for pleasure, fishing,	Ongoing – various locations			X	X

Chapter 3 – Physical Environment

3.3 Soils

Resource Impacts Addressed

This section summarizes the existing condition of soil resources in the project area and an assessment of potential effects to soil productivity from proposed activities. It specifically describes the effects proposed activities may have on soil compaction, erosion, and productivity. It also indicates whether soils in the project area are capable of supporting the thinning, restoration and road use proposed.

3.3.1 Affected Environment

The Armuchee Ridges Project is located within the boundaries of the Armuchee portion of the Conasauga Ranger District. Ecologically this area is situated in the Southern Ridge and Valley Section (231D), and the Sandstone Ridge Subsection (231Dc). These two ecological units are levels of a hierarchy developed by the USDA Forest Service to implement ecosystem management. The units provide data and information on the nature and distribution of ecosystems. The Southern Ridge and Valley Section is characterized by a folded, faulted, and uplifted belt of parallel valleys and ridges – the Armuchee Ridges project area is a “textbook” example of this ecosystem. Valleys are typically shale or limestone, separating the strongly dissected ridges underlain by sandstone and shale. Forests generally occupy the ridges with much of the valleys cleared for agriculture and other intensive land uses. A specialist report is filed in the project record (Stephens – Ecological Classification of the Armuchee Ridges Project).

Within the Sandstone Ridge subsection are three (3) landtype associations (LTAs) that contain National Forest ownership. The Armuchee Ridges LTA is characterized by parallel ridges rising 600 to 700 feet above the valley floors and predominantly forest covered. The ridges are oriented north-northeast to south-southwest with the east facing aspects described as having narrow “finger ridges” perpendicular to the main ridges, e.g. Taylor Ridge and Johns Mountain. Geology is sandstone on the ridgecrests and upper sideslopes with interbedded shale and chert on the middle and lower slopes. Streams in this LTA generally have steep gradient, low sinuosity with entrenched channels. Flow is primarily from spring heads and water levels drop drastically during summer months, often drying up completely. Average annual rainfall averages about 55 inches with a growing season length of 210 days.

Shale is the common rock type in the Shale Valley LTA, characterized by broad, “U” shaped valleys surrounded by prominent sandstone ridges. Land uses within this LTA are predominantly pastures, cropland and residential areas. Rainfall and growing season are similar to the Armuchee Ridges LTA. Streams of this LTA are larger in channel size with flow levels adequate to support aquatic species during the winter and spring months. The East Armuchee Valley LTA is located primarily along East Armuchee Creek to the

west of Johns Mountain, and is generally characterized as broad valleys underlain by limestone rock. Much of the valley bottom is in private land ownership of non-forest land uses. Springs, streams disappearing underground and sinkholes can be found in this LTA. Slopes of this LTA are gentle, ranging from 2 to 20 percent.

Soil information used to complete an analysis of possible effects of management activities was based on a soil resource inventory completed on National Forest lands on the Armuchee Ranger District in 1986-1988. Within the stands included in the action alternatives there are twenty-two (22) soil mapping units mapped by soil scientists during field inventories. These mapping units are classified into eleven (11) soil series as follows:

Table 3-2: Summary of Soil Types Mapped in Project Area

Soil Series	Mapping Units	Acres	% of Project Area
Allen	AnB, AnD, AnE	1450	21
Arkabutla	AuA	53	< 1
Bodine	BoD, BoE, BoF	1852	25
Craigsville	CvB	440	6
Fullerton	FtE, FtF	236	3
Hector	HrF	25	<1
Holston	HsD	118	2
Montevallo	MoF, MtE	779	11
Nauvoo	NaE	132	2
Nella	NeD, NeE, NeF	516	6
Townley	TnD, TnE, TnF	1528	21

Using the stream channel as a beginning point on the landscape one finds two valley bottom soils mapped along streams and in riparian areas of the project area, Craigsville and Arkabutla. Craigsville soils are very deep and well drained, found along medium to small streams, and are nearly level to gently sloping. Arkabutla soils are also deep, but somewhat poorly drained. This landform position is subject to occasional flooding events of short duration during winter and early spring. Delineations of Arkabutla also have small inclusions of poorly drained soils that classify as hydric and could potentially be regulated by Section 404 regulations of the Clean Water Act, depending on the activities on these areas.

Allen soils occur just beyond the valley bottom on hillsides, foot slopes and old terraces. These deep, well drained soils formed from sandstone and shale and have often been cleared for agriculture or maintained in forest. Predominant soil types along the middle and upper sideslopes are the Bodine and Townley soil series with Montevallo occurring on the upper slopes and ridgetops. These three soils share the soil property of being gravelly on the surface and in the subsoil horizons, and are well drained. At the upper sideslopes are small acreages of Nauvoo, Fullerton and Hector on the ridgetops. Fullerton and Hector both have cobbles and gravels on the soil surface with Nauvoo

being more productive due to soil texture and slope position gaining moisture from the ridge above. The combination of geology, climate, soils and topography contributes to a landscape capable of sustaining silvicultural activities without degrading soil productivity.

Proposed treatment areas were visited and evaluated for existing soil conditions during 2006 and 2007 to identify compaction sensitive areas, erosion problems and other interpretations for management, and to identify any areas of concern for watershed condition. Areas used for access (temporary roads, skid trails) and harvest operations (landings) were evaluated for effects to productivity – no indicators of reduced soil productivity were identified. Access routes used in past logging were rehabilitated and have adequate vegetation cover to protect soil productivity. No natural disturbances were identified within the proposed treatment areas or the project area.

3.3.2 Environmental Effects

Scope of the Analysis

The geographic boundary used to assess direct effects to soils was the activity areas or locations where treatments such as tree felling, site preparation, temporary road construction, and road maintenance were proposed (refer to maps for the Proposed Action and Alternative 2 for unit and road locations). This boundary was chosen because it can be used to determine threshold effects to soil quality from the proposed actions. For instance, the direct effects from a log landing would be the acreage used as the landing because it is the acreage of soil directly impacted by the activity.

The geographic scope used to assess indirect effects was the project area. This scope was chosen because impacts to the soil resources, such as gullies, can move from the affected site but are not likely to move out of the sub-watersheds within project area.

The geographic boundary of cumulative effects for soil quality is the entire project area as effects may extend beyond the project area to activities occurring within the Armuchee vicinity. This allows the evaluation of past and future effects within this area and determines threshold impacts to soil quality when added to the proposed actions. Given the limited disturbance proposed by the alternatives, cumulative effects are not expected to extend beyond this boundary.

The temporal boundary used to assess effects would vary depending on the activity. Short-term effects from: (1) increases in soil moisture from harvesting may last a year or two until new vegetative growth occurs; or (2) disturbance or mixing of the soil organic horizon may disrupt decomposition processes for a few weeks or months. Long-term effects of five to over 50 plus years may result if the highly productive upper layer of soil is compacted or displaced. For example, soil displacement or soil compaction could result from skid trail development and use. This may remove the organic matter and available nutrients in the upper layer of the skid trails and affect water infiltration. The effect of this may persist from the time of use of the skid trails begins until three to five

years when timber harvest activities are completed and soils are ripped and vegetated; or, if compacted soils on the skid trails are not ripped after use, impacts to soil productivity on the skid trails may persist for 40 to 70 years.

Methodology

Field visits, Geographic Information System data, reports of past activities, and information from the Forest Service soil survey for the Armuchee Ranger District were used to evaluate the impacts of proposed activities. The description of anticipated impacts to the soil resource was based on the sensitivity of the soils in the project area and the amount of soil proposed activities are likely to disturb. Forest Service Handbook FSH 2509.18 Soil Management Handbook R8 Supplement 2 soil quality standard 4.a states “At least 85 percent of an activity area is left in a condition of acceptable potential soil productivity following land management activities (USDA-FS-R8-2509.18, 2003). This is also stated in the Chattahoochee-Oconee Land and Resource Management Plan in Forest-wide standard FW-065; “On all soils dedicated to maintaining forest cover, the organic layers, topsoil, and root mat will be left intact on at least 80 percent of an activity or project area.” To see if this threshold would be exceeded by proposed Armuchee Ridges project activities, acres of soil impacted by soil disturbing activities (skid trails, log landings, and temporary road construction) were estimated using the best available information, and compared to the total acres of the activity areas (harvest units and road corridors).

3.3.3 Environmental Consequences Common to Action Alternatives

Soil Disturbance, Compaction, Productivity and Erosion: Timber harvest activities usually result in soil disturbance. Soil disturbance refers to a change in the natural state of a soil caused by an artificially imposed force (Arnup, 1998). Four basic steps can be points can be analyzed to determine whether a proposed activity will cause adverse impacts to soil productivity:

- Determine what is detrimental disturbance caused by the activity
- Match equipment and best management practices to the site
- Minimize detrimental disturbance
- Ameliorate or rehabilitate detrimental disturbance where needed

In the application of silvicultural or timber management practices, detrimental soil disturbance is commonly recognized in the form of compaction, displacement or erosion, and rutting resulting from the use of ground-based harvesting equipment (Howes, 2006). Soils can be adversely impacted by activities such as building temporary roads and log landings, operating heavy equipment, skidding logs and piling slash. The amount of detrimental disturbance that occurs depends on soil moisture, slope steepness, complexity of topography, and rock content of the soil, depth of slash, season of harvest, skidding design, and type of equipment used, sale administration and the skill of equipment operators. Combinations of these factors affect the magnitude and extent of disturbance.

Disturbance of soils from management practices involving timber harvest, site preparation and reforestation will result in some form of physical, chemical and biological changes within the sites disturbed. Direct effects to the soils are changes/loss of soil organic matter content, soil erosion, soil compaction, and nutrient leaching and/or displacement. Indirect effects are accelerated weathering, loss of soil as sediment, alteration of organic matter formation, and alteration of soil permeability/water infiltration.

Skidding and landing operations typically cause most of the soil disturbance in a harvest unit. This disturbance usually includes compaction, mixing of soil layers, and rutting. Surface erosion within a harvest unit is usually limited because of the quantity of woody material left on the slope disperses overland flow. Installation of waterbars and rehabilitating skid trails is required and also reduces accelerated erosion.

Soil Compaction: Compaction increases soil bulk density and decreases porosity as a result of the application of forces such as weight and vibration caused by the operation of heavy equipment used in forest operations. Compaction can detrimentally impact both soil productivity and watershed conditions by causing increased overland flow during storm events and reduced plant growth due to a combination of factors including reduced amounts of water entering the soil and its reduced availability to plant growth, a restricted root zone, and reduced soil aeration. It is generally acknowledged that all soils are susceptible to soil compaction or soil porosity, particularly when wet.

Soil compaction is dependent on soil texture, organic matter, and soil moisture (McKee et al. 1985). Soil compaction causes increased soil density (weight per unit volume) or bulk density. This effect can hamper root growth, reduces soil aeration, and inhibit soil water movement. The lower the bulk density range, the greater the impacts to tree growth from soil compaction. Lighter textured soils (sandy) have a higher range bulk density compared to heavier textured soils (clay). Presence of organic matter and tree limbs and leaves can buffer soil compaction by providing support to equipment. Soil moisture content has a pronounced effect on soil compaction as it influences soil porosity. Identifying soils by surface texture, maintaining surface organic matter, and operating equipment under low soil moisture conditions will reduce the effects of soil compaction within the general forest and on skid trails used for thinning and restoration operations. Temporary roads will be compacted the greatest from multiple traffic use. Harvest technique can also reduce or increase the potential for soil compaction. Use of standard logging equipment (skidders) can compact the soils with as few as three passes over the same ground. Specialized equipment that reduces or disperses equipment weight, such as low-pressure tires, can assist with limiting soil compaction effects.

The majority of the soils in the project areas have a slight to moderate compaction rating. Unless operators are using special equipment, operating under seasonally dry soil conditions, usually March through November, will aid in reducing soil compaction from conventional harvesting equipment within stands. Harvest operations on stands rated as severe need to be conducted under dry conditions that usually occur late summer and early fall. Soil compaction can be expected on temporary roads. Application of

migrating measures will assist in reducing the effects of soil compaction over a three to five year period. Full recovery can take as long as 20 years.

Within the Armuchee Ridges project area soils in the proposed treatment areas rated by soil interpretation standards as having a severe compaction hazard rating are those that have soil properties that allow ruts to form readily. Typically these soils would form ruts when soil moisture content is at or above field capacity – or saturation. This condition would occur after several days of rain, soils have not dried out and heavy equipment operates over the soils. Soils identified in the Allen, Arkabutla and Townley series (AnB, AnD, AnE, AuA, MtE, TnD, TnE, TnF) would have this rating composing approximately 45 percent of the proposed treatment areas. Compaction and rutting can be minimized by locating access routes on well drained terrain and by operating equipment during optimum soil conditions (dry) to minimize the occurrence of rutting. Mitigation measures proposed for all action alternatives to minimize compaction would be followed in accordance with the Forest Plan and BMPs.

Soil Erosion: Soil erosion is recognized as potentially the most serious form of soil damage. Soil may be permanently lost and soil particles leaving this site may result in sediment in nearby streams which would impact water quality and possibly compromise aquatic habitats. Ground disturbing management practices influence erosion principally because they remove vegetative ground cover and often concentrate and channel runoff water. Research has shown that transportation system and associated impact areas of log decks and primary skid trails are the most common causes of accelerated erosion that occurs in forested watersheds (Gucinski et al., 2000). In addition, erosion rates will tend to remain greater on these areas for several years following their use due to altered soil structure and loss of infiltration.

A soil's susceptibility to erosion varies by soil type and position on the landscape. A slight or moderate erosion hazard indicates that standard erosion control measures such as installing water bars plus seeding and fertilizing roads or skid trails, and not exposing more than 20 to 30 percent of mineral soil in treatment areas, are sufficient to prevent excessive erosion. Soils with severe erosion hazard ratings require more intensive efforts to reduce the potential for accelerated erosion both during and after the soil disturbing activity.

Soils within the proposed treatment areas with an erosion hazard rating of severe are generally those with slope gradients exceeding 30 percent. This rating indicates that erosion is likely when soils are exposed and erosion control measures, including proper location of access routes, revegetation of bare areas and control of overland flow of water are advised to minimize the impact. Soil mapping units in this rating group include the following: BoF (Bodine), FtF (Fullerton), MoF (Montevallo), NeF (Nella), and TnF (Townley). The acreage in these mapping units is approximately 2058 acres or 28 percent of the proposed treatment areas within the watershed. Mitigation measures proposed for all action alternatives to minimize erosion would be followed in accordance with the Forest Plan and BMPs.

Silvicultural practices (thinning and restoration) are known to potentially affect the soil resource primarily through nutrient removal. Harvest proposed in both action alternatives involves treatment by thinning or restoration involving overstory removal leaving residual southern yellow pines. Proposed thinning and restoration activities will harvest the stem only with tree branches and needles remaining scattered on site. Nutrient removal or restoration where harvesting the stem only, reduces nutrient removal by 50-60% (Pritchett and Fisher, 1979). Nutrient loss from stem removal is believed replaced by soil weathering and natural inputs (Grier et al., 1989, Jorgensen et al, 1971, Wells, 1971, and Pritchett and Fisher, 1979).

All proposed harvest units are expected to meet the Forest Plan standard and regional soil quality guideline of not exceeding 15 percent disturbance because portions of existing trails and roads would be utilized. This is feasible and would be required by the timber sale contract. In addition utilization of existing roadbeds and skid trails would allow for rehabilitation of those areas to be implemented under the timber sale contract.

Temporary Roads constructed for access to proposed treatment stands and associated skid trails for thinning and restoration treatments are known to affect the soil resource primarily through nutrient removal, soil compaction and soil erosion. Nutrient loss is greatest on temporary roads since the organic layer and surface soil is removed in the process of construction and/or maintenance. Skid trails under a thinning operation usually do not remove organic or soil surface layers leaving nutrients in place. Primary skid trails (those with multiple passes) can be expected to remove organic layers and expose soils as high as 50 percent. Secondary skid trails, those with surface soils intact, can be expected to have loss of organic surface and soil exposure as high as 25 percent.

Alternative 1: No Action

Direct/Indirect Effects

The No Action alternative would result in the least amount of direct erosion as no soil disturbing activities are proposed. Only undisturbed natural erosion would be expected to continue within the project areas. However, a significant indirect effect due to the implementation of this alternative would be the effects that a wildfire could have on soil productivity in the area. Under this scenario, the No Action Alternative would represent the most detrimental situation as existing high fuel loadings along with more limited fire suppression equipment access into this area would equate to the most acres that could be affected by wildfires. In the event of a wildfire the nutrient loss could be the most excessive of any of the three alternatives.

Cumulative Effects

Alternative 1 would not implement activities that would directly or indirectly disturb soils. Thus it would not contribute cumulatively to the past, present, or reasonably foreseeable future activities listed at the beginning of Chapter 3.

Alternative 2: Proposed Action

Direct/Indirect Effects

This alternative proposes to conduct silvicultural treatments on approximately 7,186 acres within the project area, with 5,787 acres being commercial or pre-commercial thinning and 1,399 acres of ecosystem restoration. Chapter 2 outlines the acres proposed for treatments under proposed action alternatives. The commercial thinning operations involve one operation under this proposal to remove commercial trees from the areas. Soil disturbances will occur in these treatments on temporary haul routes, primary skid trails, log loading and landing areas; the primary access routes and loading areas for harvest operations.

Within the stands proposed for commercial thinning are riparian corridors along perennial and intermittent streams. Analysis has identified an estimated 528 acres that classify as riparian corridor that could potentially be thinned during commercial operations. Harvesting would remove commercial pine trees leaving an average of 50 basal area after operations. The objective of the removal would be to enhance conditions for the regeneration or expansion of hardwoods species, providing improved habitat for riparian associated species. Equipment operations within the riparian corridors would be conducted during periods of dry weather and low soil moisture to mitigate the potential for soil compaction. Low pressure (psi) equipment such as rubber tire or track feller-bunchers can be used in these areas to reduce impacts to soils.

The stands proposed for restoration will also involve one operation to remove commercial trees; however, these stands may have secondary treatments to prepare the site for planting when needed. These secondary treatments can include a site preparation burn, planting of seedlings and follow-up release treatments of the seedlings when established.

For the Proposed Action Alternative, analysis has identified approximately 23 miles of temporary roads to be constructed in the stands to be treated; or 46.4 acres @ 2.0 acres/mile disturbed for a 14 foot wide road. Access routes from the previous harvest activity exist in most of these stands, available for use again if location and condition meet Forest Plan standards and BMPs. An estimated 232 individual log landings would be needed for logging operations in these stands, disturbing about 58 acres @ 0.25 acres each. In total this would be about 104.4 acres of soils that could potentially receive detrimental disturbance within the project area or less than 1 percent of the total project area. Operations within the stands to remove commercial trees would require skidding to bring the trees into the log landings for loading. Skidding operations generally make 2 to 3 passes along skid trails; however they are generally not excavated to open the route. These trails typically have woody debris left on the ground surface to provide cover and minimize erosion caused by overland flow. As previously stated in the Existing Condition section most of these soils have gravelly surfaces and rocks in the subsoil which provide stability and protection when equipment is operated over them.

Cumulative Effects

The effects to long-term soil productivity as a consequence of the actions being proposed in the Proposed Action Alternative relates to the cumulative effects from erosion, compaction, and displacement as noted above. By practicing a “light hand on the land” policy during all soil disturbance activities, by adhering to mitigation measures common to all action alternatives and following Forest Plan direction, long-term soil productivity would be maintained. In addition, fuel loadings throughout most of the analysis area would be reduced from timber harvesting and prescribed fire and the construction of temporary roads would improve overall access for fire suppression needs. These actions would reduce the probability of a future accumulation of fuels and wildfire hazard, which could impair long-term productivity.

Alternative 3

Direct/Indirect Effects

Alternative 3 is a modification of Alternative 2, proposing to implement only the commercial and pre-commercial thinning treatments in the 5,787 acres of pine stands identified. Total acres proposed for treatment would decrease by about 1,400 acres and reduce the area with a potential for detrimental disturbance (temporary roads, log landings, skid trails) to an estimated 18.8 miles of temporary roads (or 38 acres) and 198 log landings (50 acres). In total the acres would be about 88 acres or about 1% of the total project area.

Cumulative Effects

The cumulative effects of Alternative 3 would be similar to Alternative 2, however the decrease in acres treated under this alternative would cause less soil disturbance.

3.4 Water

3.4.1 Temporal and Spatial Bounds

The treatments in the Armuchee Ridges project are located over a large area and take place over eight years, with an additional five years for maintenance treatments. As a means to comprehensively analyze effects, the treatments will be analyzed at the 6th level Hydrologic Unit Code (HUC) scale. The Hydrologic Unit (HU) system was created by the US Geologic Service as a means to describe watershed characteristics in a geographically organized manner (Seaber et. al., 1987). The HU system is a nested hierarchical system where watersheds are delineated from a very large to small scale and given a hydrologic unit code (HUC) number. The largest scale of delineation divides the country into very large watersheds (or regions) that are given a two-digit number. As watersheds are further divided and classified into smaller drainages, two more numbers are added to the end of each HUC at each change in scale. As numbers get larger, watershed areas get smaller.

This project is in the South Atlantic Gulf Region (03), the Alabama Basin Subregion (0315), the Coosa-Tallapoosa Accounting Unit (031501), and the Oostanaula Cataloging Unit (03150103). See Table 1 for a list of large Hydrologic Units that encompass the project area. The project is located in four fifth-level, 10 digit HUCs; the Upper Oostanaula (0315010301), John’s Creek (0315010303), Little Armuchee Creek (0315010304), and Armuchee Creek (0315010305). The project is further divided into 10 unnamed sixth-level, 12-digit HUCs. 6th Level HUCs are not named and are referred to only by numbers. See Figure 1 for a map of the HUCs in the project area and Table 2 for a list of smaller HUCs that encompass the project area. In subsequent tables, maps, and text, 6th level HUCs are referred to by the last four digits of the 12-digit HUC number.

Table 3-3: 1st-3rd level HUCs encompassing the project area.

Region (1 st Level HUC)	Subregion (2 nd Level HUC)	Accounting Unit (3 rd Level HUC)
03 (South Atlantic-Gulf)	0315 (Alabama Basin)	031501 (Coosa-Tallapoosa)

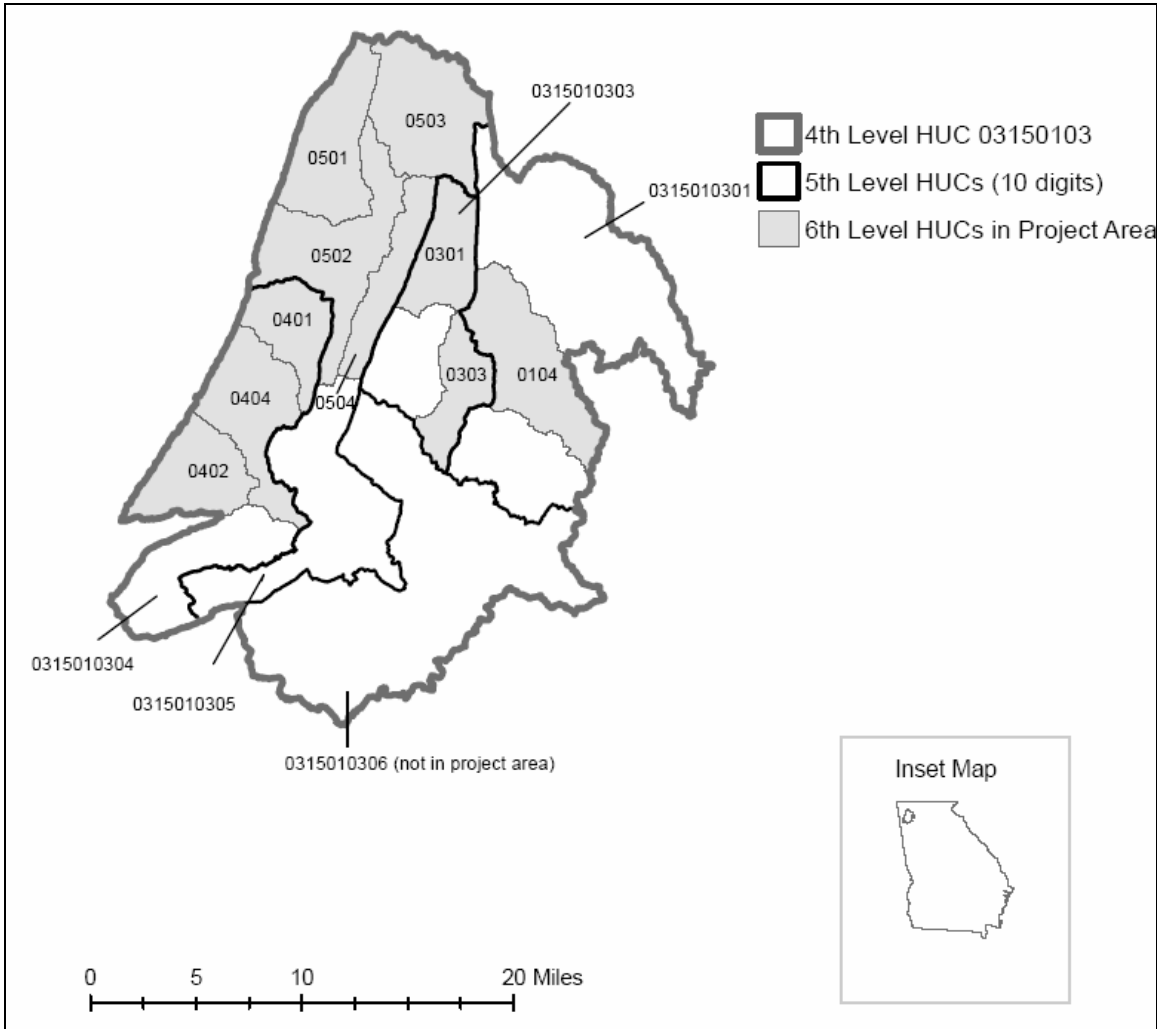
Source: Seaber et. al., 1987

Table 3-4: 4th-6th level HUCs encompassing the project area.

4th Level HUC	5th Level HUC	6th Level HUC (unnamed)
03150103 (Oostanaula)	0315010301(Upper Oostanaula)	031501030104
	0315010303 (John's Creek)	031501030301 031501030303
	0315010304 (Little Armuchee Creek)	031501030401 031501030402 031501030404
	0315010305 (Armuchee Creek)	031501030501 031501030502 031501030503 031501030504

Source: Land Management Plan (2004)

Figure 3-1: 4th, 5th, and 6th Level HUCs encompassing the Armuchee Ridges project area.



Source: US Forest Service spatial data, 1:24,000 scale.

The temporal bound for cumulative effects on water resources is five years. The spatial bounds of analysis are the total number of stream miles adjacent to treated acres, as well as the total number of treatment acres in each 6th level HUC. In cumulative effects analysis, consideration is also given to all waters within each 6th level HUC where there are treatments. The spatial and temporal scales of this project are such that effects at a watershed scale larger than the 6th level HUC is not warranted.

3.4.2 Existing Conditions

The project is located in the Ridge and Valley Ecological Region of the Conasauga River Ranger District. This area is characterized by north/south oriented sandstone ridges and limestone and shale valleys. Stream systems display a trellis drainage pattern.

Headwater streams flow perpendicular to valleys (west or east) down ridges, and larger streams flow north or south through valleys (Ecological Subregions of the US).

This area is characterized by a moderate density of small to medium-sized perennial streams and associated rivers with moderate rates of flow and velocity. Precipitation in the region averages 36 to 55 inches annually. Many smaller tributaries in the Ridge and Valley ecoregion are ephemeral and intermittent stream types that do not flow in the summer months. Streams of comparable watershed area in the nearby Southern Blue Ridge Ecoregion will flow perennially, while streams in the Ridge and Valley will be dry at times of low precipitation. Streams tend to be drier in this region because the area receives less precipitation than nearby areas, soils are well-drained, and some streams tend to flow underground in limestone systems.

The project area contains ephemeral, intermittent, and perennial stream channel types. Ephemeral streams have no defined channel and flow only in response to storm events. Intermittent streams have a well-defined channel, but do not flow throughout the year. Perennial streams have a well-defined channel and flow throughout the year. Ephemeral streams differ from intermittent and perennial streams in that ephemeral channels do not have a hyporeic (or water-influenced) zone. Therefore, the vegetation and soils in these areas are more characteristic of a terrestrial than riparian environment. Both ephemeral and intermittent channels are important inputs into the fluvial system because they connect to the perennial channel network, and because of the high density of these channel types in most watersheds.

Table 3-5 lists the number of stream miles by order located in the project area by Alternative. Stream miles were estimated using a spatial (GIS) dataset developed by the Forest Service. For this layer, low order streams were added to the basic stream layer in the office based on the best available topographic data (DEMs and contours). This stream layer was not validated in the field due to time and cost restraints. However, it does provide a better (and higher) estimate of the stream network than what is typically available on existing USGS quads.

Table 3-5: Stream miles by order for the Proposed Action and Alternative 3.

	First Order (mi)	Second Order (mi)	Third Order (mi)	Forth Order (mi)	Fifth Order (mi)	Sixth Order (mi)	Total Stream Miles
Proposed Action	47.37	21.23	9.55	3.03	1.14	3.21	85.53
Alternative 3	41.30	18.19	8.45	2.60	1.14	2.07	73.75

Source: US Forest Service spatial data, 1:24,000 scale.

Fifty-five (55%) of streams in the project area for the Proposed Action are first order. First order streams have no tributaries and are primarily ephemeral stream types. 25% of the treatment areas for the Proposed Action are located in second order streams. A second order stream is formed at the intersection of two first order streams. Second order streams in the Ridge and Valley Ecoregion tend to be intermittent and ephemeral stream

channel types. 80% of the streams in the project are ephemeral and intermittent channel types that are not as susceptible to disturbance as perennial channels.

Analysis on perennial and non-perennial (ephemeral and intermittent channels) was performed for the 1985 Forest Plan. This analysis looked at a total of 838 3rd and 4th level watersheds at the 1:24,000 scale across the forest. From this analysis comparisons of stream channels in the four ecoregions on the forest can be made.

Table 3-6: Percent of Stream Types & Drainage Density for Ecoregions on Forest

Description	Ridge and Valley	Blue Ridge	Upper Piedmont	Lower Piedmont
Percent non-perennial streams	91.1%	81.3%	89.0%	85.4%
Percent perennial streams	8.9%	18.7%	11.0%	14.6%
Non perennial stream drainage density (mi/mi ²)	10.2	7.6	9.5	8.6
Perennial stream drainage density (mi/mi ²)	1.0	1.7	1.2	1.5

Source: LaFayette, 1982

When compared to other nearby ecoregions in north Georgia, The Ridge and Valley ecoregion is unique because it has the highest percentage of total stream miles that are non-perennial (91.1%), and has the highest drainage density of non-perennial streams per mile (10.2). This analysis shows that there is a dense network of non-perennial stream channels in the Ridge and Valley ecoregion.

Sediment is the primary pollutant of concern in forested watersheds in the Southeast. Fine sediment (<2 mm in diameter) is a natural part of streams in this region, however, an excess of stored sediment in stream substrate is detrimental to aquatic habitat. Excess fine sediment in stream systems fills interstitial space between larger rocks and reduces the amount of available fish and macroinvertebrate habitat (Wood and Armitage, 1997). Fine sediment enters the fluvial system when detached soils are eroded by moving water. Fine sediment is detrimental to habitat when the amount of sediment entering the fluvial system is not transported through the system under a normal flow regime. Most of the streams on the national forest contain excess stored sediment from past land management activities as well as the nature of soils in the area. Unpaved dirt and gravel roads are the primary contributors to stream sedimentation in this region (see the Roads section of this EA for a discussion of the roads in the project area) (VanLear, 1995, Riedel and Vose, 2003). A desired condition is to reduce the amount of new and stored sediment in stream reaches.

The water use classification or beneficial use of streams in the region is fishing. Several streams in the project area are classified by the Georgia Department of Natural Resources (DNR) as year-round trout streams including Rocky Creek, Storey Mill Creek, Ruff Creek, Furnace Creek, the headwaters of East and West and Little Armuchee Creeks.

The headwaters of John's Creek is classified as a seasonal trout stream (Georgia Rules and Regulations for Water Quality Control, 2005). Streams with this designation support self-sustaining populations of rainbow, brown, or brook trout. The management conditions for trout streams designated by the Georgia DNR state that there should be no elevation of natural temperature in these streams.

The Georgia Environmental Protection Division (EPD) has not listed any of the stream segments in the project area as not supporting this designated beneficial use. However, Bow Creek, a stream that has headwater tributaries in the project area, is listed as partially supporting its designated beneficial use of fishing due to sediment impairment on the 2004 and 2006 State 303d list. Bow Creek is located in 6th level HUC 0104. In the Bow Creek watershed, there are approximately 190 acres proposed for loblolly thinning, and 124 acres proposed for shortleaf maintenance. Of these treated acres, 12.9 would be thinning in the riparian corridor.

3.4.3 Riparian Corridor

Through a GIS analysis and ground-truthing, an estimate of the acreage of riparian corridor that would potentially be treated was produced. In the initial analysis, only stands younger than 60 years old proposed for thinning (based on the purpose and need for thinning in riparian corridors) were included. The GIS stream layer used to determine stream mileage in the project areas was used, with first order streams removed. These first order streams were removed because they are likely ephemeral channels where the riparian corridor prescription is not applied. A 100-ft buffer was produced using GIS for each side for the stream and the acreage of this buffered area was calculated for each appropriate stand. This exercise produced an initial list of stands which could potentially have riparian corridor treatment.

Additional analysis utilizing GIS layers which incorporate slope (Digital Elevation Model or DEM and hillshade) was completed. This analysis eliminated a number of stands from the first list of potential stands to be treated due to steep topography. A final step in the analysis was ground-truthing a number of the stands to determine if the GIS modeling were accurate. Several additional stands were added to the list at this point due to field visits which determined that some of the first order streams were not ephemeral (the riparian corridor would apply in those stands). The product of this analysis and ground-truthing was a list of 56 stands with riparian corridors which could potentially be treated (see Table 2-1). Each of these stands will have further examination during the silvicultural prescription process to ensure that conditions exist to allow the removal of a portion of the off-site pine while protecting soils and water quality.

Table 3-7 shows the number of acres of potential riparian thinning in each HUC as well as the potential number of stream crossings in each HUC.

Table 3-7: Potential Riparian Thinning Acres & Potential Stream Crossings by 6th HUC

6 th Level HUC	Potential Riparian Corridor Thinning Acreage	Potential Stream Crossings
0104	12	7
0301	144	12
0303	0	16
0401	13	3
0402	1	0
0404	0	0
0501	0	0
0502	99	7
0503	132	4
0504	122	9

An estimate of the potential number of stream crossings in this project was determined using GIS. These numbers may change during project implementation based on conditions on the ground. In all cases, decisions about stream crossings will be made in the interest of preserving water quality. Many of these stream crossings would be to reach very small portions of the stand, areas that would likely be removed from the project areas during implementation.

3.4.4 Biological and Physical Data from a Project Area Stream

Blue Spring Branch is a typical stream in this region of the national forest. Habitat and fish data were collected on Blue Spring Branch in the summer of 2001. Data from this survey are presented here to offer an idea of the physical and biological characteristics of a typical stream flowing through the national forest in this region. This stream was chosen for analysis because all of its headwaters are on national forest, and it is thought to represent a typically managed stream in the Ridge and Valley Ecoregion. There are several unpaved roads in the watershed, one that crosses the stream and one that runs parallel to the stream for approximately one mile.

Physical and biological data were collected on this stream reach using the basin-wide visual estimation technique (BVET) (Hankin and Reeves, 1988, Dolloff et al. 1993). The BVET survey technique is designed to provide data on aquatic health and is a continuous survey type where physical stream attributes including pool and riffle length, width, and depth, dominant and subdominant substrate size, bank condition, embeddedness, and size and number of pieces of large woody debris (LWD) are collected. The survey was begun at the furthest downstream point where Blue Springs Branch flows through national forest, and was ended 1.8 km upstream where the stream channel had no flowing water. Continuous channel measurements were taken while walking upstream in the watershed. The area of the entire Blue Springs Branch watershed is 1035 acres; however the watershed area at the beginning of the survey is 766 acres.

Table 3-8 shows the habitat attributes from the 2001 BVET survey. Some of the key indicators of aquatic habitat health from this table include the residual pool depth, dominant and subdominant substrate, average embeddedness, bank instability, and the number of pieces of LWD. The residual pool depth is an indication of the degree to which pools are filled with fine sediment. Twenty three is an average figure for the residual pool depth indicating that there is some pool filling, but likely not enough to critically reduce available quality habitat. The dominant substrate in both pools and riffles is cobble (101-300 mm in diameter) and the subdominant substrate in both pools and riffles is large gravel (11-100). This indicates that fine sediment (<2 mm) in diameter is not a major component of the channel substrate in this reach. Embeddedness is a measure of the degree to which channel substrate is surrounded by fine sediment. Overall embeddedness figures are low in this reach (29% in pools, 8% in riffles) indicating that there is not an excess of stored sediment in this reach. Bank instability % visual measurements (15% and 14%) indicate that banks in this reach have a small percentage of soil that is bare, eroding, or prone to erosion. The number of pieces of LWD in this reach indicates that LWD of different sizes is present in significant numbers such that the biological and physical health of the stream is enhanced by its presence. The data for this stream indicate that this reach has relatively high habitat quality and supports a healthy aquatic community.

Table 3-8: Habitat attributes from a 2001 BVET survey on Blue Spring Branch

Stream:	Blue Spring Branch	
District:	Conasauga River (Armuchee)	
Quadrangle:	Sugar Valley	
Survey Date:	06/05/01	
Downstream Starting Point:	FS Boundary	
Total Distance Surveyed (km):	1.8	
	Pools	Riffles
Percent of Total Stream Area:	28	72
Number:	93	79
Number per km:	51	43
Total Area (m ²):	1826	4725
Mean Area (m ²):	19	59
Mean Maximum Depth (cm):	31	18
Mean Average Depth (cm):	17	10
Mean Residual Pool Depth (cm):	23	X
Dominant Substrate (mm)	101-300	101-300
Subdominant Substrate (mm)	11-100	11-100
Average % Embeddedness	29	8
% Pools with > 35% Embeddedness:	31	X
LWD Size:	Pieces per km:	
LWD < 5 m, 5-10 cm:	79	
LWD < 5 m, 10-50 cm:	11	
LWD < 5 m, > 50 cm:	1	
LWD > 5 m, 5-10 cm:	56	
LWD > 5 m, 10-50 cm:	28	
LWD > 5 m, > 50 cm:	4	
Rootwads:	4	
Total:	183	
# pieces LWD per km	102	
Other Stream Attributes		
Mean Channel Width (m):	39	
Average Channel Gradient (%)	2	
Bank Instability on Left Bank (%)	15	
Bank Instability on Right Bank (%)	14	

The biological section of this EA also discusses biologic data for this stream reach as well as other streams in the project area.

Effects of Alternative 1 (No Action)

Direct Effects

This Alternative would result in the least erosion because there would be no ground disturbing activities from this project. Erosion in the project area will be from natural processes. Stream channels will also continue to be altered through natural in-stream flow processes. Roads will continue to be a primary source of sediment, however maintenance on Forest Service system roads will continue under the No Action

Alternative. Erosion and sedimentation will also continue from hiking and OHV trails as well as other forest management activities. The impacts from these activities will be mitigated through adherence to Georgia BMPs.

Indirect Effects

The indirect effect of erosion is primarily sedimentation into the fluvial system. In the No Action Alternative, sedimentation from erosion will be from natural processes, and unpaved, unmaintained roads in the project area.

Cumulative Effects

Cumulative effects analyze the effects of past, present, and reasonably foreseeable actions within each 6th level project HUC. Table 3-9 shows past present and future projects other than the Armuchee Ridges treatments in each 6th level HUC.

Table 3-9: Total acreage of other projects in the project 6th level HUCs.

6 th Level HUC	Thinning Acres (John's and Dry Creek Sales)	Prescribed Burn Acreage	Fireline Construction (miles)	Temporary Road Construction (miles)	Number of Log Landings
0104	0	345	1.4	0	0
0301	375	973	5.5	0.9	13
0303	0	450	1.9	0	0
0401	0	1050	4.5	0	0
0402	0	0	0	0	0
0404	0	0	0	0	0
0501	0	0	0	0	0
0502	9	1775	8.1	0	0
0503	42	1370	7	0	1
0504	80	1069	6	0.7	3

Source: US Forest Service stand data.

There will be no cumulative effects from the Armuchee Ridges project in the No Action Alternative. However, there are several other projects proposed in the 10 6th level HUCs that encompass the Armuchee Ridges project area through 2015 (Table 3-9). The primary activities in these HUCs involve prescribed burning and first thinning (timber sale) projects. The Dry Creek and John's Creek timber sales are located in 3 of the project HUCs, and all are scheduled to take place before 2009 (see Table 3-9).

Therefore, all of the thinning and maintenance projects as well as the activities associated with them (temporary road and log landing construction) will be complete by 2009. There will be no cumulative effects from these projects after 2012. See the discussion below for a detailed description of cumulative effects from timber harvest and prescribed burning activities.

Table 3-10 shows the number of acres treated from other projects in relation to total acreage of each HUC and total acres of National Forest in each HUC. This table shows that the cumulative effects from these projects are minimal because of the small percentage of Forest Service land, and an even smaller percentage of land within each HUC will be treated.

Table 3-10: Acres treated in other projects in relation to HUC size and Forest Service ownership acreage.

6 th Level HUC	HUC Size (acres)	Forest Service Acres in HUCs	All Treated Acres (Thinning and Prescribed Burning)	% HUC Treated	%FS Treated
0104	18671	3637	345	2	9
0301	10092	5305	1348	13	25
0303	8344	2834	450	5	16
0401	9532	2527	1050	11	42
0402	11957	3605	0	0	0
0404	15311	2191	0	0	0
0501	15878	5566	0	0	0
0502	19875	6352	1784	9	28
0503	18619	3861	1412	8	37
0504	9194	5502	1149	12	21

Source: US Forest Service stand data.

Effects of Alternative 2 (Proposed Action)

This project includes a suite of activities including commercial timber harvest, prescribed burning, pre-commercial thinning and forest restoration over a 13-year period. There are a total of 85.53 stream miles adjacent to project areas in this Alternative. This EA discloses effects if all of the projects are undertaken in the timeframe given. It is likely that some of the acreage will be reduced from the project if sites are not conducive to the activities being proposed (ie., slope or vegetation type). Therefore, the actual number of acres of disturbance will likely be less than those outlined in this EA. Table 3-11 shows the number of treated acres, maintenance acres, miles of temporary road constructed, and the number of log landings in each 6th level HUC. The Initial Action Treated Acres includes acreage proposed for thinning, maintenance, and restoration. The Maintenance Acreage includes site preparation burn and release and burn activities.

Table 3-11: Total acreage treated in the Proposed Action by 6th level HUC.

6 th Level HUC	Initial Action Treated Acres	Maintenance Acres	Temporary Road Mileage	Log Landings
0104	453	0	1.4	14
0301	1019	120	3.3	34
0303	383	382	0.8	13
0401	797	336	3.4	27
0402	334	282	1.9	11
0404	188	510	0.1	6
0501	35	70	0.2	1

0502	1803	516	5.6	60
0503	956	0	3.0	33
0504	989	360	3.5	33

Source: US Forest Service stand data.

Maintenance acreage does not reflect plantings.

Direct Effects

The direct effect of timber harvest and prescribed burning is primarily erosion from the construction of temporary roads (or skid trails), log landings, and firelines. Construction of log landings, temporary roads, and firelines exposes bare soil and increases susceptibility to erosion. Erosion hazard from these activities increases as slope increases. There will be no timber harvesting activities on slopes > 45%. Existing roads and streams will be used for firelines whenever possible to reduce the impact of erosion and sedimentation. Existing roads within the smaller project areas will be evaluated for use during the timber sale planning process. These features will receive maintenance or treatment as needed for use during the project. Decommissioned or non-system roads used for skid trails or other uses will also receive site-specific evaluation before any use. These features may also be treated before use (i.e. gravel surfacing), if necessary.

The water quality impacts of skid trails, temporary roads, log landings, and constructed firelines are short in duration; the recovery period for logging activities is estimated to be 3 years, and the recovery period for prescribed burning is estimated at 2 years (Dissmeyer and Stump, 1978). The effects of these activities to water quality will be minimized through adherence to Georgia Best Management Practices (BMPs) and Forest Plan Standards. Research in the southeast has shown that properly implemented BMPs are effective at preserving water quality through the control of non-point source sediment pollution (Phillips et. al., 2000, Sun et. al., 2004, and Stuart and Edwards, 2006). Management Prescription 11, Riparian Corridors, dictates direction for perennial and intermittent streams, and Chapter 2 of the Land Management Plan gives guidance for projects in ephemeral stream areas.

Many of the stands initially treated in the Armuchee Ridges project have follow-up treatments proposed to remove undesirable vegetation from restoration sites. These activities include prescribed burning and release of desired species through mechanized removal of undesirable species. Maintenance treatments have very little impact on water quality because the same temporary roads and firelines from the initial action will be used for follow-up projects.

Indirect Effects

The indirect effects of this Alternative include sediment delivery and sedimentation into the fluvial system. When sediment is delivered into stream channels, it fills interstitial spaces between larger substrate particles. Sedimentation reduces the amount of quality habitat available for fish and other aquatic life. Erosion and sedimentation will be reduced in this Alternative through implementation of BMPs and adherence to Forest Plan standards.

Cumulative Effects

This project is projected to take place over the course of 13 years. Cumulative effects are analyzed 5 years after the last action. Because these projects are spread over a large area over a long period of time, the cumulative effects will be much less than if the projects were undertaken in a shorter time period, in a small area. It should also be noted that all of the thinning projects proposed in the project area that are not part of the Armuchee Ridges project will take place before 2009. Therefore there will be very little overlap between Armuchee Ridges project and the Dry and John’s Creek timber sales.

Table 3-12 shows the number of acres within each HUC that are proposed for treatment in this project as well as the treatments in other projects. In this table, the Treated Acres column includes acreage from both the Armuchee Ridges project as well as the other projects in the 6th level HUCs. The Treated Acres column does not double count acres scheduled for maintenance treatments.

Table 3-12: Acres treated in the Armuchee Ridges Proposed Action and other projects in relation to HUC size and Forest Service ownership acreage.

6 th Level HUC	HUC Size (acres)	Forest Service Acres in HUCs	Treated Acres	% HUC Treated	% FS Land Treated
0104	18671	3637	798	4	22
0301	10092	5305	2367	23	45
0303	8344	2834	833	10	29
0401	9532	2527	1847	19	73
0402	11957	3605	334	3	9
0404	15311	2191	188	1	9
0501	15878	5566	35	0.22	0.63
0502	19875	6352	3587	18	56
0503	18619	3861	2368	13	61
0504	9194	5502	2138	23	39

Source: US Forest Service stand data

In most of the 6th level HUCs, a small percentage of Forest Service land in each HUC is proposed for treatment. An even smaller percentage of overall area in each 6th Level HUC is proposed for treatment. Cumulative effects are also minimized because the effects of projects in one HUC will not have a significant impact on projects in other HUCs. There will be no foreseeable cumulative effects from the Armuchee Ridges project or other projects in the affected HUCs after 2023. The last projects in the affected HUCs are scheduled to take place in 2020. No new projects are scheduled after 2015; only maintenance projects will be undertaken from 2015 to 2020.

Table 3-13 shows the type of treatment in each 6th level HUC by year, as well as the length of recovery time from each project (shaded in gray). The total watershed acreage is also given in this table, illustrating that the affected areas are small relative to watershed size.

The recovery times used are 3 years for timber harvest and associated activities (temporary road construction, and log landings), and 2 years for prescribed burning activities (Dissmeyer and Stump, 1978). This table helps visualize the cumulative effects within each watershed from each project, and the length of disturbance as well as the number of acres of disturbance in each watershed in a given year. It should be noted that the initial disturbance activities have greater environmental effects than the activity during the recovery period (in gray). **For example, the erosion rate from a thinning project in this area is approximately 1.85 tons/acre/year in the first year of disturbance, and falls to 1 ton/acre/year for the following 3 years. The environmental effects to water resources will be minimized by following BMPs and adhering to forest-wide standards. The total watershed acreage is also given in this table, illustrating that the affected areas are small relative to watershed size.

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Table 3-13: Type of treatment by 6th Level HUC by year.

6 th Level HUCs	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
0104				0.2 3 95	0.2 3 95	0.2 3 95	0.2 3 95			1.2 11 271 87	1.2 11 271 87	1.2 11 271 87	1.2 11 271 87		
			*205	*205	*205				*140	*140	*140				
0301		*0.9 *13 *375	*0.9 *13 *375	2.6, *0.9 30, *13 762, *375 118 60	2.6, *0.9 30, *13 762, *375 118 60	0.7, 2.6, *0.9 4, 30 131, 762 13, 118	0.7, 2.6 4, 30 131, 762 13, 118	0.7 4 131 13	0.7 4 131 13						
	*185	*473, *185	*473, *185	*315 *473	*315 *473	60, *315	60		60	60	60				
0303										0.8 13 123 69 191	0.8 13 123 69 191 191	0.8 13 123 69 191 191, 191	0.8 13 123 69 191 191, 191 191		19 1
									*450	*450	*450				1 9 1
6 th Level HUCs	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

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																0	
0401	Temp. Road Log Landings Thinning Maintenance Restoration SP Burn Planting Release/Burn Rx Burn			0.8 8 237	0.8 8 237	2.6, 0.8 19, 8 392, 237	2.6, 0.8 19, 0.8 392, 237	2.6 19 392	2.6 19 392								
				*295	*755, *295	*755, *295	*755, *295	*755			168	168	168				
0402	Temp. Road Log Landings Thinning Maintenance Restoration Site Prep Burn Planting Release/Burn Rx Burn					1.9 11 193	19 11 193	19 11 193	1, 19 11 193	1	1	1					
						141	141	141			141	141	141				
0404	Temp. Road Log Landings Thinning Maintenance Restoration Site Prep Burn Planting Release/Burn Rx Burn					0.1 6	0.1 6	0.1 6	0.1 6								
						18 170	18 170 170	18 170 170	18 170 170								
											170	170	170				

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6 th Level HUCs		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2009-2010	2010-2011
0501	Temp. Road Log Landings Thinning Maintenance Restoration SP Burn Planting Release/Burn Rx Burn								0.2 1	0.2 1	0.2 1	0.2 1			35	35
0502	Temp. Road Log Landings Thinning Maintenance Restoration Site Prep Burn Planting Release/Burn Rx Burn	*9	*9	2.7 29 736, *9	2.7 29 736, *9	2.7 29 11, 736	2.7 29 11, 736	0.1 2 35, 11 28 94, 94	2.8, 0.1 29, 2 789, 35, 11 28 54, 94	2.8, 0.1 29, 2 789, 35 28 54, 94	29, 2 789 54 54 94	29 789 54 54		54	54	54
0503	Temp. Road Log Landings Thinning Maintenance Restoration Site Prep Burn Planting Release/Burn Rx Burn	*1 *42	*1 *42	*1 *42	*1 *42		0.7 14 394	0.7 14 394	0.7 14 394	2.3, 0.7 19, 14 548, 394 14	2.3 19 548 14	2.3 19 548 14	2.3 19 548 14			
		*344	*377, *344	*344, *344 377	*377, *344	*115, *344	*115	*115	*190	*190	*190					

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6 th Level HUCs		2006	2007	2008											
0501	Temp. Road Log Landings Thinning Maintenance Restoration SP Burn Planting Release/Burn Rx Burn	*0.7 *3 *50 *300	*0.7	*0.7 *30	*0.7		539 29 54 *520	1.7 21 187 180 *249	1.8, 1.7 12 180	1.8, 1.7 180	1.8, 1.7				180

Numbers marked with an * are from other projects.

All units are in acres except Temp. Road (miles); the number of log landings does not have units.

Numbers highlighted in grey show the recovery period for each activity.

Effects of Alternative 3

This Alternative includes the same treatments as Alternative 2 however; all of the restoration projects that would remove hard mast producing trees have been removed. The projects would take place over 8 years with no follow-up treatment acres. The project acreage has been reduced from 6857 to 5808 acres. There are a total of 73.75 miles of stream adjacent to the project areas in this Alternative. The duration of treatments in this Alternative would also be shorter than in the Proposed Action because there would be no follow-up maintenance treatments. All activities in this Alternative would end in 2015. Table 3-14 shows the number of acres within each HUC that are proposed for treatment in the Armuchee Ridges project.

Table 3-14: Total acres treated in Alternative 3 by 6th level HUC.

6 th Level HUC	Initial Action Treated Acres	Temporary Road Miles	Number of Log Landings
0104	453	2.2	14
0301	959	3.1	32
0303	192	0.6	7
0401	629	2.8	21
0402	193	0.8	7
0404	18	0.1	1
0501	0	0	0
0502	1599	4.3	56
0503	956	3	33
0504	809	2.7	27

Direct Effects

The nature of the effects will be the same in this Alternative as the Proposed Action, however, there are fewer acres proposed for treatment in each HUC, and fewer stream miles adjacent to the treated stands.

Indirect Effects

Since this Alternative includes less acreage there would be less sedimentation from the proposed activities.

Cumulative Effects

Since there are fewer acres treated in this Alternative, the cumulative effects will be less than in the Proposed Action. Table 3-15 shows the number of acres within each HUC that are proposed for treatment in this project as well as the treatments in other projects. The Treated Acres column includes acreage from both Alternative 3 of the Armuchee Ridges project as well as the other projects in the 6th level HUCs. This column therefore includes acreage proposed for both thinning and prescribed burning activities. In most of the 6th level HUCs, a small percentage of Forest Service land in each HUC is proposed for treatment. An even smaller percentage of each 6th Level HUC is proposed for treatment.

Table 3-15: Acres treated in the Alternative 3 and other projects in relation to HUC size and Forest Service ownership acreage.

6 th Level HUC	HUC Size (acres)	Forest Service Acres in HUCs	Treated Acres	% HUC Treated	%FS Treated
0104	18671	3637	798	4	22
0301	10092	5305	2307	23	43
0303	8344	2834	642	8	23
0401	9532	2527	1679	18	66
0402	11957	3605	193	2	5
0404	15311	2191	18	0.12	0.82
0501	15878	5566	0	0	0
0502	19875	6352	3383	17	53
0503	18619	3861	2368	13	61
0504	9194	5502	1958	21	36

Source: US Forest Service stand data.

Treated acres include acreage in Alternative 2 as well as acreage from other projects outlined in Table 3-5.

Cumulative effects are also minimized because the effects of projects in one HUC will not have a significant impact on projects in other HUCs. There will be no cumulative effects from the Armuchee Ridges project as well as other projects in the affected HUCs after 2018. The last projects in the affected HUCs are scheduled to take place in 2015.

Table 3-16 shows the type of treatment in each 6th level HUC by year. This table shows that treatments within each HUC are spread over a long period of time.

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Table 3-16: Type of treatment by 6th Level HUC by year.

6 th Level HUCs		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
0104 (18,671 acres)	Temp. Road Log Landings Thinning Maintenance Restoration SP Burn Planting Release/Burn Rx Burn				0.2 3 95	0.2 3 95	0.2 3 95	0.2 3 95			1.2 11 271 87	12 11 271 87	12 11 271 87	12 11 271 87
				*205	*205	*205				*140	*140	*140		
0301 (10,092 acres)	Temp. Road Log Landings Thinning Maintenance Restoration Site Prep Burn Planting Release/Burn Rx Burn		*0.9 *13 *375	*0.9 *13 *375	2.4, *0.9 28, *13 697, *375 118	2.4, *0.9 28, *13 697, *375 118	0.7, 2.4 4, 28 131, 697 13, 118	0.7, 2.4 4, 28 131, 697 13, 118	0.7 4 131 13	0.7 4 131 13				
		*185	*473, *185	*315 *473, *185	*315 *473	*315								
0303 (8,344 acres)	Temp. Road Log Landings Thinning Maintenance Restoration Site Prep Burn Planting Release/Burn Rx Burn										0.6 7 123 69	0.6 7 123 69	0.6 7 123 69	0.6 7 123 69
										*450	*450	*450		
0401 (9,532 acres)	Temp. Road Log Landings Thinning Maintenance Restoration SP Burn Planting Release/Burn Rx Burn			0.8 8 237	0.8 8 237	2, 0.8 13, 8 392, 237	2, 0.8 13, 8 392, 237	2 13 392	2 13 392					
				*295	*755, *295	*755, *295	*755							
0402 (11,957 acres)	Temp. Road Log Landings Thinning Maintenance					0.8 7 193	0.8 7 193	0.8 7 193	0.8 7 193					

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	Restoration Site Prep Burn Planting Release/Burn Rx Burn													
0404 (15,311 acres)	Temp. Road Log Landings Thinning Maintenance Restoration Site Prep Burn Planting Release/Burn Rx Burn					0.1 1 18	0.1 1 18	0.1 1 18	0.1 1 18					
0501 (15,878 acres)	Temp. Road Log Landings Thinning Maintenance Restoration SP Burn Planting Release/Burn Rx Burn													
0502 (19,875 acres)	Temp. Road Log Landings Thinning Maintenance Restoration Site Prep Burn Planting Release/Burn Rx Burn	*9 *485	*9 *485	1.7 26 736, *9	1.7 26 736, *9	1.7 26 11, 736	1.7 26 11, 736	0.1 2 35, 11 28	2.5, 0.1 28, 2 789, 35, 11 28	2.5, 0.1 28, 2 789, 35 28	2.5, 0.1 28, 2 789, 35 28	2.5 28 789		

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0503 (18,619 acres)	Temp. Road Log Landings Thinning Maintenance Restoration Site Prep Burn Planting Release/Burn Rx Burn	*1 *42	*1 *42	*1 *42	*1 *42		0.7 14 394	0.7 14 394	0.7 14 394	2.3, 0.7 19, 14 548, 394 14	2.3 19 548 14	2.3 19 548 14	2.3 19 548 14	
		*344	*377, *344	*344, *377, *344	*344, *377	*115, *344	*115	*115	*190	*190	*190			
0501 (9,194 acres)	Temp. Road Log Landings Thinning Maintenance Restoration SP Burn Planting Release/Burn Rx Burn	*0.7 *3 *50	*0.7 *3 *50	*0.7 *3 *50	*0.7 *3 *50			1.7 21 539	1, 1.7 6, 21 187, 539	1, 1.7 6, 21 187, 539	1, 1.7 6, 21 187, 539	1 6 187		
		*300	*300	*300		*30	*30	*249, *520	*249, *520	*249				

Numbers marked with an * are from other projects.

All units are in acres except Temp. Road (miles); the number of log landings does not have units.

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Chapter 3 – Biological Environment

This section discloses effects to biological elements of the environment expected as a result of implementing the proposed action or alternatives. The biological environment includes the diversity of plant and animal communities, habitat components, and individual species of concern or interest. Analysis of effects to these elements is organized in this document following the framework used during forest planning (Forest Plan and FEIS). Use of this framework is designed to ensure comprehensive consideration of effects to the biological environment. Elements in this framework are listed in Table 3-15, where they are assessed for their relevance to this project. Only those relevant to the project are analyzed further in this document.

Table 3-15. Elements of the biological environment, derived from forest plan analysis, their relevance to the Armuchee Ridges project, and whether they will be further analyzed in this document.		
Biological Element	Analyzed Further?	Relevance to this Project (Potential Effects of Concern)
MAJOR FOREST COMMUNITIES		
Mesic Deciduous Forests	Yes	Thinning and restoration treatments under some alternatives would change the structure of mesic deciduous forest, potentially affecting habitat structure for associated species.
Eastern Hemlock and White Pine Forests	No	No treatment is proposed in eastern hemlock or white pine forests.
Oak and Oak-Pine Forests	Yes	Thinning and restoration treatments under some alternatives would change the structure of oak and oak-pine forest, potentially affecting habitat abundance for associated species.
Pine and Pine-Oak Forests	Yes	Thinning and restoration treatments under some alternatives would change structure in existing pine and pine-oak forests, potentially affecting habitat abundance for associated species.
Mixed Woodlands, Savannas, and Grasslands	No	No treatment is proposed in existing or potential woodlands, savannas, or grasslands.
RARE COMMUNITIES		
Wetlands	No	No wetlands will be affected by this project.
Glades and Barrens	No	Surveys of affected areas indicate no glades or barrens are present.
Canebrakes	No	No canebrakes will be affected by this project.
Caves and Mines	No	No caves or mines will be affected by this project.
Table Mountain Pine	No	Surveys of affected areas indicate no table mountain pine forests are present.
Rock Outcrops and Cliffs	No	Surveys of affected areas indicate no rock outcrops or cliffs are present.
High Elevation Balds	No	Surveys of affected areas indicate no high elevation balds are present.
Basic Mesic Forests	No	Surveys of affected areas indicate no basic mesic forests are present.
SUCCESSIONAL STAGE HABITATS		

Successional Forests	Yes	Reforestation activities under some of the alternatives could change the abundance of the various forest successional stages.
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High-Elevation, Early Successional Forests	No	The project area is less than 2400 feet in elevation and therefore does not provide high elevation conditions.
Old Growth	Yes	There is existing old growth in the affected areas, and thinning and restoration treatments under some of the alternatives could affect future old growth
Forest Interior Birds	Yes	Thinning and restoration treatments under some alternatives could change habitat conditions for forest interior birds.
Permanent Openings, Old Fields, Rights-of Way, Improved Pastures	No	No permanent openings, old fields, rights-of-way, or improved pastures will be affected by this project.
SPECIAL HABITAT ATTRIBUTES		
Riparian Habitats	Yes	Thinning and restoration treatments under some alternatives would change structure in forested riparian habitats, potentially affecting habitat abundance for associated species
Snags, Dens, and Downed Wood	Yes	Thinning and restoration treatments under some alternatives may result in both loss and creation of snags. Changes in snag density would potentially affect abundance and quality of habitat for snag-dependent species.
Aquatic Habitats	Yes	Thinning and restoration treatments under some alternatives could affect aquatic habitat conditions.
THREATENED, ENDANGERED, SENSITIVE AND LOCALLY RARE SPECIES	Yes	Some TES and Locally Rare species are present or potentially present in affected areas.
DEMAND SPECIES		
Black Bear	No	Black bears are not typically found within the area affected by this project due to the interspersion of roads, development, and non-forested lands with the relatively small, isolated forested tracts.
White-tailed Deer	Yes	Thinning and restoration treatments under some alternatives could potentially affect the amount of mast, browse, and cover for this species, potentially affecting population levels and hunter success.

The Forest Plan identifies 15 management indicator species to help indicate effects of management on some elements of this framework. A subset of these MIS is analyzed further in this analysis because their populations or habitats may be affected by the project (Table B). Most of the MIS are birds that are monitored annually through the Forest’s breeding bird surveys (USDA Forest Service 2004c). Population trends for all of the current MIS are summarized in the Management Indicator Species Population Trend Report for the Chattahoochee-Oconee National Forests (USDA Forest Service 2006).

Species Name	Purpose	Analyzed Further?	Relevance to this Project (Potential Effects of Concern)
Prairie Warbler	To help indicate the effects of management on early successional forests	Yes	Prairie warblers occur in the vicinity of the project and management actions may affect the availability of early successional forest

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Ovenbird	To help indicate the effects of management on forest interiors (Chattahoochee NF)	Yes	Ovenbirds occur in the vicinity of the project and management actions may affect forest interior habitat
Wood Thrush	To help indicate the effects of management on forest interiors (Oconee NF)	No	Wood thrush was selected as a MIS for the Oconee NF, to help indicate the effects of management actions on forest interior habitat. The Ovenbird is used as the MIS for this habitat on the Chattahoochee NF.
Pileated woodpecker	To help indicate effects of management on snags.	Yes	Pileated woodpeckers occur in the vicinity of the project and management actions may affect the availability of snags.
Scarlet Tanager	To help indicate the effects of management on oak forest	Yes	Scarlet Tanagers occur in the vicinity of the project and management actions may affect the structure of oak forests
Hooded Warbler	To help indicate the effects of management on mid -late successional mesic deciduous forest	Yes	Hooded warblers occur in the vicinity of the project and management actions may affect mid-late successional mesic deciduous forests
Chestnut-sided Warbler	To help indicate the effects of management on high elevation early-successional Forests	No	Chestnut-side warblers are unlikely to be found in the project area since it less than 2400 feet in elevation and therefore does not provide high elevation conditions.
Pine Warbler	To help indicate the effects of management on Pine, Pine-Oak Forest	Yes	Pine warblers occur in the vicinity of the project and management actions may affect the structure of pine forests.
Acadian Flycatcher	To help indicate the effects of management on Mid-Late Successional Riparian Habitats	Yes	Acadian flycatchers occur in the vicinity of the project and management actions may affect the structure of forested riparian habitats.
Field Sparrow	To help indicate the effects of management on woodland, savanna and grassland communities	No	Field sparrow was selected as a MIS for woodland, savanna, and grassland communities and no management actions will affect these habitats.
Swainson’s Warbler	To help indicate the effects of management on early successional riparian forests (Oconee NF)	No	Swainson’s Warbler was selected as a MIS for early successional riparian habitats on the Oconee NF, primarily canebrakes. Habitat for this species is not present in the project area.
Red-cockaded woodpecker	To help indicate effects of management on recovery of this endangered species, and on mid-late successional pine forest community. (Oconee NF)	No	Red-cockaded woodpecker was selected as a MIS for open pine forests on the Oconee NF and do not occur on the Chattahoochee NF

During project scoping, potential effects to additional elements of the biological environment (including species of local concern) were identified as relevant to this analysis. These elements are listed, with reasons for their relevance, in Table C.

Black bear	To help indicate effects of management on supplying public demand for bear hunting and viewing.	No	Black bears are not typically found within the area affected by this project due to the interspersion of roads, development, and non-forested lands with the relatively small, isolated forested tracts.
White-tailed Deer	To help indicate effects of management on supplying public demand for deer hunting and viewing.	Yes	Thinning and restoration treatments under some alternatives would affect the amount of mast, browse and cover for this species, potentially affecting population levels and hunter success.
Smooth Coneflower	To help indicate effects of management on recovery of this endangered species.	No	On the Chattahoochee NF, smooth coneflower is known only to occur on the Chattooga Ranger District in Habersham and Stephens Counties.

Table 3-17. Additional elements of the biological environment identified during project scoping as being potentially subject to effects worthy of analysis and disclosure.

Biological Element	Relevance to this Project (Potential Effects)
Northern bobwhite	Populations of this species have experienced large decreases throughout the Southeast. Thinning and restoration treatments under some alternatives would affect the amount of nesting and brood-rearing habitat for this species, potentially affecting population levels and hunter success.
Non-native invasive plant species (NNIS)	Invasive plant species are present in the project area. Thinning and restoration treatments under some alternatives could potentially increase the abundance and distribution of these populations.

MAJOR FOREST COMMUNITIES

National Forest land in ten subwatersheds (or sixth-level HUCs) comprises the Armuchee Ridges analysis area for considering effects to the biological elements related to this project (Appendix A – vicinity map). Table 3-18 below displays a summary of acres of each forest type in the Armuchee Ridges analysis area.

Table 3-18. Forest Type Distribution for the Armuchee Ridges Project Analysis Area		
Forest Type	Acres	%
12 (Shortleaf Pine-Oak)	3646	8.8
13 (Loblolly Pine-Hardwood)	1478	3.6
16 (Virginia Pine-Oak)	4321	10.4
31 (Loblolly Pine)	7729	18.6
32 (Shortleaf Pine)	1836	4.4
33 (Virginia Pine)	3798	9.2
45 (Chestnut Oak-Scarlet Oak-Yellow Pine)	4877	11.8
46 (Bottomland Hardwood-Yellow Pine)	299	0.6
47 (White Oak-Black Oak-Yellow Pine)	508	1.2
48 (Northern Red Oak-Hickory-Yellow Pine)	531	1.3
50 (Yellow Poplar)	37	0.1
51 (Post Oak-Black Oak)	194	0.5
52 (Chestnut Oak)	4090	9.9
53 (White Oak-N Red Oak-Hickory)	7032	17
56 (Y Poplar-White Oak-N Red Oak)	744	1.8
58 (Sweet Gum-Yellow Poplar)	32	0.1
59 (Scarlet Oak)	85	0.2
60 (Chestnut Oak-Scarlet Oak)	108	0.2
Non-forested	35	0.1
	41,380	100

Element – Mesic Deciduous Forests

Measure – Measure will consist of species composition, successional stage, and forest structure in the affected timber stands and effects on habitat conditions and populations of associated species from project activities.

Bounds of Analysis – Spatial: The Armuchee Ridges project analysis area consists of ten subwatersheds on National Forest and adjacent private lands. **Temporal:** Approximately 10 years following implementation.

Existing Conditions

This forest community consists of cove hardwoods, which may include yellow poplar, white oak, northern red oak, basswood, and ash (Forest Types 50 or 56), sweet gum-red maple stands (Forest Type 58), bottomland hardwood-yellow pine stands (Forest Type 46), and the more mesic portions of the upland hardwood stands (Forest Type 53). There are approximately 7032 acres of upland hardwoods in the analysis area, but only a small portion of these stands are located on mesic sites (north aspect, riparian corridor). The majority is located on xeric sites and is included in the discussion regarding the oak and

oak-pine forest community. Cove hardwood forest types are present on 781 acres of the Armuchee Ridges analysis area, sweet gum-maple on 32 acres, and bottomland hardwood-yellow pine on 299 acres (Table D). This acreage represents 2.5% of the total Armuchee Ridges analysis area. This figure is not surprising when ownership patterns in this area are examined; the steep National Forest ridges are known for being stony, sandy, and low in fertility, while the privately owned lower slopes, knobs, and valleys are more mesic. Most of the cove hardwood stands on National Forest are located on north-facing finger ridges and drains on the east side of Taylor Ridge, while the bottomland hardwood-yellow pine stands are in the few flat creek drainages in National Forest ownership.

The majority of the mesic deciduous forest on the Armuchee Ridges analysis area is mid-late successional stage (74%). This forest community is characterized by relatively low levels of disturbance. Structural diversity in the form of a diverse and well-developed canopy, midstory, and understory are key habitat components for a number of bird species dependent upon this forest type. The hooded warbler was identified in the Forest Plan as a MIS to help assess the effects of management on species associated with mature mesic deciduous forests. Hooded warblers are fairly common Neotropical migrants found in mixed hardwood forests with dense undergrowth for nesting (DeGraaf et al. 1991). Mature forests with a structurally diverse understory and midstory are preferred. Although commonly reported during breeding bird surveys on other parts of the Chattahoochee, hooded warblers are fairly uncommon on the Armuchee Ridges analysis area due to the limited mesic deciduous habitat. The structurally diverse habitat condition is present in the older stands, but for the portion that are younger (approximately 336 acres less than 40 years old), stand conditions are currently unsuitable as habitat for hooded warbler and other species dependent upon mature mesic deciduous forest. These stands are comprised of dense saplings or pole timber with a large component of loblolly pine regeneration.

Due to past conversion of forest to agricultural uses, virtually all river floodplain forest and associated habitats such as bottomland hardwood stands or canebrakes on private land in the region have been lost. Fertile valleys and river bottoms are generally used for row crops, hay fields, or pastures (USGS 2001).

Effects of Alternative 1 (No Action)-

Direct and Indirect Effects_- This alternative would perpetuate current conditions and no direct effects to mesic deciduous forest are expected. The existing mesic deciduous forest community is extremely limited on this portion of the Forest, and no action would be taken to restore riparian hardwood species or improve structural diversity in regenerating mesic deciduous stands. Existing habitat conditions for hooded warbler and other species that utilize mesic deciduous forests will be unaffected.

Cumulative Effects - Past, present, or reasonably foreseeable activities planned for the Armuchee Ridges analysis area affecting mature mesic deciduous forests include a small amount of the approximately 7000 acres of prescribed burning for fuel reduction and

wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years. Almost all of the forest communities within the prescribed burn units are dry pine/pine-oak or oak/oak-pine, but two of the prescribed burning units have control lines within mesic deciduous hardwood stands. Low intensity prescribed fire burns poorly in moist, sheltered coves and drains; a mosaic of burned and unburned areas will result. Very few acres will be affected.

Effects of Alternative 2 (Proposed Action)-

Direct and Indirect Effects – Under this alternative, approximately 234 acres of mesic deciduous forest (Forest Type 46) would be treated with the following objectives:

Oak and oak-pine restoration:

- 180 acres (1 stand) would be selectively thinned to release oaks and desirable bottomland hardwoods

This stand is in the river floodplain of East Armuchee Creek. Prior to Forest Service ownership, a portion of it was harvested and planted with loblolly pine by a private landowner in 1989. This river floodplain stand was historically a natural bottomland hardwood forest. Loblolly pine will be removed and the desirable oaks and bottomland hardwood species such as black walnut will be released by hand. Hooded warblers are expected to respond positively to management actions (including thinning) that are designed to stimulate advanced oak regeneration and perpetuate the oak or oak/pine forest type on mesic sites (Forest Service 2004). Mast production in these stands should increase in the future due to increasing crown size as a result of less crowded conditions.

Riparian hardwood restoration:

- 54 acres (1 stand) would be selectively thinned to release bottomland hardwood species such as black walnut, butternut, and sycamore.

This stand is in the river floodplain of East Armuchee Creek. It was planted with loblolly pine in 2000, but it is much more ecologically appropriate as a bottomland hardwood stand. Loblolly pine would be removed and the desirable oaks and bottomland hardwood species such as black walnut would be released by hand. After treatment, this stand may be designated as a small block of old growth (type 13 – river floodplain). This action complies with Forest Plan objective 21.1 and standard FW-050. Hooded warblers would be benefited by the implementation of this treatment in the future, when the stand ages as a bottomland hardwood stand rather than as a mixed stand.

Cumulative effects – This alternative would have a positive effect on mesic deciduous forests due to 1) the current undesirable condition of these young stands and 2) their current limited occurrence on National Forest in the area, where active management can take place. Much of the mesic deciduous forest on private land has been converted to agricultural land or residential development, and is continually being reduced. The Forest Plan has an objective to improve structural quality in mesic deciduous stands and

restore riparian hardwood stands. This alternative will improve mesic deciduous forest habitat and riparian hardwood habitat, ultimately benefiting hooded warbler habitat.

Past, present, or reasonably foreseeable activities planned for the Armuchee Ridges analysis area affecting mature mesic deciduous forests include a small amount of the approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years. Almost all of the forest types within the prescribed burn units are dry pine/pine-oak or oak/oak-pine, but one of the prescribed burning units contains a portion of the above 180 acre stand. Low intensity prescribed fire burns poorly in moist, sheltered coves and drains; a mosaic of burned and unburned areas will result. Very few acres will be affected.

This alternative in combination with past, present, or reasonably foreseeable future activities should result in positive cumulative effects to mesic deciduous forest.

Effects of Alternative 3-

Direct and Indirect Effects- Under this alternative, approximately 54 acres of mesic deciduous forest would be affected. Only the restoration of the riparian hardwood stand would be implemented. This treatment would have a positive effect on hooded warbler habitat as the stand ages, by favoring bottomland hardwood tree species, but the amount of mesic deciduous habitat which would be enhanced by the removal of off-site pine is much smaller than under alternative 2.

Cumulative effects – This alternative would have a minor positive effect on mesic deciduous forests due to the current undesirable condition of some of the younger stands. Much of the mesic deciduous forest on private land was converted to agricultural land or residential development long ago, and is continually being reduced. The Forest Plan has an objective to improve structural quality in mesic deciduous stands and restore riparian hardwood stands. This alternative will improve riparian hardwood habitat, ultimately benefiting hooded warbler habitat. Past, present, or reasonably foreseeable activities planned for the Armuchee Ridges analysis area affecting mature mesic deciduous forests includes a small amount of the approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years. Almost all of the forest types within the prescribed burn units are dry pine/pine-oak or oak/oak-pine, but two of the prescribed burning units have control lines within mesic deciduous hardwood stands. Low intensity prescribed fire burns poorly in moist, sheltered coves and drains; a mosaic of burned and unburned areas will result. Very few acres will be affected.

This alternative in combination with past, present, or reasonably foreseeable future activities should result in positive cumulative effects to mesic deciduous forest.

Element - Oak and Oak-Pine Forests

Measure - Measure will consist of species composition, successional stage, and forest structure in the affected timber stands and effects on habitat conditions and populations of associated species from project activities.

Bounds of Analysis – Spatial: The Armuchee Ridges project analysis area consists of ten subwatersheds on National Forest and adjacent private lands. **Temporal:** Approximately 10 years following implementation.

Existing Conditions

This forest community consists of various dry or dry-mesic species such as chestnut oak, scarlet oak, white oak, black oak, northern red oak, various hickories, and a lesser component of yellow pine (Forest Types 45, 47, 48, 51, 52, 53, 59, and 60). The yellow pine component of this forest community has been reduced over the past few decades due to southern pine beetle infestations. Approximately 42% or 17,423 acres of the Armuchee Ridges analysis area is comprised of oak or oak-pine forest (Table D); this is well-distributed and about 74% is mature, mid-late successional stage (at least 40 years old and capable of mast production). This percentage mirrors that of the entire Chattahoochee National Forest (oak forests comprise nearly 46% of the forested acres), and the region as a whole (over half of the timberland is oak or oak-pine forest) (USDA Forest Service 2004a).

Forest structure in the overstocked, more closed-canopied portions of the oak/oak-pine forest tends toward little natural oak regeneration and a large component of other hardwood species such as red maple. An average of 350 to 450 understory stems per acre, typically fire-intolerant and shade-tolerant species, is common (USDA FSFIA 2004). Crowns of mature oaks are smaller, and as a result, mast production is not maximized. Oak/oak-pine stands with more open-canopy structure generally have more abundant oak regeneration and a more diverse midstory and understory. More open-canopy structure also increases mast production as a result of increased crown sizes (Greenberg 2000). The open-canopy structure is a desirable forest structure due to these factors. Most of the existing mature oak/oak-pine forest in the Armuchee Ridges analysis area is closed-canopy due to its even-aged stand condition and lack of disturbance as a result of many decades of fire suppression.

The role of fire in the development of oak stands was recognized by ecologists as early as the 1920's and 1930's (Boerner 2005). Unfortunately, this is the same time period in which fire suppression efforts became organized. The effect of fire suppression can be summarized as having favored oak competitors which are not fire-tolerant. A number of silvical differences in oak regeneration and fire-intolerant species such as red maple are apparent. Due to germination strategies oaks utilize, oak regeneration is less affected by fire than its competitors. For example, acorns have hypogeal germination (cotyledons remain in the shell and provide energy for the oak seedling, while red maple seeds have epigeal germination (cotyledons emerge and rise above the shell to become the first leaves); oak seedlings have a deeper root collar and accompanying dormant buds which place them lower in the forest floor than most other hardwoods; oaks establish a deep taproot and emphasize root development over stem growth. These characteristics allow

oaks to survive fires by repeatedly re-sprouting (Brose et. al 2005). Mature oaks have several other adaptations to fire conditions, including thick, fire-resistant bark, and compartmentalization of fire scar injuries (Abrams 2005).

Mature oak and oak-pine forests provide a valuable wildlife habitat component in the form of hard mast (acorns and nuts). The abundance and distribution of mast strongly affects population dynamics of a wide variety of wildlife species. Acorn abundance varies greatly between years, oak species and location (Greenberg and Parresol 2002). Annual productivity is affected by factors such as late spring frosts, summer drought, insect infestations, and diseases such as oak decline (Oak 2005). Availability normally peaks in October, and in good years mast is available until mid-winter. Although acorns are only available seasonally, their high carbohydrate and fat content make them an extremely important food resource. Due to different fruiting habits of the white oak versus the red oak group, simultaneous, total failures among all oak species in a single year are rare. The most common oak species present in the Armuchee Ridges analysis area are scarlet oak and chestnut oak (USDA FSFIA 2004). Both of these oaks are known as high or fairly high mast producers, with scarlet oak and other red oaks producing a more stable, although moderate annual yield than chestnut oak (as well as other white oaks) (USDA Forest Service 1971).

Wildlife biologists and managers have been interested in understanding and quantifying hard mast production for many years. Mast yields have been measured in several different ways; acorns have been trapped and weighed, twig/acorn counts have been used, as have visual or ocular estimates (Whitehead 1989). These measures have been combined with wildlife needs on a per acre basis to determine minimum pounds of acorns per acre necessary to sustain average wildlife population needs. Estimates range from 60 to 200 pounds per acre (Whitehead 1969, Downs 1944). Acorn production ranges from several hundred pounds per acre in “excellent” years to almost none in “poor” years. More recent management guidelines rely on hard-mast indices (HMI) which do not measure acorn production but compare relative crop sizes among years and areas for tracking long-term patterns due the extreme unreliability of predicting acorn production (Greenberg and Warburton 2007). Mast surveys have been conducted annually in northwest Georgia by Georgia Department of Natural Resources since 1985. Scores of each survey route are combined to estimate annual acorn production and produce an average score. Over the last five years, HMI scores have ranged from 2.09 (fair) to 4.18 (good) in northwest Georgia (Georgia DNR 2007). A large percentage of mature oak and oak-pine forest and diversity of oak species (red vs. white) such as occurs in the Armuchee Ridges analysis area ensures that HMIs fluctuate less widely than in other areas. Although hard-mast capability is good within the Armuchee Ridges analysis area, the periodic nature of mast crops makes alternative food sources such as soft mast (blackberry, mulberry, cherry, grape, other fruits and berries), roots, fungi, bulbs, floral parts, insects, and small vertebrates essential.

The revised Forest Plan identified the Scarlet Tanager as a MIS to help indicate the effects of management on species associated with mature upland oak communities. The scarlet tanager is most abundant in mature, upland deciduous forests (Hamel 1992). It is

most common in areas with a relatively closed canopy, a dense understory with a high diversity of shrubs, and limited ground cover (NatureServe 2005). The scarlet tanager is a common breeding bird on the Conasauga Ranger District. Given the availability of mature upland oak forest habitat, population levels likely are good.

Effects of Alternative 1 (No Action)

Direct and Indirect Effects – No direct impacts to oak and oak-pine forest habitat are expected. This alternative would ultimately result in the slight reduction of oak and oak-pine forest because conditions that increase oak dominance (open forest structure and moderate fire return intervals) would not be maintained, and restoration of oak or oak-pine forests on appropriate sites now occupied by pine plantations or other forest types will not be implemented. Over time, the amount of red maple and other species less valuable to wildlife would increase. This may result in a slight decrease in mast production, and may slightly decrease habitat quality for the scarlet tanager and other species that utilize mature upland oak habitats.

Cumulative Effects - Mature oak and oak-pine forest is abundant on the Armuchee Ridges analysis area and Forest as a whole. The availability of older oak stands on the Forest is expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a). Bird survey data suggests that scarlet tanager populations have increased on the Forest during the last decade and populations are expected to increase on the Forest through the implementation of the revised Forest Plan (USDA Forest Service 2004a, 2006). This alternative does not implement Forest Plan goals and objectives in the Armuchee Ridges analysis area.

Past, present, or reasonably foreseeable activities planned for the Armuchee Ridges analysis area affecting mature oak or oak-pine forests include approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years. The majority of the acreage planned for prescribed burning consists of pine or pine-oak stands but approximately 1/3 of the area consists of oak and oak-pine stands. This activity is expected to favor oak by promoting oak reproduction, reducing the abundance of fire-intolerant species such as red maple, and stimulating understory grasses and fruiting plants.

Adjacent private land contains forested ridges and slopes which are dominated by oak and oak-pine forests. These lands provide valuable forest cover and mast production, but based on a recent analysis of land use, they are slowly being converted to urban and suburban use (Georgia DNR 2005). Trends indicate a general decline in active agricultural uses, an increase in hardwood and mixed types, an increase in residential and commercial development, and a decline in evergreen forest types.

Cumulative effects to oak and oak-pine forests in the Armuchee Ridges analysis area and associated species such as scarlet tanagers based on this alternative and past, present, and

reasonably foreseeable actions are expected to be minor due to the extensive amount of this forest community.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects – Under this alternative, approximately 863 acres of existing oak or oak-pine forest would be treated with the following objectives:

Oak and oak-pine thinning and maintenance:

- 131 acres (5 stands) would be thinned and prescribed burned to maintain oak dominance

Four of the five stands are young, dense stands less than 22 years old. This treatment would help to develop more open oak/oak-pine stand conditions and provide favorable conditions for the establishment of oak regeneration. Mast production in these stands should increase due to increasing crown size as a result of less crowded conditions. The treatments may result in less desirable habitat conditions for the scarlet tanager and other species that utilize mature, closed-canopy upland oak habitats. However, only a very small portion of the oak/oak-pine forest in the analysis area will be affected by this treatment (less than 1%) and these habitats are very abundant on the Forest. The affected stands are well distributed over the analysis area and would be treated over the next 8-10 years.

Oak and oak-pine restoration:

- 246 acres (3 stands) would be selectively thinned to 40-60 square feet basal area and prescribed burned.

The objective of this treatment is to restore oaks or oak-pine forests on appropriate sites currently occupied by pine plantations or other hardwood species such as gum or maple. Oaks, hickories, and other mast-bearing trees would be retained. The resulting stand would have a major increase in light regime and a more diverse mid- and understory as a result. Crowns of residual trees would expand and mast production would increase. This treatment would result in less desirable habitat for scarlet tanager in the short-term, as well as a small, short-term reduction in mast production, but would improve conditions for oak dominance in the future.

Mountain longleaf pine and pine-oak restoration:

- 486 acres (10 stands) would be harvested, prescribed burned, and planted with containerized seedlings of mountain longleaf pine.

This treatment would result in a decrease in mast production within the individual stands to be treated, as the majority of the trees would be removed from these stands. There would be some hardwood inclusions within the stands in ephemeral drains or other areas containing oaks. On a landscape scale, the loss of this amount of mature mast-bearing potential would be a short-term effect, buffered by that produced by adjacent stands, and the presence of alternative food resources. After harvest, the regenerating stands would

provide structural diversity (early-successional habitat or ESH) within an almost uniformly mature forest structure. This treatment would result in a decrease in the amount of closed-canopy oak/oak-pine forest, preferred habitat for scarlet tanager and other species, but only a small amount of the existing oak forest would be affected (2.7%). Scarlet tanager populations should not be affected by this treatment due to the abundance of the mature oak and oak/pine forest community throughout the Armuchee Ridges analysis area and the Forest as a whole.

These ten stands are distributed along Taylor Ridge and Strawberry Mountain, and treatment would be phased in over a ten year period.

Cumulative Effects - Across the Forest, the availability of older oak stands is expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a). Bird survey data suggests that scarlet tanager populations have increased on the Forest during the last decade and populations are expected to increase on the Forest through the implementation of the Forest Plan (USDA Forest Service 2004a, 2006). Additional activities planned for the Armuchee Ridges analysis area that would affect mature oak or oak-pine forests include approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years. This activity is expected to favor oak by promoting oak reproduction and reducing the abundance of fire-intolerant species such as red maple, and stimulating understory grasses and fruiting plants.

The implementation of this alternative and past, present, and reasonably foreseeable actions would have negligible effects on mast-dependent wildlife species and the scarlet tanager due to the extensive amount of mature oak forest well distributed across the Armuchee Ridges analysis area as well as on adjacent private land.

Effects of Alternative 3

Direct and Indirect Effects – Under this alternative, approximately 131 acres of existing oak or oak-pine forest would be treated with the following objectives:

Oak and oak-pine thinning and maintenance:

- 131 acres (5 stands) would be thinned and prescribed burned to maintain oak dominance

These treatments would help to develop more open oak/oak-pine stand conditions and provide favorable conditions for the establishment of oak regeneration. Mast production in these stands should increase due to increasing crown size as a result of less crowded conditions. The treatments may result in less desirable habitat conditions for the scarlet tanager and other species that utilize mature, closed-canopy upland oak habitats. However, only a very small portion of the oak/oak-pine forest in the analysis area would be affected by this treatment (less than 1%) and these habitats are very abundant on the Forest. The affected stands are well distributed over the analysis area and will be treated

over the next 8-10 years. No early-successional stage oak/oak-pine habitat will be created in this alternative.

Cumulative Effects - Across the Forest, the availability of older oak stands is expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a). This alternative implements the Forest Plan by helping develop conditions which favor oak on 131 acres, but does not achieve as many other objectives as Alternative 2. Additional activities planned for the Armuchee Ridges analysis area that would affect mature oak or oak-pine forests include approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years. This activity is expected to favor oak by promoting oak reproduction, reducing the abundance of fire-intolerant species such as red maple, and stimulating understory grasses and fruiting plants.

Bird survey data suggests that scarlet tanager populations have increased on the Forest during the last decade and populations are expected to increase on the Forest through the implementation of the Forest Plan (USDA Forest Service 2004a, 2006). The implementation of this alternative and past, present, and reasonably foreseeable actions would have negligible effects on mast-dependent wildlife species and the scarlet tanager due to the extensive amount of mature oak forest well distributed across the Armuchee Ridges analysis area as well as on adjacent private land.

Element - Pine and Pine-Oak Forests

Measure - Measure will consist of species composition, successional stage, and structure in the affected timber stand and effects on habitat conditions and populations of associated species from project activities.

Bounds of Analysis – Spatial: The Armuchee Ridges project analysis area consists of ten subwatersheds on National Forest and adjacent private lands. **Temporal:** Approximately 10 years following implementation.

Existing Conditions

This forest community consists of yellow pine stands where 70% or greater of the dominant trees are yellow pine, or pine-oak stands where yellow pine makes up 51% to 69% of the dominant trees (Forest Types 12, 13, 16, 31, 32, 33). There are approximately 22,808 acres of pine and pine-oak forest types on the Armuchee Ridges analysis area (55% of the area). Yellow pine species include shortleaf, Virginia, and loblolly.

Much of the Armuchee Ridges analysis area was once cleared for agriculture or harvested for timber products. Areas that were once native yellow pine and pine-oak or oak-pine stands were converted to faster growing loblolly pine. Large areas were planted to pine with little or no attempt to retain natural streamside vegetation. As a result, the productive bottomland hardwood forests and their accompanying floral and faunal diversity were greatly reduced. In addition, fire suppression has caused a significant shift in the existing pine and pine/oak forest. The lack of fire has caused a decline in the extent and quality of

native yellow pine and pine-oak stands, especially in the shortleaf and mountain longleaf pine/pine-oak stands, and allowed fire-intolerant species such as Virginia pine to grow in areas and quantities it would not have likely occurred prior to the land use disturbances of the early 1900's. The result is a crowded, dense forest of stressed trees competing for resources such as sunlight, water, and soil nutrients. The stressed condition makes trees more vulnerable to insect and disease infestation, such as southern pine beetle (SPB) attack. In the past decade, SPB has moved through the pine and pine/oak forest, leaving patches of dead trees. Wildlife habitat is poor due to the lack of sunlight that reaches the ground and the resultant poor forage, fruit, insect production, and nesting cover.

There is an extremely small amount of mountain longleaf pine in the area. Longleaf pine forests originally covered almost 100 million acres in the southeastern United States. Now, less than 3 million acres remain, and longleaf pine forest in its natural fire-maintained condition is recognized as the rarest community type in the southeast (Noss et al. 1995). Mountain longleaf pine, a geographically separate ecotype, is even rarer, comprising only 2% of longleaf's total remnant acreage. It exists only on isolated forested ridges in northeast Alabama and northwest Georgia, such as the xeric ridges in the Armuchee Ridges analysis area which are underlain with Red Mountain sandstone (Wharton 1978). Today, relict mountain longleaf pine occurs in combination with other yellow pine and xeric oak species on parallel side ridges on Taylor Ridge. Some of the trees are in the 70-90 year range; one was aged as over 200 years old (Forest Service notes). Very little longleaf regeneration is present in the stands due to the closed canopy and history of fire suppression (a 185 acre unit containing most of the relict longleaf pine was prescribed burned in 2000). The restoration of 1,100 acres of mountain longleaf pine over the next 7-8 years is a key objective in the Forest Plan. The Armuchee Ridges analysis area contains the entire potential habitat for this restoration.

The revised Forest Plan identified the pine warbler as a MIS to help indicate the effects of management on species associated with pine and pine-oak forests. The pine warbler uses mid to late successional pine forests throughout the year. (Hamel 1992). It occurs in both open pine woodlands and dense pine plantations, but seldom uses hardwood stands. The highest numbers seem to occur where pure stands of pine are found. It is less abundant as the proportion of hardwood tree species increases (NatureServe 2005). The pine warbler is a common breeding bird on the Conasauga Ranger District and has been reported from Breeding Bird Surveys in the Armuchee Ridges analysis area. Given the availability of mid-late successional pine and pine-oak forest habitat, population levels likely are good.

Effects of Alternative 1 (No Action)

Direct and Indirect Effects – No direct impacts to pine and pine-oak forest habitat are expected. This alternative would ultimately result in the reduction of yellow pine and pine-oak forest because conditions that perpetuate pine/pine-oak dominance (open forest structure and moderate fire return intervals) would not be maintained.

Future attacks from southern pine beetle and encroachment from hardwoods will further reduce pine and pine/oak forest in the analysis area. This should result in a decline in habitat conditions for the pine warbler and other species that utilize mature pine forest habitats.

Cumulative Effects – The pine/pine-oak forest community is common both within the Armuchee Ridges analysis area (22,808 acres of pine/pine oak) and Forest wide (161,000 acres) (USDA Forest Service 2004a), as well as on adjacent private lands. This forest community is being reduced due to fire suppression, SPB infestations, and within the adjacent private property, due to development into residential areas. Bird survey data suggests that pine warbler populations have been relatively stable on the Forest and populations on the Forest are expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a, 2006). This alternative does not implement the Forest Plan by improving forest health, wildlife habitat, or restoring native ecosystems.

Additional past, present, or reasonably foreseeable activities for the Armuchee Ridges analysis area affecting pine/pine-oak forest include:

- Approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years. This activity is expected to reducing the abundance of fire-intolerant species such as red maple and Virginia pine, favor oak by promoting oak reproduction, and stimulate understory grasses and fruiting.
- Dry Creek timber sale, 103 acres of pine/pine oak forest thinning completed in 2007.
- John's Creek timber sale, 375 acres of pine thinning scheduled to begin in 2008.
- Taylor Ridge pre-commercial thinning, 185 acres of pine thinning completed in spring 2008.

All of the above past, present, or reasonably foreseeable actions will cumulatively have positive effects to pine/pine-oak forest habitat and associated species such as pine warbler. Alternative 1 would provide no additional positive cumulative effects to pine/pine-oak forest health, wildlife habitat, native pine/pine-oak communities or associated wildlife species such as pine warbler.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects – Under this alternative, approximately 6046 acres of pine or pine-oak forest would be treated with the following objectives:

Thinning of pine stands:

- 5428 acres (119 stands) would be commercially thinned and 350 acres (14 stands) would be pre-commercially thinned to improve forest health and wildlife habitat

This treatment would result in a reduction in stand density (up to 50%) which will improve wildlife habitat by increasing sunlight to the forest floor, stimulating growth of

grasses, forbs, fruiting of shrubs, insect production, and nesting cover. The stands to be treated are well distributed across the Armuchee Ridges analysis area. They consist of approximately 25% of the existing pine/pine oak in the area. Thinning treatments would be phased in over the next 10 years. Existing system roads and short spurs of temporary roads and skid trails would be utilized to access the timber stands. Disturbed soils would be sown with native plant seed or non-native seed that is non-persistent.

Riparian corridors in 56 of the pine stands would potentially be selectively thinned in order to favor hardwoods. Loblolly pine would be removed from the riparian corridor in order to restore hardwood dominance. Natural riparian vegetation is extremely valuable because of the predominance of herbaceous and woody plants, particularly hardwoods, which provide mast, nesting, and denning cavities, diversity of habitat, high soil moisture, and travel ways for wildlife. An average of 50 square feet of basal area per acre would be retained in the riparian areas in order to maintain shade and temperature control for the stream.

Approximately 600 acres of the total thinning acreage is comprised of mixed (pine-oak) stands (Forest Types 12, 13, 16). Although some mature oaks may be removed with this treatment, overall mast production would be maintained by crown expansion of residual oaks due to the extra space gained and less competition for water and soil nutrient resources. Advanced oak regeneration would be more likely to remain dominant in the thinned stands.

Pine warbler populations would not be directly affected by this treatment because they utilize pine forests of all densities. Their abundance may decrease over time as this treatment would result in an increase in the amount of hardwoods in the pine/pine-oak forest.

Mountain longleaf pine and pine-oak restoration:

- 153 acres (5 stands) would be harvested, prescribed burned, and planted with containerized seedlings of mountain longleaf pine.

This treatment would result in a decrease in mast production within the individual stands to be treated, as the majority of the trees would be removed from these stands. Oak is a lesser component of these stands; one is a Virginia pine stand; the others are mixed pine-oak. After harvest, the regenerating stands would provide structural diversity (early-successional habitat or ESH) within an almost uniformly mature forest structure. ESH is valuable because it provides dense, low, shrubby vegetation for wildlife cover and browse. This treatment would result in a decrease in the amount of mid-late successional pine/pine-oak forest, preferred habitat for pine warbler, but only a small amount of the existing pine/pine-oak forest would be affected (0.7%). Pine warbler populations should not be affected by this treatment due to the abundance of this forest community throughout the Armuchee Ridges analysis area and the Forest as a whole.

These five stands are distributed along Taylor Ridge and Strawberry Mountain, and treatment would be phased in over a 10-year period.

Shortleaf pine restoration:

- 30 acres (1 stand) would be harvested, prescribed burned, and planted with seedlings of shortleaf pine.

This treatment would not result in a decrease in mast production within the individual stand to be treated because it is less than 25 years old and is likely not producing mast. After harvest, the regenerating stands would provide structural diversity (ESH) within an almost uniformly mature forest structure. This treatment would not result in a decrease in the amount of mid-late successional pine/pine-oak forest, preferred habitat for pine warbler, because it is not mid-late successional stage. Pine warbler populations should not be affected by this treatment due to the abundance of this forest community throughout the Armuchee Ridges analysis area and the Forest as a whole.

Oak or oak-pine maintenance:

- 25 acres (2 stands) would be pre-commercially thinned and prescribed burned to re-establish oak dominance

Two young loblolly pine-oak stands would be treated to re-establish oak dominance. Loblolly pine would be removed. The stands would be burned to favor oak and remove fire-intolerant species. These treatments would help to develop more open oak/oak-pine stand conditions and provide favorable conditions for the establishment of oak regeneration. Mast production in these stands should increase due to increasing crown size as a result of less crowded conditions. Pine warbler populations should not be affected by this treatment due to the abundance of this forest community throughout the Armuchee Ridges analysis area and the Forest as a whole.

Oak or oak-pine restoration:

- 60 acres (3 stands) would be thinned and prescribed burned to re-establish oak dominance

Three loblolly pine-oak (Forest Type 13) stands are located on sites better suited to oak or oak-pine forest. All three stands would be thinned (loblolly pine will be removed), and residual oaks and other desirable hardwoods would be retained. The stands would be burned to favor oak and remove fire-intolerant species. These treatments would help to develop more open oak/oak-pine stand conditions and provide favorable conditions for the establishment of oak regeneration. Mast production in these stands should increase due to increasing crown size as a result of less crowded conditions. Pine warbler populations should not be affected by this treatment due to the abundance of this forest community throughout the Armuchee Ridges analysis area and the Forest as a whole.

Cumulative Effects – The pine/pine-oak forest community is common both within the Armuchee Ridges analysis area (22,808 acres of pine/pine oak) and Forest-wide (161,000 acres) (Forest Service 2004a), as well as on adjacent private lands. This forest community is being reduced due to fire suppression, SPB infestations, and within the adjacent private property, due to development into residential areas. The planned

restoration of these forest communities (mountain longleaf pine and shortleaf pine) on National Forest lands will be the only opportunity in this area for reestablishing this type ecosystem. The availability of older pine stands on the Forest is expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a). Bird survey data suggests that pine warbler populations have been relatively stable on the Forest and populations on the Forest are expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a, 2006). This alternative implements the Forest Plan by helping develop conditions which improve forest health and wildlife habitat and restores native ecosystems.

Additional activities for the Armuchee Ridges analysis area affecting pine/pine-oak forest include:

- Approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years. This activity is expected to reducing the abundance of fire-intolerant species such as red maple and Virginia pine, favor oak by promoting oak reproduction, and stimulate understory grasses and fruiting.
- Dry Creek timber sale, 103 acres of pine/pine oak forest thinning completed in 2007.
- John's Creek timber sale, 375 acres of pine thinning scheduled to begin in 2008.
- Taylor Ridge pre-commercial thinning, 1885 acres of pine thinning completed in spring 2008.

All of these past, present, or reasonably foreseeable actions, in combination with Alternative 2, have cumulatively positive effects to pine/pine-oak forest habitat and associated species such as pine warblers.

Effects of Alternative 3

Direct and Indirect Effects – Under this alternative, approximately 5803 acres of pine or pine-oak forest would be treated with the following objectives:

Thinning of pine stands:

- 5428 acres (119 stands) would be commercially thinned and 350 acres (14 stands) would be pre-commercially thinned to improve forest health and wildlife habitat

This treatment would result in a reduction in stand density (up to 50%) which would improve wildlife habitat by increasing sunlight to the forest floor, stimulating growth of grasses, forbs, fruiting of shrubs, insect production and nesting cover. Thinning would leave the dominant pines and oaks in these stands, reducing the density and increasing vigor in the remaining pines and increasing their resistance to SPB attacks. The treated stands are well distributed across the Armuchee Ridges analysis area. They consist of approximately 25% of the existing pine/pine oak in the area. Thinnings would be phased in over the next 10 years. Riparian corridors would be treated in selected stands as in Alternative 2.

Approximately 600 acres of the total thinning acreage is comprised of mixed (pine-oak) stands. Although some mature oaks may be removed with this treatment, overall mast production would be maintained by crown expansion of residual oaks due to the extra space gained, as well as increased water and soil nutrient resources. Advanced oak regeneration would be more likely to remain dominant in the thinned stands.

Pine warbler populations would not be directly affected by this treatment because they utilize pine forests of all densities. Their abundance may decrease over time as this treatment would result in an increase in the amount of hardwoods in the pine/pine-oak forest.

Oak or oak-pine maintenance:

- 25 acres (2 stands) would be pre-commercially thinned and prescribed burned to re-establish oak dominance

Two young loblolly pine-oak stands would be treated to re-establish oak dominance. Loblolly pine would be removed. The stands would be burned to favor oak and remove fire-intolerant species. These treatments would help to develop more open oak/oak-pine stand conditions and provide favorable conditions for the establishment of oak regeneration. Mast production in these stands should increase due to increasing crown size as a result of less crowded conditions. Pine warbler populations should not be affected by this treatment due to the abundance of this forest community throughout the Armuchee Ridges analysis area and the Forest as a whole.

Cumulative Effects – The pine/pine-oak forest community is common both within the Armuchee Ridges analysis area (22,808 acres) and Forest wide (161,000 acres) (Forest Service 2004a), as well as adjacent private lands. This forest community is being reduced due to fire suppression, SPB infestations, and within the adjacent private property, due to development into residential areas. The availability of older pine stands on the Forest is expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a). Bird survey data suggests that pine warbler populations have been relatively stable on the Forest and populations on the Forest are expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a, 2006). This alternative implements the Forest Plan by helping develop conditions which improve forest health and wildlife habitat, but it does not restore native ecosystems (mountain longleaf pine and shortleaf pine).

Additional activities for the Armuchee Ridges analysis area affecting pine/pine-oak forest include:

- Approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years. This activity is expected to reducing the abundance of fire-intolerant species such as red maple and Virginia pine, favor oak by promoting oak reproduction, and stimulate understory grasses and fruiting.

- Dry Creek timber sale, 103 acres of pine/pine oak forest thinning completed in 2007.
- John’s Creek timber sale, 375 acres of pine thinning scheduled to begin in 2008.
- Taylor Ridge pre-commercial thinning, 185 acres of pine thinning completed in spring 2008.

All of these past, present, or reasonably foreseeable actions, in combination with Alternative 3, have no cumulative negative effects to pine/pine-oak forest habitat and associated species such as pine warblers due to their utilization of various densities of mid-late successional pine.

SUCCESSIONAL STAGE HABITATS

Element - Successional Forests

Measure - Measure will consist of changes in seral stage distribution in the project area and effects on habitat conditions and populations of associated species from project activities.

Bounds of Analysis – Spatial: The Armuchee Ridges project analysis area consists of ten subwatersheds on National Forest and adjacent private lands. **Temporal:** Approximately 10 years following implementation.

Existing Conditions

The current seral stage distribution of the Armuchee Ridges analysis area is listed below in Table 3-19.

Forest Community	Early (0-10 years)	Sapling/Pole (11-40)	Mid (41-80)	Late (80+)
Mesic Deciduous Forest	54	282	323	452
Oak/Oak-Pine Forest	1	999	3092	13338
Pine/Pine-Oak Forest	613	8667	6250	7194
Total Acreage	668	9948	9665	20984
Percentage of Total	1.6%	24%	23%	51%

Less than 2% of the Armuchee Ridges analysis area is less than ten years old (early successional habitat or ESH). Approximately 24 percent is in the sapling/pole stage (11-40 years old), approximately 23 percent is mid successional (41-80 years old), and 51 percent is late successional (80+ years of age). Less than 0.2% is non-forested. A description of the various successional stage characteristics as well as their value to wildlife can be found in the Forest Plan EIS (Forest Service 2004a, page 3-153).

Seral stage distribution in the Armuchee Ridges analysis area is similar to that of the Chattahoochee National Forest overall. The majority of the Chattahoochee is in mid and late successional stages, with over 50% in late successional stage. Only two percent is in ESH condition. This percentage has declined over 60% since 1985, while late successional stage acreage has almost doubled (USDA Forest Service 2004a pg. 3-157). While late successional stage forests are extremely valuable, it is important that a percentage of forest be maintained in ESH. Many wildlife species are dependent upon ESH and a number of these are in decline due to its scarcity (Hunter et al. 2001). To ensure provision of the various successional habitats, the Forest Plan assigned different successional stage objectives to each management prescription, which was then allocated to National Forest land.

All the National Forest land within the Armuchee Ridges analysis area is assigned to a management prescription (Table 3-20). Each management prescription has goals regarding ESH, ranging from 0 to 10% of the acreage in each block of national forest. There is a significant deficit in ESH acreage in almost every management prescription at this time. The existing ESH (21 stands totaling 668 acres) is quickly growing out of this category (0-10 year age class). The ESH stands are not well-distributed spatially or within forest types, slopes, elevations, or aspects; approximately ½ of the acreage is within one subwatersheds (031501030402) and 91% consists of pine/pine-oak stands.

Table 3-20. Management prescriptions allocated to National Forest land in the Armuchee Ridges analysis area.

Mgmt. Rx	Acres	ESH goal	Current percentage in ESH
4D*	120	none	0
4F2	235	0-4%	0
4I	485	0-4%	0
5A	3	none	0
6B*	7417	none	0
6D*	597	0-4%	0
7A	2598	0-4%	0.2 (5.8 acres)
7B	338	0-4%	0
7E1	963	0-4%	5.6 (54 acres)
7E2	1081	0-4%	3.8 (42 acres)
9F*	23	none	0
9H	27448	4-10%	2.0 (566 acres)
Total acres	41380		1.6 % (668 acres)

*old growth or old growth compatible prescriptions

Late successional habitat (forest habitat 80 years and older) is well-distributed spatially and within forest types, slopes, elevations, and aspects. This seral stage will continue to increase in abundance on the Armuchee Ridges analysis area because of the amount of land allocated to old-growth or old-growth compatible management prescriptions (no ESH objective) and the small percentage of ESH associated with the other management prescriptions (0-10%).

Adjacent private land provides very little early successional habitat in the analysis area; 2.9% of the total area is characterized as shrub/scrub habitats (USGS 2001). Quality of forest successional habitats may also vary between private and public land due to differing priorities and land uses.

The revised Forest Plan identified the prairie warbler was selected as a MIS to help indicate the effects of management on species associated with early successional forests. Prairie warblers are shrubland nesting birds found in suitable habitats throughout the Southern Appalachians, Piedmont, and Coastal Plain (Hamel 1992). Prairie warblers require dense forest regeneration or open shrubby conditions in a forest setting. Near optimal habitat conditions are characterized by regeneration, thinned areas or patchy openings 10 acres or more in size (Nature Serve 2005). Populations respond favorably to conditions created 3 to 10 years following regeneration in larger forest patches (Lancia et al. 2000). The prairie warbler is a fairly common breeding bird on the Conasauga Ranger District and has been reported from Breeding Bird Surveys in the Armuchee Ridges analysis area. Prairie warbler populations likely are low on the Armuchee Ridges area due to the limited availability of early successional habitats.

Effects of Alternative 1 (No Action)

Direct and Indirect Effects - This alternative would perpetuate current conditions and no direct changes to the distribution of successional habitats are expected. The small amount of ESH would decrease as the young forest stands mature. This would result in a reduction in habitat availability for the prairie warbler and other species that utilize early successional habitats. Habitat for species associated with mid and late successional species would increase over time.

Cumulative Effects - ESH is limited on the Armuchee Ridges analysis area and the Forest as a whole due to a reduction in forest management activities. The availability of ESH on the Forest is expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a). This alternative does not help implement the Forest Plan goal of providing habitat diversity for the full range of wildlife species (Forest Service 2004, p. 2-4). Bird survey data suggests that prairie warbler populations have been relatively stable on the Forest during the last decade (USDA Forest Service 2005). Populations are expected to increase on the Forest through the implementation of the revised Forest Plan (USDA Forest Service 2004a). There are no additional activities planned for the Armuchee Ridges analysis area that would affect the availability of ESH or benefit the prairie warbler population. Unplanned natural disturbance events such as

wildfire, ice and wind damage, and insect damage could potentially create some ESH during the next 10 years, but this amount cannot be predicted.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects – This alternative would directly influence successional stage forests in the Armuchee Ridges analysis area by the implementation of regeneration harvest planned on 669 acres (mountain longleaf pine or shortleaf pine restoration on 16 stands) (Table 3-21). This treatment would create 669 acres of ESH, fairly well-distributed spatially across 5 of the 10 subwatersheds in the Armuchee Ridges analysis area and across forest types, elevations, and aspects. The treatments would be implemented over a 7-8 year period, approximately 100 to 150 acres per year. Timber harvest would be followed by prescribed burning in each of the 16 stands. All of the stands planned for regeneration are within the 9.H management prescription area. This would increase the 0-10 year age class in the 9.H management prescription area to 1235 acres or 4.4%. This would be within guidelines for 9.H even if all of the 1235 acres were within the 0-10 age class at one time; instead, there will be incremental decreases in this acreage as existing ESH ages out of the class and incremental increases as ESH is created over the next 7-8 years.

Table 3-21. Existing ESH in Armuchee Ridges analysis area and additional ESH created by Alternative 2.				
Mgmt. Rx	ESH goal	Existing ESH %/ (acres)	Alt 2 ESH %/ (acres)	Total ESH %/ (acres)
4D*	none	0	0	0
4F2	0-4%	0	0	0
4I	0-4%	0	0	0
5A	none	0	0	0
6B*	none	0	0	0
6D*	0-4%	0	0	0
7A	0-4%	0.2 (6)	0	0.2 (6)
7B	0-4%	0	0	0
7E1	0-4%	5.6 (54)	0	5.6 (54)
7E2	0-4%	3.8 (42)	0	3.8 (42)
9F*	none	0	0	0
9H	4-10%	2.0 (566)	2.4 (669)	4.4 (1235)
Total acres		667	669	1337

* Old growth or old growth-compatible prescriptions

The removal of mature trees would cause localized decreases in hard mast capability, cavity availability, and other canopy level habitat components, but late successional forest, which supplies these habitat components, is abundant and widely distributed across the area. The habitat diversity provided by ESH is much more limited in the Armuchee Ridges analysis area.

The ESH created in this alternative would provide a small amount of improvement in habitat conditions for the prairie warbler and other species associated with early successional conditions. Habitat for species associated with mid and late successional species would increase over time.

Cumulative Effects -

ESH is limited on the Armuchee Ridges analysis area and the Forest as a whole due to a reduction in forest management activities. The availability of ESH on the Forest is expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a). This alternative helps implement the Forest Plan goal of providing habitat diversity for the full range of wildlife species (Forest Service 2004b, p. 2-4). Bird survey data suggests that prairie warbler populations have been relatively stable on the Forest during the last decade (USDA Forest Service 2006). Populations are expected to increase on the Forest through the implementation of the revised Forest Plan (USDA Forest Service 2004a). There are no additional activities planned for the Armuchee Ridges analysis area that would affect the availability of ESH. Unplanned natural disturbance events such as wildfire, ice and wind damage, and insect damage could potentially create some ESH during the next 10 years, but this amount cannot be predicted. This alternative is expected to have positive cumulative effects to ESH and associated species such as prairie warblers.

Effects of Alternative 3 -

Direct and Indirect Effects – There would be no direct changes in seral stage distribution or increase in ESH under this alternative. Habitat conditions for the prairie warbler and other species associated with early successional conditions would remain limited. Existing ESH would continue to age and cease to provide needed habitat diversity for prairie warbler and associated species. Habitat for species associated with mid and late successional species would increase over time.

Cumulative Effects – ESH is limited on the Armuchee Ridges analysis area and the Forest as a whole due to a reduction in forest management activities. The availability of ESH on the Forest is expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a). This alternative does not help implement the Forest Plan goal of providing habitat diversity for the full range of wildlife species (Forest Service 2004b, p. 2-4). Bird survey data suggests that prairie warbler populations have been relatively stable on the Forest during the last decade (USDA Forest Service 2006). Populations are expected to increase on the Forest through the implementation of the revised Forest Plan (USDA Forest Service 2004a). There are no additional activities

planned for the Armuchee Ridges analysis area that would affect the availability of ESH or benefit the prairie warbler population. Unplanned natural disturbance events such as wildfire, ice and wind damage, and insect damage could potentially create some ESH during the next 10 years, but this amount cannot be predicted.

Element - Old Growth

Measure - Effects on habitat conditions and populations of associated species from project activities.

Bounds of Analysis – Spatial: The Armuchee Ridges project analysis area consists of ten subwatersheds on National Forest and adjacent private lands. **Temporal:** Approximately ten years following implementation.

Existing Conditions

There is very little “existing” old growth in the Armuchee Ridges analysis area. Seven stands in the Armuchee Ridges analysis area meet the minimum age for potential old growth based on the Region 8 Old-Growth Guidance (USDA Forest Service 1997). These include three mesic deciduous stands (Forest Types 58 and 46) over 100 years old and four pine-oak stands over 100 years old (Forest Type 12). There are several more stands over 100 years old, but based on forest type and site index, the minimum potential old growth age for these stands is 120 to 140 years old.

Wildlife habitat associated with old growth forests is rich in diversity due to the multiple canopy layers, “patchiness” of canopy caused by the death of single or multiple trees in small groups, standing dead and down dead trees and limbs, large diameter trees with cavities for denning and nesting, and many other habitat components at a variety of scales. Although there are no known wildlife species that are old growth obligates in the southeastern United States, there are many species that are dependent upon late-successional forest habitats (of which old growth is an important component). Late successional habitat is fairly plentiful in the Armuchee Ridges analysis area although old growth is not.

To increase the amount of potential old growth on the Forest, in watersheds with more than 1000 acres of National Forest land, at least 5 percent of each 6th level HUC or subwatersheds will be reserved as either existing or potential old growth (Forest Plan objective 20.1). If less than 5% of the subwatersheds are allocated to old growth or old growth-compatible management prescriptions, additional small blocks of future old growth will be identified and will be managed to protect their old-growth characteristics during the Plan cycle (Forest Plan standard FW-044). In the Armuchee Ridges analysis area (41,380 acres), 8,157 acres are allocated to old growth or old-growth compatible prescriptions (see Table F above in section on Successional Forests). Each of the 10 subwatersheds in the Armuchee Ridges analysis area was analyzed to determine whether the above standard was met (Table 3-22).

Table 3-22. Amounts of old growth or old growth-compatible acreage in subwatersheds in the Armuchee Ridges analysis area.

Sub watershed	FS Acres	5% of FS acres	OG/OGC* acres
031501030104	3637	182	805
031501030301	5305	265	1817
031501030303	2834	142	782
031501030401	2527	126	598
031501030402	3605	180	473
031501030404	2191	110	47
031501030501	5566	278	995
031501030502	6352	318	429
031501030503	3861	193	503
031501030504	5502	275	1684

*old growth or old growth-compatible prescriptions (4D, 6B, 6D, 9F)

Nine of the 10 subwatersheds had sufficient acreage designated as old growth or old growth-compatible prescriptions, many of them with up to 5 times the amount needed to meet the Plan standard. The other subwatersheds (031501030404) had less than the amount needed to meet the standard. In order to meet the 5% standard for this subwatersheds, at least 63 acres need to be set aside as small blocks of future old growth. Two stands within this subwatersheds were identified as good potential small blocks - Compartment 946 stands 48 (50 acres) and 49 (38 acres). Both are 95 year old chestnut oak stands (old growth type 22 – dry-xeric oak forest). These stands most-nearly meet the age requirement for existing old growth type 22 (110 years old), and provide diversity in old growth types. Dry and dry/mesic oak-pine (old growth type 25) is much more common in the analysis area.

Effects of Alternative 1 (No Action)

Direct and Indirect Effects - This alternative would perpetuate current conditions and no direct effects to potential old-growth habitats are expected. Over time, some of the older stands would reach minimum old growth age and begin to develop old-growth conditions.

Cumulative Effects – Little, if any old growth forest exists on adjacent private lands in the Armuchee Ridges analysis area. While the Forest as a whole contains approximately 46,000 acres of potential old-growth stands (stands that meet the minimum age for potential old growth), there is very little potential old growth on National Forest in the Ridge and Valley Physiographic Province (USDA Forest Service 2004a Table 3-83). The Forest Plan allocates approximately 8,157 acres of the Armuchee Ridges analysis area to old-growth and old-growth compatible management prescriptions (USDA Forest Service 2004a Table 3-85). This is approximately 20 percent of the National Forest acres.

An additional activity planned for the Armuchee Ridges analysis area that would affect the availability or development of old-growth forests is prescribed burning. Two of the pine-oak stands meeting minimum age criteria are within existing prescribed burning units. The units will be prescribed burned during the dormant season. This treatment will not negatively affect the stands' ability to meet old growth criteria; it has the potential to improve the stands' chances of surviving a catastrophic wildfire as well as increasing the likelihood that shortleaf pine and oak will be retained on site. Unplanned natural disturbance events such as wildfire, ice and wind damage, and insect damage could potentially affect possible or future old growth forest during the next 10 years, but this amount or its effects cannot be predicted. Natural events could improve old growth characteristics such as canopy patchiness and downed woody material, or completely destroy the oldest age class of trees on an entire slope.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects – This alternative would directly affect approximately 59 acres of potential old growth. Three shortleaf pine-oak stands age 101-105 years of age would be thinned. The stands are Compartment 925 stand 28, Compartment 927 stand 7, and Compartment 929 stand 8. These stands meet the minimum old growth age requirements for old growth type 24 – xeric pine and pine-oak forest (100 years of age) and are located in management prescriptions 9.H, 7E1, and 7E2, respectively. This objective describes treatments to create conditions which favor the shortleaf pine-oak forest type. Thinning would not affect the stands' ability to meet old growth criteria because the focus would be on retaining the oldest shortleaf pines and oaks and removing competition “from below” by removing codominant and midstory pines and hardwoods. This treatment would also create old growth characteristics such as increased downed woody material, snags, canopy patchiness, and a more developed understory.

This alternative would also directly affect 179 acres (six stands) allocated to old growth-compatible prescription 6D. Management prescription 6D contains a “core” old growth area, which consists of late-successional stage mixed mesophytic or cove hardwood forest (stands 933014 and 933020 totaling 226 acres). The “core” area has not reached minimum age for old growth type 05 - mixed mesophytic (140 years) but is 80-100 years old. The 6 stands proposed for thinning in 6.D are outside the “core” area. Thinning (commercial or precommercial depending on their age) these young overstocked pine/pine-oak stands (12-24 year old) would improve forest health but not affect the

stands' ability to meet future old growth criteria. The oldest age class of trees would be retained and given room to grow; this does not negatively affect the stands' ability to meet old growth criteria in the future.

Cumulative Effects – Little, if any old growth forest exists on adjacent private lands in the Armuchee Ridges analysis area. While the Forest as a whole contains approximately 46,000 acres of possible old-growth stands (stands that meet the minimum age for potential old growth), there is very little old growth on National Forest in the Ridge and Valley Physiographic Province (USDA Forest Service 2004a Table 3-83).

The Forest Plan allocates approximately 8,157 acres of the Armuchee Ridges analysis area to old-growth and old-growth compatible management prescriptions (USDA Forest Service 2004a Table 3-85). This is approximately 20 percent of the National Forest acres. Activities in Alternative 2 do not affect the availability of possible old growth forest, affect the ability of the stands to meet old growth criteria, or negatively affect the development of future old growth forest.

An additional activity planned for the Armuchee Ridges analysis area that would affect the availability or development of old-growth forests is dormant-season prescribed burning. Two of the stands meeting minimum age criteria are within existing prescribed burning units. The units would be prescribed burned during the dormant season. This treatment would not negatively affect the stands' ability to meet old growth criteria; it has the potential to improve the stands' chances of surviving a catastrophic wildfire as well as increasing the likelihood that shortleaf pine and oak will be retained on site. Unplanned natural disturbance events such as wildfire, ice and wind damage, and insect damage could potentially affect possible or future old growth forest during the next 10 years, but this amount or its effects cannot be predicted. Natural events could improve old growth characteristics such as canopy patchiness and downed woody material, or completely destroy the oldest age class of trees on an entire slope. This alternative in combination with other planned treatments will not negatively affect old growth forest or associated species.

Effects of Alternative 3 -

Direct and Indirect Effects – The effects of this alternative on old growth forest are identical to that of Alternative 2.

Cumulative Effects – The effects of this alternative on old growth forest are identical to that of Alternative 2.

Element - Forest Interior Birds

Measure - Effects on habitat conditions and populations of associated species from project activities.

Bounds of Analysis – Spatial: The Armuchee Ridges project analysis area consists of ten subwatersheds on National Forest and adjacent private lands. **Temporal:** Approximately ten years following implementation.

Existing Conditions

Forest interior birds are associated with contiguous blocks of mature, mostly mesic deciduous forests. They avoid forest edges during nesting and can be sensitive to forest fragmentation. Most are Neotropical migrants that primarily nest and raise young in the temperate Americas. This group includes birds like the wood thrush, ovenbird, Kentucky warbler, pileated woodpecker, and scarlet tanager. Landscapes with at least 70-80% forest cover provide quality habitat for forest interior species, because the relative amounts of forest edge is reduced (Robinson et al. 1995). Levels of nest parasitism and predation have been negatively correlated to the amount of forest cover in the landscape (Robinson et al. 1995).

The Armuchee Ridges analysis area (including adjacent private land) is approximately 73% forested (USGS 2001). The surrounding private lands are a mixture of forested land, pastures, and residential development. The National Forest land in the analysis area provides a moderately-sized block of contiguous forested habitat, suitable habitat for forest interior birds.

Small openings generally do not fragment forest interiors when they are within a mostly forested landscape. Clearcuts in a mostly forested (88%) West Virginia (Monongahela National Forest) landscape did not result in negative population effects such as those observed in areas fragmented by agricultural lands in the mid-West (Duguay et al. 2001). Donovan et al. (1997) found that the negative impacts of edge effect (including increased nest parasitism and predation) was significantly greater in highly fragmented (less than 15% forested) landscapes than in moderately fragmented (45-55% forested) or unfragmented (more than 90% forested) landscapes in the mid-West.

The revised Forest Plan identified the ovenbird as a MIS to help indicate the effects of management on species associated with interior forest habitats on the Chattahoochee National Forest. Ovenbirds are strongly associated with mature forest interior habitats (Hamel 1992, Crawford et al. 1981). They generally breed in closed canopy mesic deciduous or mixed forests with limited understory. The availability of older hardwood stands on the Forest has increased over the last few decades. The ovenbird is a common breeding bird on the Conasauga Ranger District and has been reported from Breeding Bird Surveys in the Armuchee Ridges project area. Given the availability of interior forest habitat, population levels likely are moderate.

Effects of Alternative 1 (No Action)

Direct and Indirect Effects - This alternative would perpetuate current conditions and no direct or indirect impacts to interior forest habitat are expected.

Cumulative Effects - Landscape-scale habitat patterns influence the effects of forest fragmentation. Forest-level analysis indicates that the majority of the Chattahoochee

National Forest occurs within a landscape that is more than 70 percent forested (USDA Forest Service 2004a). In these forest-dominated landscapes, edge effect is not expected to significantly influence productivity of interior forest species. While the Armuchee Ridges analysis area provides moderate levels of interior forest habitat due to land ownership patterns, these habitats are abundant on the Forest as a whole. The availability of interior forest conditions on the Forest is expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a). Bird survey data suggests that ovenbird populations have been relatively stable to slightly increasing on the Forest during the last decade (USDA Forest Service 2006). Populations are expected to increase on the Forest through the implementation of the revised Forest Plan (USDA Forest Service 2004a). Additional residential development may decrease the availability of contiguous forest habitat on private lands. However, there are no additional activities planned for the Armuchee Ridges area that would affect the availability of interior forests. Therefore no cumulative effects to interior forest habitat and associated species such as ovenbird are expected.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects – This alternative would affect forest interior habitats in the Armuchee Ridges analysis area by the regeneration harvest planned on 669 acres (mountain longleaf pine or shortleaf pine restoration on 16 stands). The regeneration of the stands would result in small openings in the forest canopy, fairly well-distributed spatially across 5 of the 10 subwatersheds in the Armuchee Ridges analysis area and across forest types, elevations, and aspects. The treatments would be implemented over a 7-8 year period, approximately 100 to 150 acres per year. Timber harvest would be followed by prescribed burning in each of the 16 stands.

Most of the openings created by these treatments would be small and a continuous forest canopy would be maintained over the majority of the area. Habitat conditions and populations of interior forest species such as the ovenbird would be maintained. Over time, the amount of mature interior forest habitat would increase as forests in the area mature. This should result in improved habitat conditions for the ovenbird and other species that utilize mature interior forest habitats.

Cumulative Effects - While the Armuchee Ridges analysis area provides moderate levels of interior forest habitat; these habitats are abundant on the Forest as a whole. The availability of interior forest conditions on the Forest is expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a). Bird survey data suggests that ovenbird populations have been relatively stable or slightly increasing on the Forest during the last decade (USDA Forest Service 2006). Populations are expected to increase on the Forest through the implementation of the revised Forest Plan (USDA Forest Service 2004a). Additional residential development may decrease the availability of contiguous forest habitat on private lands. However, there are no additional activities planned for the Armuchee Ridges analysis area that would affect the availability of interior forests. Therefore no cumulative effects to interior forest habitat and associated species such as ovenbird are expected.

Effects of Alternative 3:

Direct and Indirect Effects – This alternative would not affect forest interior habitats because no openings in the forested canopy would result. Thinning of forest stands would not alter forest interior habitats. The restoration of the riparian hardwood stand would not affect forest interior habitats because the seedling/sapling stage stand does not currently provide mature forested habitat. None of these treatments would impact the availability of interior forest habitat. Habitat conditions and populations of interior forest species such as the ovenbird would be maintained. Over time, the amount of mature forest habitat would increase as the forests in the area mature. This should result in improved habitat conditions for the ovenbird and other species that utilize interior forest habitats.

Cumulative Effects – While the Armuchee Ridges analysis area provides moderate levels of interior forest habitat; these habitats are abundant on the Forest as a whole. The availability of interior forest conditions on the Forest is expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a). Bird survey data suggests that ovenbird populations have been relatively stable or slightly increasing on the Forest during the last decade (USDA Forest Service 2006, LaSorte et al. 2007). Populations are expected to increase on the Forest through the implementation of the revised Forest Plan (USDA Forest Service 2004a). Additional residential development may decrease the availability of contiguous forest habitat on private lands. However, there are no additional activities planned for the Armuchee Ridges analysis area that would affect the availability of interior forests. Therefore no cumulative effects to interior forest habitat and associated species such as ovenbird are expected.

SPECIAL HABITAT ATTRIBUTES**Element - Riparian Habitats**

Measure - Effects on habitat conditions and populations of associated species from project activities.

Bounds of Analysis – **Spatial:** Riparian habitats within the Armuchee Ridges project analysis area, consisting of ten subwatersheds on National Forest and adjacent private lands. **Temporal:** Approximately ten years following implementation.

Existing Conditions

Riparian areas are among the most important and productive wildlife habitats due to rich, moist soils that support many of the habitat needs of a variety of wildlife species. Factors that affect the value of riparian areas to wildlife include adjacent land uses, cover type and structure, and width of forested and vegetated riparian buffers (Yarrow 2004).

Due to land ownership patterns, National Forest ownership of riparian corridors in the Armuchee Ridges analysis area is fairly limited. The majority of the stream miles and

riparian corridor acreage is privately owned. Most of the stream miles on National Forest consist of small first- or second-order streams draining steep slopes, such as the tributaries of Little Armuchee Creek and West Armuchee Creek which drain the east face of Taylor Ridge, and tributaries of the Oostanaula River (such as Blue Spring Branch and Bow Creek) draining the east side of Horn Mountain. These streams are almost entirely intermittent in flow. Less common in National Forest ownership are perennial segments of lower gradient, higher order streams such as East Armuchee Creek, which is characterized by a sandy, gravelly base and warmer temperatures.

Approximately 4,670 acres comprise the riparian corridors on National Forest in the Armuchee Ridges analysis area. The majority (83%) of the stream corridors are in mid- to late-successional stage forest. Exceptions to this include recent acquisitions in the East Armuchee Creek corridor consisting of some young riparian area stands.

Riparian corridors on the National Forest stream segments are completely forested, but due to former land uses and management, natural streamside vegetation (which would have been dominated by hardwoods) in some cases has been eliminated and replaced with planted pine. The structural and functional integrity of the riparian corridor is greatly diminished due to the lack of vegetation diversity in these situations. This condition primarily occurs in former industrial forest or agricultural lands which are now in National Forest ownership.

Riparian corridors on all Chattahoochee National Forest streams are managed under the Riparian Corridor Prescription (11). Corridor widths are a minimum of 100 feet on each side of all perennial and intermittent streams. The purpose of the prescription is to protect riparian area structural and functional integrity and associated aquatic systems (Forest Service 2004a p. 3-226). Standards include provisions for maintaining desirable levels of shade and woody debris and protection from ground disturbing activities in most cases. The Forest Service has worked to reestablish the riparian vegetation in some areas, such as along Johns Creek and East Armuchee Creek, by prohibiting activities such as camping, parking, horse use, and off-road vehicle use directly adjacent to streams. Vegetation management within this corridor must meet Plan standards as well as the current Best Management Practices for Forestry in Georgia (Georgia Forestry Commission 1999). For example, on perennial (including trout) streams, silvicultural activities are permitted in the riparian corridor if an average of 50 square feet of basal area per acre is retained, evenly distributed throughout the riparian corridor to provide shade.

The revised Forest Plan identified the Acadian Flycatcher as the MIS to represent Mid-Late Successional Riparian Habitat Conditions. Habitat for the Acadian flycatcher consists of deciduous forests near streams (Hamel 1992). Preferred habitat for this species is moist bottomlands, swamps, and riparian thickets. Usually this bird builds its nest in branches directly overhanging streams. The Acadian flycatcher is a common breeding bird on the Conasauga Ranger District and has been reported from Breeding Bird Surveys in the project area. Given the limited quantity of mature bottomland riparian habitat on National Forest, population levels likely are low to moderate.

Riparian corridor segments in private ownership tend to have less forest cover across the entire southern Appalachian area, and especially in the Ridge and Valley physiographic province (SAMAB 1999). This is also true of the Armuchee Ridges analysis area. This increases the value of forested buffers on National Forest as they protect both aquatic and terrestrial habitats.

Effects of Alternative 1 (No Action):

Direct and Indirect Effects - This alternative would perpetuate current conditions and no direct impacts to riparian habitat are expected. Over time, the amount of mid-late successional riparian habitat would increase as the portions containing young forests mature. This should result in improved habitat conditions for the Acadian flycatcher and other species that utilize mature riparian habitats.

Cumulative Effects- Mid-late successional forested riparian habitat is common on the Forest and the availability of these older riparian habitats is expected to increase through time with the implementation of the Forest Plan (USDA Forest Service 2004a). Riparian corridor standards will be followed on all projects on the Forest to maintain desirable habitat conditions in the riparian corridor. Bird survey data suggests that Acadian flycatcher populations have been relatively stable on the Forest (LaSorte et al. 2007) and populations are expected to increase on the Forest through the implementation of the revised Forest Plan (USDA Forest Service 2004a, 2006).

An additional activity for the Armuchee Ridges analysis area affecting riparian corridors is dormant season prescribed burning of approximately 7000 acres for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years. Streams are used as firelines in some cases. Low intensity fire is allowed to burn into riparian areas where soil and fuel moistures are generally higher. This creates a mosaic of burned and unburned vegetation which increases plant and insect diversity. In other cases, fire line is constructed into riparian corridors with hand tools in order to minimize ground disturbance. Firelines are revegetated as soon after the fire is controlled as possible, using native plant seed or non-persistent non-native plant seed. Low intensity prescribed burning and associated fire line construction does not negatively affect riparian function or structure (Elliot and Vose 2005). Therefore no cumulative effects to riparian habitat and associated species such as Acadian flycatcher are expected.

Effects of Alternative 2: (Proposed Action):

Direct and Indirect Effects- The thinning treatments planned in this alternative have the potential to impact riparian habitat conditions. However, application of riparian corridor standards (MRx 11) and Best Management Practices (BMPs) will ensure that desired conditions in the riparian corridor will be maintained and/or enhanced. These include provisions for controlling impacts from silvicultural activities. Tree removals may only take place in the riparian corridors to improve habitat for rare or riparian-

associated species, rehabilitate disturbed areas, reduce fuel buildup, or if needed to enhance the diversity and complexity of vegetation (Forest Service 2004b).

Riparian corridors of a portion of the stands proposed for pine thinning could potentially be treated by selective removal of off-site loblolly pine (see Table 2-3). Selective removal of pine from a riparian corridor may be prescribed in stands to be thinned in order to allow the corridor to be restored to a more natural hardwood vegetation type, more desirable as wildlife habitat due to the hard and soft mast, dens, and cavities provided. An average of at least 50 square feet of basal area per acre and all stream bank trees would be retained in these cases. An increase in light regime and vegetation diversity would result; this would positively affect riparian structure and function and riparian-associated wildlife. This type of riparian corridor treatment would only be undertaken if there was a clear need to reestablish hardwood dominance and if off-site pines could be removed while meeting BMPs and MRx 11 standards.

No silvicultural activities are proposed in riparian corridors in stands to be restored to mountain longleaf pine or shortleaf pine. The restoration of these native pine forest stands would not affect riparian structure, function, or species such as Acadian flycatcher.

As a result of application of riparian corridor standards (MRx 11) and the BMPs, riparian habitat conditions and populations of associated species such as the Acadian Flycatcher would be maintained. Over time, the amount of mid-late successional riparian habitat would increase as the portions containing young forests mature. This should result in improved habitat conditions for the Acadian Flycatcher and other species that utilize mature riparian habitats.

Cumulative Effects- Mid-late successional forested riparian habitat is common on the Forest and the availability of these older riparian habitats is expected to increase through time with the implementation of the revised Forest Plan (USDA Forest Service 2004a). Riparian Corridor standards will be followed on all projects on the Forest to maintain desirable habitat conditions in the riparian corridor. Bird survey data suggests that Acadian Flycatcher populations have been relatively stable on the Forest and populations are expected to increase on the Forest through the implementation of the revised Forest Plan (USDA Forest Service 2004a, 2006). This project implements the Forest Plan by ensuring that desired conditions in the riparian corridor will be maintained and enhanced.

An additional activity for the Armuchee Ridges analysis area affecting riparian corridors is dormant season prescribed burning of approximately 7,000 acres for fuel reduction and wildlife habitat improvement. Around 2,200 acres of this has been completed; the rest is planned over the next 4-5 years. Streams are used as firelines in some cases. Low intensity fire is allowed to burn into riparian areas where soil and fuel moistures are generally higher. This creates a mosaic of burned and unburned vegetation which increases plant and insect diversity. In other cases, fireline is constructed into riparian corridors with hand tools in order to minimize ground disturbance. Firelines are revegetated as soon after the fire is controlled as possible, using native plant seed or non-persistent non-native plant seed. Low intensity prescribed burning and associated fireline construction does not negatively affect riparian function or structure. No negative

cumulative effects to riparian habitat and associated species such as Acadian flycatcher are expected.

Effects of Alternative 3:

Direct and Indirect Effects – Effects to riparian habitats would be identical to that of Alternative 2.

Cumulative Effects - Effects to riparian habitats would be identical to that of Alternative 2.

Element - Snags, Dens, and Downed Wood

Measure - Effects on habitat conditions and populations of associated species from project activities.

Bounds of Analysis – **Spatial:** The Armuchee Ridges project analysis area consists of ten subwatersheds on National Forest and adjacent private lands. **Temporal:** Approximately ten years following implementation.

Existing Conditions

Snags, dens, and downed wood are important habitat element for a variety of species of wildlife. Large snags are used as nesting and feeding sites and perches by birds, and roosting and maternity habitat for bats. Den trees are used for nesting, roosting and hibernating by a variety of species. Downed woody debris provides cover and feeding sites for amphibians, reptiles, small mammals, and invertebrates. These elements are typically most abundant in older forests. Approximately 51% of the Armuchee Ridges analysis area is greater than 80 years old. Additional snags and downed wood have been created as a result of the recent Southern Pine Beetle activity in the area, as well the periodic ice and windstorms.

The revised Forest Plan identified the pileated woodpecker as a MIS to help indicate the effects of management on species that utilize snags. Habitat consists of mature (60+ years) and extensive hardwood and hardwood-pine forest (Hamel 1992). Preferred habitat is primarily deep woods, swamps, or river bottom forests. The pileated woodpecker can also be found in rather open, upland forest of mixed forest types. This bird forages and nests on and in snags, with some foraging also occurring on fallen logs and other forest debris. The pileated woodpecker is a common breeding bird on the Conasauga Ranger District and has been reported from Breeding Bird Surveys in the Armuchee Ridges analysis area. Given the availability of mid-late successional forest habitat, population levels likely are moderate.

Effects of Alternative 1 (No-Action):

Direct and Indirect Effects- This alternative would perpetuate current conditions and no direct impacts to snags, dens, and downed wood are expected. Over time, the amount of mid-late successional habitat would increase as the forest in the area matures. This should result in improved habitat conditions for the pileated woodpecker and other species that utilize snags, dens, and downed wood.

Cumulative Effects – Recruitment of snags, dens, and downed wood is most dependent on providing abundant late successional forests. The availability of these habitats is expected to increase through time with the implementation of the revised Forest Plan (USDA Forest Service 2004a). The revised Forest plan has several standards that ensure the retention and recruitment of snags and den trees. Bird survey data suggests that pileated woodpecker populations have been relatively stable on the Forest during the last decade and are expected to increase on the Forest through the implementation of the revised Forest Plan (USDA Forest Service 2004a, 2006, LaSorte et al. 2007). Additional activities completed or planned for the Armuchee Ridges analysis area that would affect the availability of snags, dens, or downed wood include:

- Approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years.

This activity could both increase snag and downed wood availability by causing some tree mortality, and decrease snag and downed wood availability in fire-adapted ecosystems when fuels are consumed on a regular basis.

- Dry Creek timber sale, 103 acres of pine/pine oak forest thinning completed in 2007.
- John’s Creek timber sale, 375 acres of pine thinning scheduled to begin in 2008.
- Taylor Ridge pre-commercial thinning, 185 acres of pine thinning completed in spring 2008.

All standing snags and den trees are retained during vegetation management activities except for those that threaten public safety. This protects existing snags and den trees, and timber harvest operations result in downed woody debris.

No negative cumulative effects to these habitat elements and associated species such as pileated woodpeckers are expected.

Effects of Alternative 2 (Proposed Action):

Direct Effects- The treatments planned in this alternative have the potential to impact the availability of snags, dens, and downed wood. However, Forest-wide standards would be followed that ensure the retention and recruitment of these habitat elements on the landscape. Existing snags and den trees would be retained during the thinning operations. Some additional snags, den trees, and downed woody debris may be created as a result of timber harvest operations during the thinnings. Restoration activities involving regeneration harvest would directly affect the majority of trees in each stand

treated (16 stands restored to mountain longleaf pine or shortleaf pine). Standards to provide existing and future snags, den trees, and downed woody debris include: 1) existing snags and den trees will be retained during the timber harvest operations, 2) if at least two snags per acre are not present or cannot be retained, at least two snags will be created from large diameter trees, 3) at minimum of five of the largest diameter class trees per acre will be retained to provide future snags (this can include existing den trees) (Forest Service 2004b p. 2-27).

Although some reduction in the availability of snags and downed wood may occur as a result of the implementation of this alternative, these habitat elements would still be common in the project area due to the abundance of late-successional forest habitat. Habitat conditions and populations of snag-dependent species such as the pileated woodpecker would be maintained.

Over time, the amount of mid-late successional habitat would increase as the forests in the area mature. This should result in improved habitat conditions for the pileated woodpecker and other species that utilize snags, dens, and downed wood.

Cumulative Effects – Recruitment of snags, dens, and downed wood is most dependent on providing abundant late successional forests. The availability of these habitats is expected to increase through time with the implementation of the revised Forest Plan (USDA Forest Service 2004a). The revised Forest plan has several standards that ensure the retention and recruitment of snags and den trees. Bird survey data suggests that pileated woodpecker populations have been relatively stable on the Forest during the last decade and are expected to increase on the Forest through the implementation of the revised Forest Plan (USDA Forest Service 2004a, 2006). This alternative implements the Forest Plan by improving forest health and wildlife habitat. Additional activities completed or planned for the Armuchee Ridges analysis area that would affect the availability of snags, dens, or downed wood include:

- Approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years.

This activity could both increase snag, den tree, and downed wood availability by causing some tree mortality, and decrease snag and downed wood availability in fire-adapted ecosystems when fuels are consumed on a regular basis.

- Dry Creek timber sale, 103 acres of pine/pine oak forest thinning completed in 2007.
- John's Creek timber sale, 375 acres of pine thinning scheduled to begin in 2008.
- Taylor Ridge pre-commercial thinning, 185 acres of pine thinning completed in spring 2008

All standing snags and den trees are retained during vegetation management activities except for those that threaten public safety. This protects existing snags and den trees, and timber harvest operations result in downed woody debris.

No negative cumulative effects to these habitat elements and associated species such as pileated woodpeckers are expected.

Effects of Alternative 3:

Direct and Indirect Effects- The treatments planned in this alternative have the potential to impact the availability of snags, dens, and downed wood. However, Forest-wide standards would be followed that ensure the retention and recruitment of these habitat elements on the landscape. Existing snags and den trees would be retained during the thinning operations. Some additional snags, den trees, and downed woody debris may be created as a result of timber harvest operations during the thinning.

Cumulative Effects – Recruitment of snags, dens, and downed wood is most dependent on providing abundant late successional forests. The availability of these habitats is expected to increase through time with the implementation of the revised Forest Plan (USDA Forest Service 2004a). The revised Forest plan has several standards that ensure the retention and recruitment of snags and den trees. Bird survey data suggests that pileated woodpecker populations have been relatively stable on the Forest during the last decade and are expected to increase on the Forest through the implementation of the revised Forest Plan (USDA Forest Service 2004a, 2006). This alternative implements the Forest Plan by improving forest health and wildlife habitat. Additional activities completed or planned for the Armuchee Ridges analysis area that would affect the availability of snags, dens, or downed wood include:

- Approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years.

This activity could both increase snag, den tree, and downed wood availability by causing some tree mortality, and decrease snag and downed wood availability in fire-adapted ecosystems when fuels are consumed on a regular basis.

- Dry Creek timber sale, 103 acres of pine/pine oak forest thinning completed in 2007.
- John's Creek timber sale, 375 acres of pine thinning scheduled to begin in 2008.
- Taylor Ridge pre-commercial thinning, 185 acres of pine thinning completed in spring 2008

All standing snags and den trees are retained during vegetation management activities except for those that threaten public safety. This protects existing snags and den trees, and timber harvest operations result in downed woody debris.

No negative cumulative effects to these habitat elements and associated species such as pileated woodpeckers are expected.

Element - Aquatic Habitats

Measure - Effects on habitat conditions and populations of associated species from project activities.

Bounds of Analysis – **Spatial:** The Armuchee Ridges project analysis area consists of ten subwatersheds on National Forest and adjacent private lands. **Temporal:** Approximately ten years following implementation.

Existing Conditions

The streams within the Armuchee Ridges analysis area are part of a unique aquatic region known as the upper Coosa River Basin. The upper Coosa River basin refers to streams that combine to form the Coosa River. The Oostanaula River is one of the main tributaries of the Coosa. All of the major perennial streams in the Armuchee Ridges analysis area are Oostanaula River tributaries. Georgia Department of Natural Resources has designated several of these streams as High Priority Waters due to their unique aquatic communities, including East and West Armuchee Creeks, Little Armuchee Creek, and Johns Creek (Georgia DNR 2005). No other aquatic region in North America has a higher proportion of endemic species. Over 30 species of fish, mussels, snails, and crayfish are endemic to the region (CRBI 2007).

Stream health and aquatic communities are well documented in the area. Most states, including Georgia, utilize some version of the Index of Biotic Integrity (IBI) (Karr et al. 1986) to determine the quality of fish communities as biotic indicators of stream health. This index utilizes the numbers and types of fish species present in a stream to produce a stream score or rating for comparison across streams within a region or to the same stream over time. Physical and chemical parameters such as habitat availability and water quality are sampled in order to explain why IBI scores are similar or differ among streams.

The Georgia DNR Stream Team has collected a total of 169 bio-monitoring samples from streams in the Ridge and Valley Ecoregion since 2001. A total of 57 native fish species were collected from Coosa Basin streams. In addition to the IBI, Georgia also utilizes a modified Index of Well-Being (Iwb) to confirm the results of the IBI regarding the health of the fish community. Several of the streams sampled during the recent Ridge and Valley Stream Team efforts are within the Armuchee Ridges analysis area. Table 3-24 displays some of the IBI and Iwb scores and categories from these streams.

Table 3-24. Stream habitat data from selected Armuchee Ridges area streams (Georgia DNR Stream Team 2007)

Stream Name	County	Year	DBA (sq.mi.)*	IBI category	Iwb Sc	IwbCat
Blue Springs Creek	Gordon	2002	4.6	Fair	9	Excellent
East Armuchee Creek	Walker	2002	11.3	Good	9.3	Good
Johns Creek	Floyd	2001	14.3	Excellent	9.5	Good
Rocky Creek	Gordon	2002	7.5	Fair	8.6	Good
Storey Mill Creek	Chattooga	2001	5.7	Fair	9.1	Good
West Armuchee Creek	Chattooga	2003	36.1	Excellent	9.7	Good

*DBA (sq mi) – drainage basin area in square miles

The majority of the stream miles are on private land. Over 80% of the streams on National Forest are ephemeral or intermittent in flow and are classified as first or second order streams. Examples of these are streams draining steep slopes, such as the tributaries of Little Armuchee Creek and West Armuchee Creek which drain the east face of Taylor Ridge. These streams are intermittent in flow and being of fairly low elevation (most are less than 1200 ft elevation), may be characterized as cool water streams. Upper Johns Creek and Furnace creek are a little larger and support trout, creek chubs, and endemic shiners and darters. The Pocket Creek has several sunfish species, chubs, stonerollers, suckers, chubs, shiners, darters, and the occasional trout. Small fishes such as brightly colored darters and minnows dominate species diversity. Minnows and darters represent over half the upper Coosa Basin fishes and all of the endemic and rare fishes (CRBI 2007). The riparian corridors of these headwater streams are all completely forested. Water quality and aquatic community health benefit because riparian forests influence the aquatic community through their effects on food availability, habitat diversity, stream flow, light intensity, and water temperature and chemistry (Yarrow 2004).

Trout streams

Trout need clean, cold water to survive and reproduce. Water temperatures higher than 60-70 degrees F., dissolved oxygen less than 5.00 ppm, high sediment loads, or high turbidity affect aquatic life by reducing the food base, impairing fish feeding, reducing reproduction, and make a stream unsuitable for sensitive aquatic fauna. Forested riparian corridors are essential for providing shade and high water quality for all streams, and trout are particularly sensitive indicators of stream health. Trout streams require additional protection to maintain high water quality and low stream temperatures. The Georgia BMPs for trout streams include 100 foot minimum streamside management zones (SMZs) on both sides of designated streams and tributaries, with two options for retaining adequate canopy cover and shade (Georgia Forestry Commission 1999). Forest Service riparian corridor standards meet or exceed the Georgia BMPs for trout streams on all intermittent and perennial streams. The Ridge and Valley Ecoregion is comprised of mostly non-perennial streams of lower elevation, not typical “cold water” trout streams; Furnace Creek is the only “primary” or self-sustaining trout stream in the analysis area. Several other streams including Ruff Creek, Storey Mill Creek, the headwaters of Little Armuchee Creek, Rocky Creek, upper Johns Creek, and upper West Armuchee Creek have “secondary” trout stream designations and have trout populations sustained by

seasonal stocking by the Georgia DNR (Georgia Rules and Regulations for Water Quality Control, 2005). Most of these streams have been assessed by the DNR Stream Team, as well as by Forest Service biologists, and other researchers. Stream health on the forested National Forest segments is “good to excellent” (see Table I above).

Less common in National Forest ownership are segments of lower gradient, higher order streams such as East Armuchee Creek, which is characterized by a sandy, gravelly base and warmer temperatures. Fishes include the most common cool-water Coosa Basin fish, the redeye or Coosa bass, and a variety of native shiners and darters, as well as several freshwater mussel species. Riparian corridors on the National Forest segments of these streams are also completely forested. Riparian corridors on all Chattahoochee National Forest streams are managed under the Riparian Corridor Prescription (11). Corridor widths are a minimum of 100 feet on each side of all perennial and intermittent streams. The purpose of the prescription is to protect riparian area structural and functional integrity and associated aquatic systems (Forest Service 2004a p. 3-226).

Effects of Alternative 1 (No Action):

Direct and Indirect Effects - This alternative will perpetuate current conditions and no direct impacts to aquatic habitat are expected. Over time, the forest cover in the riparian corridors will mature. This should result in increased streamside shading, woody debris input into the stream, and improved conditions for aquatic species.

Cumulative Effects – The Chattahoochee National Forest has 2,436 miles of perennial streams, including 1,770 miles of cold water streams and 666 miles of cool water streams (Forest Service 2004a). Riparian Corridor standards, forest wide standards and Best Management practices (BMPs) will be followed on all projects on the Forest to protect water quality and aquatic habitat condition. An additional activity for the Armuchee Ridges analysis area potentially affecting aquatic resources is dormant season prescribed burning of approximately 7,000 acres for fuel reduction and wildlife habitat improvement. Around 2,200 acres of this has been completed; the rest is planned over the next 4-5 years. Streams are used as firelines in some cases. Low intensity fire is allowed to burn into riparian areas where soil and fuel moistures are generally higher. This creates a mosaic of burned and unburned vegetation which increases plant and insect diversity. In other cases, fire line is constructed into riparian corridors with hand tools in order to minimize ground disturbance. Firelines are revegetated as soon after the fire is controlled as possible, using native plant seed or non-persistent non-native plant seed. Low intensity prescribed burning and associated fire line construction does not negatively affect riparian function or structure, water quality, or aquatic habitats (Elliot and Vose 2005). No negative cumulative effects to aquatic habitat and associated species are expected.

Effects of Alternative 2 (Proposed Action):

Direct and Indirect Effects- The thinning and restoration treatments on a total of 6857 acres have the potential to impact aquatic habitat conditions. There are a total of 85.53

stream miles adjacent to project areas in this Alternative. Ground disturbance will occur in the development of temporary roads, skid trails, and log landings during the commercial timber harvest operations; this effect will be lessened by the fact that 80% of the streams in the project area are ephemeral and intermittent channel types that are not as susceptible to disturbance as perennial channels. This project will be conducted in phases over the next 8-10 years, and throughout the analysis area. Application of riparian corridor standards (MRx 11) and Best Management Practices (BMPs) will ensure that water quality and aquatic habitat conditions will be maintained and/or enhanced.

Major ground disturbing activities such as road construction and log landing construction are prohibited from the riparian corridor and all silvicultural activities within this corridor will be conducted to meet or exceed compliance with BMPs. Silvicultural activities within the riparian corridor are limited to selective removal of a portion of overstory trees (see Table 2-3 in Chapter 2 for stands), utilizing mechanized equipment during dry weather, and designated stream crossings. Retention of an average of 50 square feet of basal area per acre and all stream bank trees will protect riparian function and aquatic habitats.

Cumulative Effects – The Chattahoochee National Forest has 2,436 miles of perennial streams, including 1,770 miles of cold water streams and 666 miles of cool water streams (Forest Service 2004a). Riparian Corridor standards, forest wide standards and Best Management practices (BMPs) will be followed on all projects on the Forest to protect water quality and aquatic habitat condition. An additional activity for the Armuchee Ridges analysis area potentially affecting aquatic resources is dormant season prescribed burning of approximately 7,000 acres for fuel reduction and wildlife habitat improvement. Around 2,200 acres of this has been completed; the rest is planned over the next 4-5 years. Streams are used as firelines in some cases. Low intensity fire is allowed to burn into riparian areas where soil and fuel moistures are generally higher. This creates a mosaic of burned and unburned vegetation which increases plant and insect diversity. In other cases, fire line is constructed into riparian corridors with hand tools in order to minimize ground disturbance. Firelines are revegetated as soon after the fire is controlled as possible, using native plant seed or non-persistent non-native plant seed. Low intensity prescribed burning and associated fire line construction does not negatively affect riparian function or structure, water quality, or aquatic habitats (Elliot and Vose 2005). Over time, the forest cover in the riparian corridors will mature. This should result in increased streamside shading, woody debris input into the stream, and improved conditions for aquatic species. No negative cumulative effects to aquatic habitat and associated species are expected.

Effects of Alternative 3

Direct and Indirect Effects – The thinnings and the riparian hardwood restoration treatment have the potential to impact aquatic habitat conditions. No mountain longleaf, shortleaf, or oak/oak-pine restoration is included in this alternative, therefore the total project acreage has been reduced from 6857 to 5808 acres. There are a total of 73.75 miles of stream adjacent to the project areas in this Alternative. The duration of

treatments in this Alternative would also be shorter than in the Proposed Action because there would be no follow-up maintenance treatments. Ground disturbance will occur in the development of temporary roads, skid trails, and log landings during the commercial timber harvest operation; this effect will be lessened by the fact that 80% of the streams in the project area are ephemeral and intermittent channel types that are not as susceptible to disturbance as perennial channels. This project will be conducted in phases over the next 8-10 years, and throughout the analysis area. Application of riparian corridor standards (MRx 11) and Best Management Practices (BMPs) will ensure that water quality and aquatic habitat conditions will be maintained and/or enhanced.

Major ground disturbing activities such as road construction and log landing construction are prohibited from the riparian corridor and all silvicultural activities within this corridor will be conducted to meet or exceed compliance with BMPs. Silvicultural activities within the riparian corridor are limited to selective removal of a portion of overstory trees (see Table 2-3 in Chapter 2 for stands), utilizing mechanized equipment during dry weather, and designated stream crossings. Retention of an average of 50 square feet of basal area per acre and all stream bank trees will protect riparian function and aquatic habitats.

Cumulative Effects- The Chattahoochee National Forest has 2,436 miles of perennial streams, including 1,770 miles of cold water streams and 666 miles of cool water streams (Forest Service 2004a). Riparian Corridor standards, forest wide standards and Best Management practices (BMPs) will be followed on all projects on the Forest to protect water quality and aquatic habitat condition. An additional activity for the Armuchee Ridges analysis area potentially affecting aquatic resources is dormant season prescribed burning of approximately 7,000 acres for fuel reduction and wildlife habitat improvement. Around 2,200 acres of this has been completed; the rest is planned over the next 4-5 years. Streams are used as firelines in some cases. Low intensity fire is allowed to burn into riparian areas where soil and fuel moistures are generally higher. This creates a mosaic of burned and unburned vegetation which increases plant and insect diversity. In other cases, fire line is constructed into riparian corridors with hand tools in order to minimize ground disturbance. Firelines are revegetated as soon after the fire is controlled as possible, using native plant seed or non-persistent non-native plant seed. Low intensity prescribed burning and associated fire line construction does not negatively affect riparian function or structure, water quality, or aquatic habitats (Elliot and Vose 2005). Over time, the forest cover in the riparian corridors will mature. This should result in increased streamside shading, woody debris input into the stream, and improved conditions for aquatic species. No negative cumulative effects to aquatic habitat and associated species are expected.

Element - Threatened, Endangered, Sensitive Species and Locally Rare Species

Measure - Effects on habitat conditions and populations of TES and Locally Rare species from project activities.

Bounds of Analysis – Spatial: The Armuchee Ridges project analysis area consists of ten subwatersheds on National Forest and adjacent private lands. **Temporal:** Approximately ten years following implementation.

Threatened and Endangered Species

Existing Conditions

Site-specific inventories for federally listed, Regional Forester sensitive and locally rare plants were conducted during summer 2006. No federally listed plants were found during surveys.

Effects to federally-listed threatened and endangered species are analyzed in detail in the Biological Evaluation for this project. Results are summarized here. Based on this analysis, the only federally-listed species that are known to occur in the Armuchee Ridges analysis area are the large-flowered skullcap (*Scutellaria montana*) and the gray myotis (*Myotis grisescens*).

Large-flowered skullcap is currently listed as Threatened (Federal Register 2002). Two populations of this species are located on National Forest in the Armuchee Ridges analysis area. Both of these populations are considered nonviable due to their small sizes (less than 10 individuals). There are two additional introduced populations located in the area; these were rescued from areas slated for development and planted on National Forest. One of these populations still exists but is also nonviable. Annual monitoring of the populations is ongoing. No threats from non-native invasive plants have been documented. Any and all skullcap populations, regardless of future viability, will be protected from disturbance. All potential skullcap habitats in Armuchee Ridges project treatment stands were surveyed for the presence of large-flowered skullcap in summer 2006. No skullcaps were found.

Gray myotis or bat is currently listed as Endangered (Federal Register 1976). A cave hosting one bachelor male colony is located on private land within the Armuchee Ridges analysis area. No known hibernacula or maternity caves are located on National Forest due to the limited amount of limestone (karst) substrate. Male gray bats forage along perennial streams and lakes, including at least one stream on National Forest (East Armuchee Creek) where 4 male gray bats were captured (Loeb 2001). Gray bats prefer large streams and rivers to small, narrow ones (Johnson 2002). Protection of stream corridors, managed as Riparian Corridor Prescription (11) objectives and standards on National Forest, is important gray bat foraging habitat management. The prescription will provide forest cover for foraging and protection from predation and ensure high water quality to support the aquatic insect base (Forest Service 2004a).

Effects of Alternative 1 (No Action):

Direct and Indirect Effects - This alternative will perpetuate current conditions and no direct or indirect impacts to large-flowered skullcap or gray myotis are expected.

Cumulative Effects –

Large-flowered skullcap - There are no other past, present, or reasonably foreseeable future activities which would affect the known large-flowered skullcap populations. Surveys of potential habitat will be completed prior to any future ground disturbing activity.

Gray myotis – Activities potentially affecting gray bat foraging habitat, which consists of riparian corridors of streams, rivers, or reservoirs near occupied caves, would include activities affecting riparian corridors in the southwestern portion of the analysis area. Riparian corridors on the Forest are managed and protected through the Riparian Corridor Prescription (11) objectives and standards, which meet or exceed State Best Management Practices (BMPs). The only past, present, or reasonably foreseeable activity in that area is prescribed burning planned in the next two to three years (five burning units of 250-400 acres each on Taylor Ridge). Streams within those burning blocks are small first-order streams, intermittent in flow in most cases. The probability of gray bats utilizing those first-order stream segments is very unlikely due to their narrow, closed canopies, “clutter”, and intermittent flow. Gray bats prefer wider and more open streams and rivers for foraging (Johnson 2002). This activity will not negatively affect gray bat foraging habitat.

Effects of Alternative 2 (Proposed Action):

Direct and Indirect Effects –

Large-flowered skullcap – There are no known individuals or populations of large-flowered skullcap in any of the stands planned for treatment. All the stands with potential habitat for this species were surveyed in summer 2006 and none were found. Therefore activities such as thinning or restoration treatments will have no direct or indirect effects on large-flowered skullcap.

Gray myotis – Riparian corridors in a portion of the Armuchee Ridges analysis area could potentially provide foraging habitat for the known gray bat bachelor colony on private land. Gray bats from this colony have been shown to preferentially use the Oostanaula River and the larger tributaries (Johnson 2002) rather than small, narrow streams, but any riparian corridors on National Forest in the Armuchee Ridges analysis area should provide forest cover. Forest cover in the riparian corridors offers protection from predation as well as protecting water quality and the aquatic insect base. Activities such that in this alternative (thinning and restoration treatments) which comply with MRx 11 and the BMPs should have no effect on foraging habitat (Forest Service 2004 EIS p 282). Riparian corridors (minimum of 100 feet on each side) will in most cases be protected; in some of the stands to be thinned, individual trees will be removed from the

riparian corridor (see discussion above in Riparian Habitats section). The selective removal of a portion of the forest cover (retaining at least 50 square feet of basal area per acre) in riparian corridors should not alter forest structure significantly or cause a riparian corridor to be suitable as foraging habitat (Bat Conservation International 2001).

Research in the Piedmont region of the southeast indicates that treatments that reduce “clutter”, particularly thinning, actually increase the suitability of pine stands for bat foraging and commuting activity (Loeb and Waldrop 2007).

Cumulative Effects –

Large-flowered skullcap – This species will not be affected by any of the treatments planned in this alternative, or by any past, present, or reasonably foreseeable action in the Armuchee Ridges analysis area. All suitable habitats are surveyed for the presence of this and other rare plant species prior to any ground-disturbing activity.

Gray myotis - Activities potentially affecting gray bat foraging habitat would include activities affecting riparian corridors in the southwestern portion of the analysis area. Riparian corridors on the Forest are managed and protected through the Riparian Corridor Prescription (11) objectives and standards, which meet or exceed State Best Management Practices (BMPs). This alternative has minimal effect on riparian corridor structure or function and will not affect gray bat foraging habitat. The only past, present, or reasonably foreseeable activity in that area is prescribed burning planned in the next two to three years (five burning units of 250-400 acres each on Taylor Ridge). Streams within those burning blocks are small first-order streams, intermittent in flow in most cases. The probability of gray bats utilizing those first-order stream segments is very unlikely due to their narrow, closed canopies, “clutter”, and intermittent flow. Gray bats prefer wider and more open streams and rivers for foraging (Johnson 2002). This activity will not negatively affect gray bat foraging habitat.

Effects of Alternative 3:

Direct and Indirect Effects –

Large-flowered skullcap - This species will not be affected by any of the treatments planned in this alternative, or by any past, present, or reasonably foreseeable action in the Armuchee Ridges analysis area. All suitable habitats are surveyed for the presence of this and other rare plant species prior to any ground-disturbing activity.

Gray myotis - Riparian corridors in a portion of the Armuchee Ridges analysis area could potentially provide foraging habitat for the known gray bat bachelor colony on private land. Activities such as thinning, which comply with MRx 11 and the BMPs should have no effect on foraging habitat (Forest Service 2004 EIS p 282). The retention of at least 50 square feet of basal area per acre in riparian corridors should not alter forest structure significantly or cause a riparian corridor to be suitable as foraging habitat (Bat Conservation International 2001).

Cumulative Effects –

Large-flowered skullcap – This species will not be affected by any of the treatments planned in this alternative, or by any past, present, or reasonably foreseeable action in the Armuchee Ridges analysis area. All suitable habitats are surveyed for the presence of this and other rare plant species prior to any ground-disturbing activity.

Gray myotis - Activities potentially affecting gray bat foraging habitat would include activities affecting riparian corridors in the southwestern portion of the analysis area. Riparian corridors on the Forest are managed and protected through the Riparian Corridor Prescription (11) objectives and standards, which meet or exceed State Best Management Practices (BMPs). This alternative has minimal effect on riparian corridor structure or function and will not affect gray bat foraging habitat. The only past, present, or reasonably foreseeable activity in that area is prescribed burning planned in the next two to three years (five burning units of 250-400 acres each on Taylor Ridge). Streams within those burning blocks are small first-order streams, intermittent in flow in most cases. The probability of gray bats utilizing those first-order stream segments is very unlikely due to their narrow, closed canopies, “clutter”, and intermittent flow. Gray bats prefer wider and more open streams and rivers for foraging (Johnson 2002). This activity will not negatively affect gray bat foraging habitat.

Viability Concern Species

Existing Conditions -

Site-specific inventories for federally listed, Regional Forester sensitive and locally rare plants were conducted during summer 2006. One stands to be treated (pine thinning) was found to contain viability concern species (a locally rare plant); exotic species also found in the stand were Nepalese browntop, Japanese honeysuckle, and privet. The locally rare plant population was not at risk of displacement by the NNIS.

Effects to Regional Forester Sensitive Species are analyzed in detail in the Biological Evaluation for this project. These species are those for which there is concern for viability of their populations across their range. Based on this analysis, 11 Sensitive Species occur or potentially occur in the vicinity of the project. In addition, 6 other species of local viability concern are also addressed here because they occur or potentially occur in the vicinity of the project. This was determined by: (1) consulting Forest Service plant inventory records, (2) consulting Georgia Natural Heritage Program (GNHP) records, (3) consulting University of Georgia (UGA), Forest Service, and Georgia Department of Natural Resources (GADNR) aquatic inventory records, (4) reviewing U.S. Fish and Wildlife Service county lists for potential species, (5) ongoing discussions with GNHP, Forest Service, and other agency biologists, (6) various scientific references such as technical manuals, herbarium records, NatureServe information, and others, and (7) results from project-level surveys.

Table 3-24. Viability Concern Species known to occur or with potential to occur in the Armuchee Ridges analysis area.

Common Name	Scientific Name	Status
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	S
Diana fritillary	<i>Speyeria Diana</i>	S
Lined chub	<i>Hybopsis lineapunctata</i>	S
Trispot darter	<i>Etheostoma trisella</i>	S
Alabama rainbow	<i>Villosa nebulosa</i>	S
Ridged mapleleaf	<i>Quadrula rumphiana</i>	S
Tennessee heelsplitter	<i>Lasmigona holstonia</i>	S
Margarita river skimmer	<i>Macromia margarita</i>	S
Allegheny snaketail	<i>Ophiogomphus incurvatus alleghaniensis</i>	S
Edmund's snaketail	<i>Ophiogomphus edundo</i>	S
Cherokee clubtail dragonfly	<i>Gomphus conasanguis</i>	S
Rock darter	<i>Etheostoma ruprestre</i>	LR
Coosa darter	<i>Etheostoma coosae</i>	LR
Greenbreast darter	<i>Etheostoma jordani</i>	LR
Burrhead shiner	<i>Notropis asperifrons</i>	LR
Rainbow shiner	<i>Notropis chrosomus</i>	LR
Nuttall's hedge-nettle	<i>Stachys nuttallii</i>	LR

S – sensitive species, LR – locally rare species

Effects of Alternative 1 (No Action):

Direct and Indirect Effects - This alternative will perpetuate current conditions and no direct impacts to viability concern species are expected.

Cumulative Effects - Past, present, or reasonably foreseeable activities which could affect viability concern species include:

- Approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years.

Rafinesque's big-eared bat - This rare and little known bat of the southeastern U.S. is associated with mature forests near permanent water (Harvey 1992). It or hibernates in man-made structures, in caves, or mines either singly or in small colonies. No known hibernaculum or maternity habitat is present in the Armuchee Ridges analysis area. In 2001, bat mist-netting was conducted across the Chattahoochee National Forest (Loeb 2001). Some of the sites were within the Armuchee Ridges analysis area. No big-eared bats were found during any of the mist netting. In the summer, male big-eared bats may roost in hollow trees (Harvey,

1992). Hollow trees are associated with older forests, typically greater than 60 years of age. There are approximately 680,000 acres of these older Forests on the Chattahoochee-Oconee. Although the prescribed burning could damage some hollow trees, given their abundance on the Forest, the availability of summer roost trees will not be affected. Since no hibernation habitat is present, big-eared bats are not likely to be present on these sites during the dormant season when the controlled burns will occur.

Diana fritillary - The Diana fritillary occurs throughout the Southern Appalachians, inhabiting pine and deciduous forests near streams. Violets serve as the host plant for larvae (Scott 1986). Opler (1992) states that males may use a variety of habitats, but primary habitat consists of openings and fields in wet, rich woods. Roads and other openings in moist woods provide nectar plants for this butterfly (Broadwell 1992). Because it uses a variety of forest types including both pine and hardwood forests of varying successional stages, nearly the entire Forest (750,000 acres) provides suitable habitat. If this species was present in the prescribed burning units, they would be present only in the larval (caterpillar) stage at the time of year the prescribed burn would occur. At the end of summer, Diana fritillary eggs are laid next to dried-up violets where they hatch in the fall. Diana larvae over winter deep in the duff, and are unlikely to be impacted by dormant season prescribed burns (pers. comm. with C. Wentworth). In addition, existing fire line, streams, and roads are used for much of the control lines so new ground disturbance will be minimal.

Nuttall's hedge-nettle – This member of the mint family is uncommonly found in moist upland forests in middle and east Tennessee and northwest Georgia (NatureServe 2007). A small population of this plant was found during botanical survey in summer 2006. This species was not found in the prescribed burning units. Its preferred habitat is moist uplands or drains not typically affected by fire.

Aquatic species - Nine Sensitive aquatic species are known to occur or have the potential to occur in streams within the Armuchee Ridges analysis area, including fish such as **trispot darter**, which occurs in lower Johns Creek, and **lined chub**, found in a Little Armuchee Creek tributary; freshwater mollusks such as **Alabama rainbow**, found in lower Johns Creek and East and West Armuchee Creeks, **ridged mapleleaf**, which occurs in lower Johns Creek, Armuchee Creek, and the Oostanaula River, and **Tennessee heelsplitter**, which is found in West Armuchee Creek; and aquatic insects such as **Margarita river skimmer**, **Appalachian snaketail**, **Edmund's snaketail**, and **Cherokee clubtail dragonfly**, which could occur in several of the streams. Five locally rare species are known to occur or have the potential to occur in streams also. Locally rare fish include **rock darter**, **Coosa darter**, **greenbreast darter**, **burrhead shiner**, and **rainbow shiner**. These fish occur in many of the medium to large size streams in the analysis area. Riparian Corridor standards, forestwide standards and Best Management practices (BMPs) will be followed on all projects on the Forest to protect water quality and aquatic habitat condition. Low intensity prescribed burning and associated fireline construction does not negatively affect riparian function or

structure, water quality, or aquatic habitats (Elliot and Vose 2005). No negative cumulative effects to aquatic habitat and associated species are expected.

- Dry Creek timber sale, 103 acres of pine/pine oak forest thinning completed in 2007.
- John's Creek timber sale, 375 acres of pine thinning scheduled to begin in 2008.
- Taylor Ridge precommercial thinning, 185 acres of pine thinning completed in spring 2008

Rafinesque's big-eared bat - Some hollow trees could be damaged by the proposed thinning, but given their abundance on the Forest, the availability of summer roost trees will not be affected. The revised Forest plan contains a standard that provides for protection of existing snags and den trees during vegetation management treatments. As a result, hollow trees will not be cut or intentionally disturbed. Even if a hollow tree is inadvertently damaged, roosting bats are quick to fly away when disturbed on the roost (Ozier 1999), and will promptly relocate (M. Bunch SCDNR, pers. comm. with A. Gaston). This project will have no impact to this species.

Diana fritillary - If Diana Fritillary is present within the treated stands, individuals could be impacted by the ground disturbance associated with heavy equipment. This impact likely would be indirect, due to a reduction in larval host plants (violets) and nectar plants on the sites. However, given that the treated stands contains no habitat specifically required by this species, that most of the Forest (750,000 acres) provides suitable habitat, and that only a small amount of ground disturbance is involved, the potential indirect impact to individuals by the proposed action is negligible. This project will have no impact to this species.

Nuttall's hedge-nettle – This species was not found during botanical surveys of the above thinning project areas. The thinning projects (Dry Creek, Johns Creek, and Taylor's Ridge) will not affect this species.

Aquatic species - Riparian Corridor standards, forest wide standards and Best Management practices (BMPs) will be followed on all projects on the Forest to protect water quality and aquatic habitat condition. The thinning projects will not affect aquatic habitat or associated species.

This alternative in combination with the past, present, and reasonably foreseeable activities affecting viability concern species will not be cumulatively negative.

Effects of Alternative 2 (Proposed Action):

Direct and Indirect Effects -

Rafinesque's Big-eared Bat - In the summer, male big-eared bats may roost in hollow trees (Harvey 1992). Hollow trees are common throughout the Forest and likely are present in the stands to be treated tracts. Hollow trees are associated with older forests, typically greater than 60 years of age. There are approximately 680,000 acres of these

older Forests on the Chattahoochee-Oconee National Forest. Some hollow trees could be damaged by the proposed thinning and restoration treatments, but given their abundance on the Forest, the availability of summer roost trees will not be affected. The revised Forest plan contains a standard that provides for protection of existing snags and den trees during vegetation management treatments. As a result, hollow trees will not be cut or intentionally disturbed. Even if a hollow tree is inadvertently damaged, roosting bats are quick to fly away when disturbed on the roost (Ozier 1999), and will promptly relocate (M. Bunch SCDNR, pers. comm. with A. Gaston). This project will have no impact to this species.

Diana Fritillary – If Diana Fritillary is present within the stands to be treated, individuals could be impacted by the ground disturbance associated with heavy equipment. This impact likely would be indirect, due to a reduction in larval host plants (violets) and nectar plants on the sites. However, given that the project area contains no habitat specifically required by this species, that most of the Forest (750,000 acres) provides suitable habitat, and that only a small percentage of the area is planned for ground disturbance, the potential indirect impact to individuals by the proposed action is negligible. This project will have no impact to this species.

Nuttall's hedge-nettle – A small population (15 scattered individuals) of this species was found during botanical survey in summer 2006. It is in the East Armuchee Creek drainage. NNIS found in the stand include Nepalese browntop, Japanese honeysuckle, and privet. The stand it occurs in is to be thinned. The area where the plants are located is within an ephemeral drain. The site will be protected during timber marking: a buffer will be placed around the plants and an equipment limitation zone designated around it in order to protect the plants from equipment damage and preserve the existing light regime. This project will have no impact on this small population.

Aquatic Species - The thinning and restoration treatments have the potential to impact aquatic habitat conditions. However, application of riparian corridor standards (MRx 11) and Best Management Practices (BMPs) will ensure that water quality and aquatic habitat conditions will be maintained and enhanced. This should result in increased streamside shading, woody debris input into the stream, and improved conditions for aquatic species.

Cumulative Effects - Past, present, or reasonably foreseeable activities which could affect viability concern species include:

- Approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years.

Rafinesque's big-eared bat - In the summer, male big-eared bats may roost in hollow trees (Harvey 1992). Hollow trees are associated with older forests, typically greater than 60 years of age. There are approximately 680,000 acres of these older Forests on the Chattahoochee-Oconee. Although the prescribed burning could damage some hollow trees, given their abundance on the Forest, the availability of summer roost trees will not be affected. Since no hibernation habitat is present, big-

eared bats are not likely to be present on these sites during the dormant season when the controlled burns will occur.

Diana fritillary - Because it uses a variety of forest types including both pine and hardwood forests of varying successional stages, nearly the entire Forest (750,000 acres) provides suitable habitat. If this species was present in the prescribed burning units, they would be present only in the larval (caterpillar) stage at the time of year the prescribed burn would occur. At the end of summer, Diana fritillary eggs are laid next to dried-up violets where they hatch in the fall. Diana larvae over winter deep in the duff, and are unlikely to be impacted by dormant season prescribed burns (Adams, pers. comm. with C. Wentworth). In addition, existing fire line, streams, and roads are used for much of the control lines so new ground disturbance will be minimal.

Nuttall's hedge-nettle – This member of the mint family is uncommonly found in moist upland forests in middle and east Tennessee and northwest Georgia. A small population of this plant was found during botanical survey in summer 2006. This species was not found in the prescribed burning units. Its preferred habitat is moist uplands or drains not typically affected by fire.

Aquatic species – Riparian corridor standards, forestwide standards and Best Management practices (BMPs) will be followed on all projects on the Forest to protect water quality and aquatic habitat condition. Low intensity prescribed burning and associated fireline construction does not negatively affect riparian function or structure, water quality, or aquatic habitats (Elliot and Vose 2005). No negative cumulative effects to aquatic habitat and associated species are expected.

- Dry Creek timber sale, 103 acres of pine/pine oak forest thinning completed in 2007.
- John's Creek timber sale, 375 acres of pine thinning scheduled to begin in 2008.
- Taylor Ridge pre-commercial thinning, 185 acres of pine thinning completed in spring 2008

Rafinesque's big-eared bat - Some hollow trees could be damaged by the proposed thinning, but given their abundance on the Forest, the availability of summer roost trees will not be affected. The revised Forest plan contains a standard that provides for protection of existing snags and den trees during vegetation management treatments. As a result, hollow trees will not be cut or intentionally disturbed. Even if a hollow tree is inadvertently damaged, roosting bats are quick to fly away when disturbed on the roost (Ozier 1999), and will promptly relocate (M. Bunch SCDNR, pers. comm. with A. Gaston). This project will have no impact to this species.

Diana fritillary - If Diana Fritillary is present within the treated stands, individuals could be impacted by the ground disturbance associated with heavy equipment. This impact likely would be indirect, due to a reduction in larval host plants (violets) and nectar plants on the sites. However, given that the treated stands contains no habitat specifically required by this species, that most of the Forest (750,000 acres) provides

suitable habitat, and that only a small amount of ground disturbance is involved, the potential indirect impact to individuals by the proposed action is negligible. This project will have no impact to this species.

Nuttall's hedge-nettle – This species was not found during botanical surveys in these project areas. The thinning projects will not affect this species.

Aquatic species - Riparian Corridor standards, forest wide standards and Best Management practices (BMPs) will be followed on all projects on the Forest to protect water quality and aquatic habitat condition. The thinning projects will not affect aquatic habitat or associated species.

This alternative in combination with the past, present, and reasonably foreseeable activities affecting viability concern species will not be cumulatively negative.

Effects of Alternative 3:

Direct and Indirect Effects -

Rafinesque's Big-eared Bat - In the summer, male big-eared bats may roost in hollow trees (Harvey 1992). Hollow trees are common throughout the Forest and likely are present in the stands to be treated. Hollow trees are associated with older forests, typically greater than 60 years of age. There are approximately 680,000 acres of these older Forests on the Chattahoochee-Oconee National Forest. Some hollow trees could be damaged by the proposed thinning and restoration treatments, but given their abundance on the Forest, the availability of summer roost trees will not be affected. The revised Forest plan contains a standard that provides for protection of existing snags and den trees during vegetation management treatments. As a result, hollow trees will not be cut or intentionally disturbed. Even if a hollow tree is inadvertently damaged, roosting bats are quick to fly away when disturbed on the roost (Ozier 1999), and will promptly relocate (M. Bunch SCDNR, pers. comm. with A. Gaston). This project will have no impact to this species.

Diana Fritillary – If Diana Fritillary is present within the stands to be treated, individuals could be impacted by the ground disturbance associated with heavy equipment. This impact likely would be indirect, due to a reduction in larval host plants (violets) and nectar plants on the sites. However, given that the project area contains no habitat specifically required by this species, that most of the Forest (750,000 acres) provides suitable habitat, and that only a small percentage of the area is planned for ground disturbance, the potential indirect impact to individuals by the proposed action is negligible. This project will have no impact to this species.

Nuttall's hedge-nettle – A small population of this plant was found during botanical survey in summer 2006. The stand it occurs in is to be thinned. The area where the plants

are located will be protected during timber marking by designating an equipment limitation zone around it. This project will have no impact on this population.

Aquatic Species - The thinning and restoration treatments have the potential to impact aquatic habitat conditions. However, application of riparian corridor standards (MRx 11) and Best Management Practices (BMPs) will ensure that water quality and aquatic habitat conditions will be maintained and enhanced. This should result in increased streamside shading, woody debris input into the stream, and improved conditions for aquatic species.

Cumulative Effects - Past, present, or reasonably foreseeable activities which could affect viability concern species include:

- Approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years.

Rafinesque's big-eared bat - In the summer, male big-eared bats may roost in hollow trees (Harvey, 1992). Hollow trees are associated with older forests, typically greater than 60 years of age. There are approximately 680,000 acres of these older Forests on the Chattahoochee-Oconee. Although the prescribed burning could damage some hollow trees, given their abundance on the Forest, the availability of summer roost trees will not be affected. Since no hibernation habitat is present, big-eared bats are not likely to be present on these sites during the dormant season when the controlled burns will occur.

Diana fritillary - Because it uses a variety of forest types including both pine and hardwood forests of varying successional stages, nearly the entire Forest (750,000 acres) provides suitable habitat. If this species was present in the prescribed burning units, they would be present only in the larval (caterpillar) stage at the time of year the prescribed burn would occur. At the end of summer, Diana fritillary eggs are laid next to dried-up violets where they hatch in the fall. Diana larvae over winter deep in the duff, and are unlikely to be impacted by dormant season prescribed burns (Adams, pers. comm. with C. Wentworth). In addition, existing firelines, streams, and roads are used for much of the control lines so new ground disturbance will be minimal.

Nuttall's hedge-nettle – This member of the mint family is uncommonly found in moist upland forests in middle and east Tennessee and northwest Georgia. A small population of this plant was found during botanical survey in summer 2006. This species was not found in the prescribed burning units. Its preferred habitat is moist uplands or drains not typically affected by fire.

Aquatic species – Riparian corridor standards, forestwide standards and Best Management practices (BMPs) will be followed on all projects on the Forest to protect water quality and aquatic habitat condition. Low intensity prescribed burning and associated fireline construction does not negatively affect riparian function or

structure, water quality, or aquatic habitats (Coweeta reference xxxx). No negative cumulative effects to aquatic habitat and associated species are expected.

- Dry Creek timber sale, 103 acres of pine/pine oak forest thinning completed in 2007.
- John’s Creek timber sale, 375 acres of pine thinning scheduled to begin in 2008.
- Taylor Ridge precommercial thinning, 185 acres of pine thinning scheduled to begin in fall 2007.

Rafinesque’s big-eared bat - Some hollow trees could be damaged by the proposed thinning and restoration treatments, but given their abundance on the Forest, the availability of summer roost trees will not be affected. The revised Forest plan contains a standard that provides for protection of existing snags and den trees during vegetation management treatments. As a result, hollow trees will not be cut or intentionally disturbed. Even if a hollow tree is inadvertently damaged, roosting bats are quick to fly away when disturbed on the roost (Ozier 1999), and will promptly relocate (M. Bunch SCDNR, pers. comm. with A. Gaston). This project will have no impact to this species.

Diana fritillary - If Diana Fritillary is present within the treated stands, individuals could be impacted by the ground disturbance associated with heavy equipment. This impact likely would be indirect, due to a reduction in larval host plants (violets) and nectar plants on the sites. However, given that the treated stands contains no habitat specifically required by this species, that most of the Forest (750,000 acres) provides suitable habitat, and that only a small amount of ground disturbance is involved, the potential indirect impact to individuals by the proposed action is negligible. This project will have no impact to this species.

Nuttall’s hedge-nettle – This species was not found during botanical surveys in these project areas. The thinning projects will not affect this species.

Aquatic species - Riparian Corridor standards, forest wide standards and Best Management practices (BMPs) will be followed on all projects on the Forest to protect water quality and aquatic habitat condition. The thinning projects will not affect aquatic habitat or associated species.

This alternative in combination with the past, present, and reasonably foreseeable activities affecting viability concern species will not be cumulatively negative.

DEMAND SPECIES

White-tailed deer was selected as Forest Plan MIS to represent public demand issues and is relevant to this project. Black bears, which are the other Forest Plan Demand Species MIS, do not occur within the project area.

Element - White-tailed Deer

Measure - Effects on habitat conditions and deer populations from project activities.

Bounds of Analysis – **Spatial:** The Armuchee Ridges project analysis area consists of ten subwatersheds on National Forest and adjacent private lands. **Temporal:** Approximately ten years following implementation.

Existing Conditions

White-tailed deer was selected as a MIS to help indicate the effects of management in meeting public demand as a hunted species. Deer require a mixture of forest/successional stage habitats to meet their year-round habitat needs. Key requirements include the interspersed of mature mast-producing stands during fall and winter, early successional forest to provide browse and soft mast, and high quality permanent openings. Deer harvest data collected by Georgia DNR indicates that deer populations in the Ridge and Valley Province are stable to increasing with some fluctuations primarily due to differences in the annual mast crops (USDA Forest Service 2006). Current deer populations are low to moderate on the Armuchee Ridges analysis area due to limited availability of ESH and high quality permanent openings. Deer in the Armuchee Ridges analysis area utilize both National Forest and private land to meet their needs.

Effects of Alternative 1 (No Action)

Direct and Indirect Effects- This alternative will perpetuate current conditions and no direct impacts to white-tailed deer are expected. Over time, the limited amount of available ESH in the Armuchee Ridges analysis area will decline as the forests in the area mature. This should result in a reduction of the availability of deer forages and habitat conditions for deer. Mature hard mast-producing forest (oak or oak-pine forest) is abundant in the analysis area.

Cumulative Effects - Implementation of the revised Forest Plan is expected to provide a diversity of habitats that will benefit white-tailed deer populations on the Forest (USDA Forest Service 2004a). This alternative does not implement activities which benefit white-tailed deer. ESH and high quality permanent openings important for deer are limited on the Armuchee Ridges analysis area. Adjacent private land in the Armuchee Ridges area also provides deer habitat in the form of mixed ages of forest interspersed with agricultural land and openings. However, continued residential development may reduce the quantity and quality of deer habitat on adjacent private lands.

Past, present, or reasonably foreseeable activities which could affect white-tailed deer habitat include:

- Approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years.

Prescribed burning creates more open conditions in the understory and stimulates new plant growth. Both herbaceous and woody growth will increase and be more nutritious and palatable. Seed-bearing plants bear more fruit. Long-term benefits are gained because fire favors oaks rather than other less wildlife-friendly hardwood species.

- Dry Creek timber sale, 103 acres of pine/pine oak forest thinning completed in 2007.
- John's Creek timber sale, 375 acres of pine thinning scheduled to begin in 2008.
- Taylor Ridge precommercial thinning, 185 acres of pine thinning completed in spring 2008

Thinning improves habitat for white-tailed deer by allowing additional sunlight to reach the ground, stimulating understory vegetation and providing more forage and browse. Mast production increases when the canopy is opened up and crowns of oaks and other mast-bearers expand.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects – The thinning and restoration treatments proposed under this alternative will result in improved habitat conditions for deer. The canopy openings resulting from the thinning and reforestation activities will increase the production of browse and soft mast in these stands. This alternative creates 669 acres of ESH, fairly well-distributed spatially across 5 of the 10 subwatersheds in the Armuchee Ridges analysis area and across forest types, elevations, and aspects. The treatments will be implemented over a 7-8 year period, approximately 100 to 150 acres per year. Timber harvest will be followed by prescribed burning in each of the 16 stands. This additional ESH will benefit white-tailed deer populations. The removal of mature mast-bearing trees will cause localized decreases in hard mast capability, but late successional forest is abundant and widely distributed across the area. The habitat diversity provided by ESH is much more limited in the Armuchee Ridges analysis area.

Over time, the amount of mid-late successional oak forests will increase as the forests in the area mature. This should result in increased hard mast production in the area, which will benefit deer and other mast-dependent species.

The construction of temporary roads in order to access timber stands will benefit deer populations. After the roads are closed to vehicular traffic, depending upon their location and the planting season, the roads will be sown to cool-season grains or legumes such as clover or wheat, which provide quality forage, or warm-season grains such as milo or millet combined with native grasses (bluestem, indiagrass, and switchgrass). This will stabilize the soil, provide quality forage and cover for bedding.

Cumulative Effects – Across the Forest, implementation of the revised Forest Plan is expected to provide a diversity of habitats that will benefit white-tailed deer populations on the Forest (USDA Forest Service 2004a). The thinning and restoration treatments in this alternative will enhance deer habitat on the Armuchee Ridges analysis area. This

may help offset the expected declines the quantity and quality of deer habitat on adjacent private lands due to continued residential development.

Past, present, or reasonably foreseeable activities which could affect white-tailed deer habitat include:

- Approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years.

Prescribed burning creates more open conditions in the understory and stimulates new plant growth. Both herbaceous and woody growth will increase and be more nutritious and palatable. Seed-bearing plants bear more fruit. Long-term benefits are gained because fire favors oaks rather than other less wildlife-friendly hardwood species.

- Dry Creek timber sale, 103 acres of pine/pine oak forest thinning completed in 2007.
- John's Creek timber sale, 375 acres of pine thinning scheduled to begin in 2008.
- Taylor Ridge precommercial thinning, 185 acres of pine thinning completed in spring 2008

Thinning improves habitat for white-tailed deer by allowing additional sunlight to reach the ground, stimulating understory vegetation and providing more forage and browse. Mast production increases when the canopy is opened up and crowns of oaks and other mast-bearers expand.

This alternative in combination with the past, present, and reasonably foreseeable activities affecting white-tailed deer will be cumulatively positive in effect.

Effects of Alternative 3

Direct Effects – The thinning and riparian hardwood restoration will result in improved habitat conditions for deer. Under this alternative, no other restoration treatments are planned and no ESH will be created. Therefore benefits to deer browse and forage will be more limited. There will be no localized reductions in mast production. Over time, the amount of mid-late successional oak forests will increase as the forests in the area mature. This should result in increased hard mast production in the area, which will benefit deer and other mast-dependent species.

The construction of temporary roads in order to access timber stands will benefit deer populations. After the roads are closed to vehicular traffic, depending upon their location and the planting season, the roads will be sown to cool-season grains or legumes such as clover or wheat, which provide quality forage, or warm-season grains such as milo or millet combined with native grasses (bluestem, indiagrass, and switchgrass). This will stabilize the soil, provide quality forage and cover for bedding.

Cumulative Effects – Implementation of the revised Forest Plan is expected to provide a diversity of habitats that will benefit white-tailed deer populations on the Forest (USDA Forest Service 2004a). This alternative implements activities which benefit white-tailed deer but does not supply ESH, which is limited in the Armuchee Ridges analysis area. Adjacent private land in the Armuchee Ridges area also provides deer habitat in the form of mixed ages of forest interspersed with agricultural land and openings. However, continued residential development may reduce the quantity and quality of deer habitat on adjacent private lands.

Past, present, or reasonably foreseeable activities which could affect white-tailed deer habitat include:

- Approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years.

Prescribed burning creates more open conditions in the understory and stimulates new plant growth. Both herbaceous and woody growth will increase and be more nutritious and palatable. Seed-bearing plants bear more fruit. Long-term benefits are gained because fire favors oaks rather than other less wildlife-friendly hardwood species.

- Dry Creek timber sale, 103 acres of pine/pine oak forest thinning completed in 2007.
- John's Creek timber sale, 375 acres of pine thinning scheduled to begin in 2008.
- Taylor Ridge precommercial thinning, 185 acres of pine thinning completed in spring 2008

Thinning improves habitat for white-tailed deer by allowing additional sunlight to reach the ground, stimulating understory vegetation and providing more forage and browse. Mast production increases when the canopy is opened up and crowns of oaks and other mast-bearers expand.

This alternative in combination with the past, present, and reasonably foreseeable activities affecting white-tailed deer will be cumulatively positive in effect.

ADDITIONAL ELEMENTS

Element – Northern Bobwhite

Measure - Effects on habitat conditions and northern bobwhite populations from project activities.

Bounds of Analysis – Spatial: The Armuchee Ridges project analysis area consists of ten subwatersheds on National Forest and adjacent private lands. **Temporal:** Approximately ten years following implementation.

Existing Conditions

Northern bobwhite populations have declined dramatically throughout the Southeast during the last three decades (Dimmick et al. 2002). The major limiting factor is lack of suitable nesting and brood-rearing habitat due to land-use changes including the loss of agricultural lands, ‘clean farming’ practices, conversion of native rangeland to exotic grass pastures, intensive pine plantation management, decreased use of prescribed fire, and increased urbanization (Thackston and Whitney 2001). Georgia’s bobwhite numbers have dropped more than 70% since 1966 (USDA Forest Service 2004a). Other grassland/shrubland birds such as loggerhead shrike share both the bobwhite’s habitat preferences and widespread population declines (Dimmick et al. 2002). Trends on the Chattahoochee-Oconee National Forest as well as other National Forests across the Southeast suggest large decreases in quail populations (LaSorte et al. 2007). Point counts in the Ridge and Valley Physiographic Province on the Chattahoochee showed a -5% annual change in bobwhite observation during 1992-2004 (LaSorte et al. 2007). This area includes the Armuchee Ridges analysis area.

Bobwhites primarily depend on ESH such as open areas dominated by weeds, legumes, grasses, shrubs, and briar thickets (Thackston and Whitney 2001). Regenerating stands of timber provide this type of habitat, but the effect is short-term; bobwhites generally utilize regeneration cuts for two to four years following harvest. This type of habitat is extremely limited on the Armuchee Ridges analysis area (less than 2% of the Armuchee Ridges analysis area is less than ten years old). Very little non-forested habitat such as permanent openings, old fields, or rights-of-way are present on National Forest in the analysis area. Adjacent private lands provide suitable habitats such as grassland, shrub/scrub, pasture or hay fields, or croplands on approximately 23% of the analysis area (USGS 2001), but quality of these lands, especially those in exotic grasses such as fescue fields, in reality offer little to bobwhites.

Pine-oak and oak-pine forests comprise a significant proportion of the bobwhite’s range in Georgia (Thackston and Whitney 2001). The structure and diversity of understory vegetation in these forest communities (such as grasses and other herbaceous vegetation which develops in open, frequently burned pine stands) strongly influence quail abundance (Thackston and Whitney 2001). Quail are dependent upon both hard and soft mast as well as seeds and insects (Goodrum et al. 1971).

There is potential to improve habitat for bobwhites and associated bird species on the Armuchee Ridges analysis area due to the forest communities present, including pine or pine oak forests (55% of the area) or oak-pine stands (42% of the area). The limiting factor regarding these forest habitats is the small percentage of these in open stand conditions frequently maintained by fire. Only a few hundred acres of timber stands have been thinned over the past decade. Overstocked, fire-suppressed stands provide little habitat for quail or other wildlife. Prescribed fire has been irregularly applied in the area, resulting in an abundance of fire-intolerant hardwoods and Virginia pine shading out the forest floor and suppressing grass and forb development which are important quail nesting and brood-rearing habitats.

Effects of Alternative 1 (No Action)

Direct and Indirect Effects- This alternative will perpetuate current conditions and no direct impacts to northern bobwhites are expected. Over time, the limited amount of available ESH in the Armuchee Ridges analysis area will decline as the forests in the area mature. This will result in a reduction in suitable habitat for bobwhites.

Cumulative Effects - This alternative does not implement activities which benefit northern bobwhites. ESH and open pine-oak or oak-pine stands maintained by fire are limited on the Armuchee Ridges analysis area. Adjacent private land in the Armuchee Ridges area provides some quail habitat in the form of mixed ages of forest interspersed with agricultural land and openings. However, the quality of these habitats supplies little of the requirements to maintain healthy bobwhite populations.

Past, present, or reasonably foreseeable activities which could affect bobwhite habitat include:

- Approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years.

Prescribed burning creates more open conditions in the understory and stimulates new plant growth. Both herbaceous vegetation and insects increase in abundance. Seed-bearing plants are more productive and grasses thrive.

- Dry Creek timber sale, 103 acres of pine/pine oak forest thinning completed in 2007.
- John's Creek timber sale, 375 acres of pine thinning scheduled to begin in 2008.
- Taylor Ridge precommercial thinning, 185 acres of pine thinning completed in spring 2008

Thinning improves habitat for quail by allowing additional sunlight to reach the ground, stimulating understory vegetation and providing more forage and nesting vegetation. Mast production increases when the canopy is opened up and crowns of oaks and other mast-bearers expand.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects – The thinning and restoration treatments proposed under this alternative will result in improved habitat conditions for northern bobwhites. This alternative creates 669 acres of ESH, fairly well-distributed spatially across 5 of the 10 subwatersheds in the Armuchee Ridges analysis area and across forest types, elevations, and aspects. The treatments will be implemented over a 7-8 year period, approximately 100 to 150 acres per year. Timber harvest will be followed by prescribed burning in each of the 16 stands. This additional ESH will benefit quail populations. The removal of mature mast-bearing trees will cause localized decreases in hard mast capability, but late

successional forest is abundant and widely distributed across the area. The habitat diversity provided by ESH is much more limited in the Armuchee Ridges analysis area.

The restoration of mountain longleaf pine on the landscape is especially beneficial to bobwhites. All yellow pine species can be managed to benefit bobwhites, but longleaf pine has characteristics which are particularly valuable to quail, such as: 1) its sparse crown allows more sunlight to the ground, 2) it is relatively insect and disease resistant and less prone to wind throw, 3) its seed is nutritious and preferred by quail, 4) it is longer lived, and 5) it can be burned at a relatively young age (Thackston and Whitney 2001). The restoration of mountain longleaf on Taylor Ridge and Strawberry Mountain would be a positive component of improving quail habitat on a landscape scale.

The canopy openings resulting from the thinning of the pine and pine-oak stands and the oak and oak-pine stands will increase the production of grasses, forbs, hard and soft mast, and insects in these stands. Approximately 25% of the existing pine and pine-oak forest and 1% of the oak or oak-pine forest in the Armuchee Ridges analysis area will be thinned.

The construction of temporary roads in order to access timber stands will benefit bobwhite populations. After the roads are closed to vehicular traffic, depending upon their location and the planting season, the roads will be sown to cool-season grains or legumes such as clover or wheat, which provide quality forage and an abundance of insects and other invertebrates, or warm-season grains such as milo or millet combined with native grasses (bluestem, indiangrass, switchgrass) for cover. Both mixtures will provide quality forage for quail and other grassland birds.

Northern bobwhite populations will be positively affected by this alternative.

Cumulative Effects – these alternative implements activities which benefit northern bobwhites by creating ESH and thinning pine-oak or oak-pine stands. These habitats are limited on the Armuchee Ridges analysis area. Adjacent private land in the Armuchee Ridges area provides some quail habitat in the form of mixed ages of forest interspersed with agricultural land and openings. However, the quality of these habitats supplies little of the requirements to maintain healthy bobwhite populations.

Past, present, or reasonably foreseeable activities which could affect bobwhite habitat include:

- Approximately 7000 acres of prescribed burning for fuel reduction and wildlife habitat improvement. Around 2200 acres of this has been completed; the rest is planned over the next 4-5 years.

Prescribed burning creates more open conditions in the understory and stimulates new plant growth. Both herbaceous vegetation and insects increase in abundance. Seed-bearing plants are more productive and grasses thrive.

- Dry Creek timber sale, 103 acres of pine/pine oak forest thinning completed in 2007.

- John’s Creek timber sale, 375 acres of pine thinning scheduled to begin in 2008.
- Taylor Ridge precommercial thinning, 185 acres of pine thinning completed in spring 2008

Thinning improves habitat for quail by allowing additional sunlight to reach the ground, stimulating understory vegetation and providing more forage and nesting vegetation. Mast production increases when the canopy is opened up and crowns of oaks and other mast-bearers expand.

This alternative in combination with the past, present, and reasonably foreseeable activities affecting northern bobwhite populations will be cumulatively positive in effect.

Effects of Alternative 3

Direct Effects – The thinning treatments will result in improved habitat conditions for northern bobwhites. Under this alternative, no restoration treatments (other than riparian hardwood restoration) are planned and no ESH will be created. Therefore benefits to bobwhites and other ESH dependent wildlife will be more limited. There will be no localized reductions in mast production. Over time, the amount of mid-late successional oak forests will increase as the forests in the area mature. This should result in increased hard mast production in the area, which will benefit quail and other mast-dependent species.

The construction of temporary roads in order to access timber stands will benefit bobwhite populations. After the roads are closed to vehicular traffic, depending upon their location and the planting season, the roads will be sown to cool-season grains or legumes such as clover or wheat, which provide quality forage and an abundance of insects and other invertebrates, or warm-season grains such as milo or millet combined with native grasses (bluestem, indiangrass, switchgrass) for cover. Both mixtures will provide quality forage for quail and other grassland birds.

Cumulative Effects –This alternative implements activity which benefits northern bobwhites by thinning pine-oak or oak-pine stands but does not create ESH. These habitats are limited on the Armuchee Ridges analysis area. Adjacent private land in the Armuchee Ridges area provides some quail habitat in the form of mixed ages of forest interspersed with agricultural land and openings. However, the quality of these habitats supplies little of the requirements to maintain healthy bobwhite populations.

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This alternative in combination with the past, present, and reasonably foreseeable activities affecting northern bobwhite populations will be cumulatively positive in effect.

Element – Non-native invasive plant species (NNIS)

Measure – Effects of proposed activities on habitat conditions and resulting establishment and/or spread of NNIS; effects of NNIS on biological resources

Bounds of Analysis – Spatial: The Armuchee Ridges project analysis area consists of ten subwatersheds on National Forest and adjacent private lands. **Temporal:** Approximately ten years following implementation.

Existing Conditions

All federal agencies are directed by Executive Order 13112 to detect and rapidly respond to control populations of NNIS. This Order defines a species as non-native if it is not native to the ecosystem under consideration, and if its introduction is likely to cause harm to human health, to the environment, or to the economy. NNIS have been identified by the Chief of the USDA Forest Service as one of the 4 significant threats to National Forest ecosystems.

Non-native invasives are a concern because infestations of these species, both plant and animal, threaten ecosystems by degrading natural habitats and decreasing biodiversity. NNIS plants displace the native plants normally present. Any animals dependent on those native plants may then also be displaced. NNIS animals may displace native animals by out competing the natives. NNIS pathogens and insects can affect the health of both plants and animals.

In 2006, stands proposed for thinning and restoration were inventoried for federally listed, Regional Forester sensitive and locally rare plants. As part of these inventories, occurrences of non-native invasive plants were also documented. In addition, in 2007

system roads leading to proposed thinning and restoration areas were surveyed for NNIS occurrences.

Based on these surveys, the majority of the NNIS populations are located along road edges and streamsides. Road edges yielded Japanese stiltgrass or Nepal grass (*Microstegium vimineum*), Japanese honeysuckle (*Lonicera japonica*), sericea and bicolor lespedezas (*Lespedeza cuneata* and *L. bicolor*, respectively), autumn olive (*Eleagnus umbellata*), multiflora rose (*Rosa multiflora*), mimosa (*Albizia julibrissin*), kudzu (*Pueraria lobata*), princess tree or royal paulownia (*Paulownia tomentosa*), and tree of heaven (*Ailanthus altissima*). Invasive plants found along streams were primarily the Nepal grass, Chinese privet (*Ligustrum sinense*), and honeysuckle.

Two of the roadside species were found in only a few inventory sites. The princess tree was found in 3 of the road surveys, but only 1 site is proposed for activities. The latter site, consisting of two trees, is along FS Road 254, compartment 935 stand 18, an area proposed for longleaf restoration. Tree of heaven was also found along a roadside. However, there are no activities proposed in the area where this species was found. The other invasive species listed above were found in several sites throughout the project area.

One area in particular is noteworthy for the amount and variety of invasives documented during the inventories. Compartment 925 stand 7 was found to contain honeysuckle, mimosa, Nepal grass, privet, autumn olive, multiflora rose, and sericea lespedeza. A locally rare plant, Nuttall’s hedge-nettle (*Stachys nuttallii*) was found in Compartment 925 stand 35. Several NNIS were also found in the stand; honeysuckle, Nepal grass, and privet.

Characteristics of the above NNIS

Various characteristics of the above species determine the rate and extent to which they will invade appropriate habitat. Some of these characteristics based on several references are summarized in Table 3-25 below (NatureServe 2008, Evans et al 2006, Remaley 2006 and 2005, Bergmann and Swearingen 2005, Miller 2003, Amrine 2002, Stevens 2002).

Table 3-25: Characteristics of some NNIS in the Armuchee Ridges

Invasive Species	Primary Method of Reproduction		Seed Dispersal Mechanism			Soil/Seed Bank
	Seed	Asexual	Animal *	Wind	Water	
Autumn olive	+	--	+	--	--	Ni **
Honeysuckle	+	+	+	--	--	< 1 yr.
Kudzu	--	+	--	--	--	N/A
Lespedeza (bicolor and sericea)	+	+	+	--	--	>20 yrs.
Mimosa	+	+	--	+	+	> 5 yrs.
Multiflora rose	+	--	+	--	--	20 yrs.

Nepal grass	+	--	+	--	+	3-5 yrs.
Princess tree	+	--	--	+	+	Ni
Privet	+	+	+	--	+	< 1 yr.
Tree of heaven	+	+	--	+	--	< 1 yr.

* Dispersal includes ingestion by birds, for example, as well as seeds adhering to hiker’s clothing, animal fur, etc.

** Ni = “No information”

Effects of Alternative 1 (No Action)

Direct and Indirect Effects

This alternative will perpetuate the current conditions. The NNIS listed above will continue to grow and spread by means of natural mechanisms such as seed dispersal by hikers, birds and other animals, wind and water. Species such as mimosa and Chinese privet will also continue to expand and form vigorous colonies from root sprouts. Kudzu will spread rapidly by vegetative means, with potential to expand as far as 60 feet in a growing season (Bergmann and Swearingen, 2005). With the no action alternative, there would be no soil disturbance, increase of sunlight into the understory, or operation of large equipment across sites containing NNIS, all of which can be conducive to spread of invasive plants. However, natural disturbances causing tree fall and resulting canopy gaps may provide additional habitat into which NNIS can become established, especially when adjacent to already infested sites. Although spread of the invasives will occur even with no action, in the absence of disturbance the degree of spread in the analysis area would likely not be as great as in the 2 action alternatives.

Cumulative Effects

Because NNIS will continue to spread even in the absence of harvest-related ground disturbance, cumulative effects of the no-action alternative would be much the same as those listed above. Large populations of NNIS occur on nearby private land, and they are likely to spread to FS land regardless of FS activities. Conversely, where disturbed private land is in close proximity to FS property, seeds of NNIS present on FS land could spread to private land by means of animals, water, wind, and human dispersal (i.e. seeds adhering to clothing and vehicles).

In this alternative, there would be no prescribed burning proposed. However, dormant-season prescribed burning on 7000 acres of pine stands was addressed and approved in a separate decision. These acres occur in the project analysis area. Approximately 2200 acres have been completed. The remaining 4800 acres will be burned over the course of the next four to five years. Evans (2006) reports that many of the NNIS found in the project area recolonize or resprout after fire, but there is no indication that any of the species are promoted by prescribed burning. Nepal grass, can easily reestablish on bare soil resulting from a prescribed burn. However, Forest Service standards for prescribed burning do not allow for burning to bare soil. Although burning does not eradicate honeysuckle, several studies have demonstrated that prescribed burning inhibits spread by killing seedlings and young plants (Nuzzo 1997). Evans (2006) states that fire may scarify lespedeza seeds and increase the germination rates, but another report by The Nature Conservancy (Stevens 2002) states that although spring burns may encourage germination, late season burns may kill seedlings as well as destroy any seeds. Land managers in Alabama have controlled privet by means of burning when done annually under particular environmental conditions (Batcher 2000). Therefore, there should be no cumulative effects causing spread or establishment of NNIS as a result of the 2200 acres

of dormant season prescribed burns that have already occurred, nor from dormant-season prescribed burns on 4800 acres over the next four to five years.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects

This alternative would construct approximately 23.2 miles of temporary road, and create 232 log landings over a 7-year period from fiscal year 2008 through 2015. Approximately 6445 acres would be thinned. Pre-commercial thinning of 670 of these acres would be accomplished by hand, and thus no heavy equipment would be present to potentially spread invasives into the latter acreage. The indirect effects of soil disturbance and increased light to the log landings and roadbeds would create conditions favorable for the establishment of NNIS (Evans et al. 2006). Keys to preventing this establishment will be seeding any bare soil to native and/or desirable non-invasive, non-native species as soon as possible after disturbance. The Equipment Cleaning Clause BT6.35 will be included in the timber sale contract. The clause requires invasive species of concern to be indicated on the Sale Area Map, and gives specific requirements for cleaning of equipment when moving from NNIS-infested sites to non-infested sites. Monitoring of the sites will then be necessary to check for the presence of NNIS and for beginning eradication measures if they are becoming established. Eradication would be addressed in a separate decision.

Prescribed growing season and dormant season burning of a total of 1157 acres is proposed in the Armuchee Ridges stands over the 7 year period. Most of the NNIS listed above reestablish rapidly after fire, with the possible exception of Nepal grass. Evans et al (2006) state that prescribed burning late in the growing season can help to control Nepal grass, which is an annual, but that it can easily reestablish on bare soil. However, Forest Service standards for prescribed burning do not allow for burning to bare soil. With a seed bank of 3 to 5 years, it would take several annual burns to adequately control the grass, and this is not part of the proposal. Although Evans (2006) reports that many of the NNIS found in the project area recolonize or resprout after fire, there is no indication that any of the species are promoted by prescribed burning. He does say that fire may scarify lespedeza seeds and increase the germination rates, but another report by The Nature Conservancy (Stevens 2002) states that although spring burns may encourage germination, late season burns may kill seedlings as well as destroy any seeds. Although burning does not eradicate honeysuckle, several studies have demonstrated that prescribed burning inhibits spread by killing seedlings and young plants (Nuzzo 1997). Land managers in Alabama have controlled privet by means of burning when done annually under particular environmental conditions (Batcher 2000). Again, monitoring of the sites will be key to ensuring that NNIS do not establish in new sites after prescribed burning.

As mentioned above, compartment 925 stand 7 is noteworthy due to the heavy infestation of invasive plant species. NNIS documented during inventories are honeysuckle, mimosa, Nepal grass, privet, autumn olive, multiflora rose, and sericea lespedeza. This

stand is proposed for riparian hardwood restoration through non-commercial thinning. This would be accomplished by hand methods and there would be no equipment in the site. But any thinning of the area would open it up to more sunlight, improving conditions for spread of the seven invasive plants already present in the stand and possibly improving vigor and thus a heavier seed source of NNIS able to infest other sites.

Compartment 925, stand 35 is the only stand where a rare plant (Forest locally rare) Nuttall's hedge-nettle (*Stachys nuttallii*), was found during inventories. The stand also contains honeysuckle, Nepal grass and privet. In general, the proposed commercial thinning will create more light into the stands, providing additional habitat for the spread of these NNIS. Equipment operating in the stands also has potential of spreading these plants when seeds and plant parts adhere to the equipment if it is driven through the invasives. However, the site of the hedge-nettle will be protected from equipment, and a buffer will be placed around the plants such that no trees are cut that would alter the light regime in the site. In addition, the Equipment Cleaning Clause BT6.35 discussed above, will be included in the timber sale contract. Therefore, although the proposed activities could contribute to spread of the NNIS in some portions of the stand, because of this mitigation there should be no spread of NNIS to the hedge-nettle locations, and no adverse impacts to the plant from harvest activities. This stand is not proposed for any prescribed burning.

All potential large-flowered skullcap (*Scutellaria montana*) habitat in the analysis area was surveyed for the presence of the federally listed plant. None were found, and no activities are proposed in or near the four, known skullcap locations that occur on the District. Also, no Regional Forester sensitive species were found during inventories. Therefore, although NNIS are present in sites throughout the area of the proposed project, the invasives are not a threat to TES (federally threatened, endangered, or Regional Forester sensitive) plants as a result of the activities proposed in Alternative 2.

There are no rare communities present in the compartments and stands proposed for harvest and burning in Alternative 2. Therefore, the rare community resource would not be at risk from the spread of NNIS as a result of this alternative.

Cumulative Effects

Because NNIS will continue to spread even in the absence of harvest-related ground disturbance, cumulative effects of Alternative 2 would be much the same as those listed above. Large populations of NNIS occur on nearby private land, and they are likely to spread to FS land regardless of FS activities. Conversely, where disturbed private land is in close proximity to FS property, seeds of NNIS present on FS land could spread to private land by means of animals, water, wind, and human dispersal (i.e. seeds adhering to clothing and vehicles).

Alternative 2 proposes 1157 acres of prescribed burning. Activities with potential to cause cumulative effects are those of dormant-season prescribed burning on an additional 7000 acres of pine stands. These additional acres were addressed in a separate decision, and approximately 2200 acres have been completed. The remaining 4800 acres will be burned over the course of the next four to five years. Evans (2006) reports that many of the NNIS found in the project area recolonize or resprout after fire, but there is no indication that any of the species are promoted by prescribed burning. Therefore, there should be no cumulative effects that would cause spread or establishment of NNIS as a result of the 2200 acres of dormant-season burns that have already occurred. Nor should there be cumulative effects that would cause spread or establishment of NNIS as a result of the growing and/or dormant season prescribed burning of 5957 acres (i.e. 1157 this proposal + 4800 already approved) over the course of the next 7 years.

Effects of Alternative 3

Direct and Indirect Effects

This alternative would construct approximately 18.8 miles of temporary road, and create 198 log landings over a 7-year period from fiscal year 2008 through 2015. This is slightly less mileage of temporary road construction, and fewer log landings compared to Alternative 2. There are 5878 acres proposed for thinning, with 350 of these acres proposed as pre-commercial thinning by hand methods. Thus there would be fewer areas of soil disturbance and fewer sites with an increased light regime, compared to Alternative 2. But the disturbance that does occur, along with the increased sunlight to the sites, will create conditions favorable for the establishment of NNIS (Evans et al. 2006). Keys to preventing this establishment will be seeding any bare soil to native and/or desirable non-invasive, non-native species as soon as possible after disturbance. The Equipment Cleaning Clause BT6.35 will be included in the timber sale contract. The clause requires invasive species of concern to be indicated on the Sale Area Map, and gives specific requirements for cleaning of equipment when moving from NNIS-infested sites to non-infested sites. Monitoring of the sites will then be necessary to check for the presence of NNIS and for beginning eradication measures, which would be addressed in a separate decision, if they are becoming established. In summary, the harvest activities would create the same direct and indirect effects in both Alternatives 2 and 3, but there would be fewer potential areas for NNIS establishment in Alternative 3.

Prescribed burning is not proposed in Alternative 3. Although Evans (2006) reports that many of the NNIS found in the project area recolonize or resprout after fire, there is no indication that any of the species are promoted by prescribed burning. Therefore, the lack of prescribed burning in this alternative does not differ from Alternative 2 in the effects on NNIS.

Effects of Alternative 3 in compartment 925 stand 7 would be the same as those discussed in Alternative 2. NNIS documented during inventories are honeysuckle, mimosa, Nepal grass, privet, autumn olive, multiflora rose, and sericea lespedeza. The

proposed riparian hardwood restoration would be accomplished through non-commercial thinning by hand methods, and there would be no equipment in the site. But any thinning of the area would open it up to more sunlight, improving conditions for spread of the seven invasive plants already present in the stand and possibly improving plant vigor and thus a heavier seed source of NNIS able to infest other sites.

There would be no adverse impacts to the locally rare hedge-nettle in this Alternative 3, as already discussed in Alternative 2. All potential large-flowered skullcap (*Scutellaria montana*) habitat in the analysis area was surveyed for the presence of the federally listed plant. None were found, and no activities are proposed in or near the four, known skullcap locations that occur on the District. Also, no Regional Forester sensitive species were found during inventories. Therefore, although NNIS are present in sites throughout the area of the proposed project, the invasives are not a threat to TES (federally threatened, endangered, or Regional Forester sensitive) or locally rare plants as a result of the activities proposed in Alternative 3.

There are no rare communities present in the compartments and stands proposed for harvest in Alternative 3. Therefore, the rare community resource would not be at risk for spread of NNIS as a result of this alternative.

Cumulative Effects

Because NNIS will continue to spread even in the absence of harvest-related ground disturbance, cumulative effects of Alternative 3 would be much the same as those listed above. Large populations of NNIS occur on nearby private land, and they are likely to spread to FS land regardless of FS activities. Conversely, where disturbed private land is in close proximity to FS property, seeds of NNIS present on FS land could spread to private land by means of animals, water, wind, and human dispersal (i.e. seeds adhering to clothing and vehicles).

There is no prescribed burning proposed in Alternative 3. Activities with potential to cause cumulative effects are those of dormant-season prescribed burns on 7000 acres of pine stands. These latter acres were addressed in a separate decision, and approximately 2200 acres have been completed. The remaining 4800 acres will be burned over the course of the next four to five years. Evans (2006) reports that many of the NNIS found in the project area recolonize or resprout after fire, but there is no indication that any of the species are promoted by prescribed burning. Nepal grass, can easily reestablish on bare soil resulting from a prescribed burn. However, Forest Service standards for prescribed burning do not allow for burning to bare soil. Therefore, there should be no cumulative effects causing spread or establishment of NNIS as a result of the dormant season prescribed burns that have already occurred, nor from dormant-season prescribed burns on 4800 acres over the next four to five years.

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Chapter 3 – Social Environment

3.6 Element - Visual or Scenery Resources

Resource Impacts Addressed

This section summarizes the existing condition of the visual or scenic resources in the project area and how proposed activities may impact them. It is generally understood that valued “scenery” is the visible expression of ecosystems that people enjoy and seek to sustain. The underlying SMS goal remains to achieve and sustain the highest scenic quality possible and to enrich society through the many benefits that beautiful landscapes provide. Direct contact with natural appearing settings and attractive cultural features that offer a sense of diversity, order, and wholeness are highly valued for their ability to stimulate the senses and nurture the mind.

Scope of the Analysis

The geographic scope used to assess direct effects to scenery was the location of where activities (e.g. tree felling, site preparation, temporary road construction, and road maintenance) would be implemented within the project area (see the Proposed Action and Alternative 1 maps for unit and road locations). For instance, the direct effects from a restoration project would emphasize that the aesthetics of visual disturbance is the focus of the Scenic Integrity indicator, while other ecological conditions are specifically excluded. Also included are the aesthetics of natural disturbances visible in the existing landscape, if they are so visually extreme as to be inconsistent with the historic norms for that landscape. Scenic Stability specifically identifies and measures the ecological sustainability of the valued scenic (landscape) character directly impacted by the activity.

The geographic scope used to assess indirect effects was the project area viewshed. This is the total visible area from multiple observer positions. Viewsheds are accumulated seen areas from highways, trails, campgrounds, towns, or other viewer locations. Viewsheds are dynamic and constantly changing. However, Desired Scenic Character has been identified in Plan Revision for each Management Area. This will be our guide.

The geographic scope of cumulative effects may extend beyond the project area to activities occurring within the Armuchee area. This may be on private land, which this proposal has no power to affect. Given the limited disturbance proposed by the alternatives, cumulative effects from the Forest Service are not expected to extend beyond this boundary.

The temporal boundary used to assess effects would vary depending on the activity. Short-term effects from: (1) An interim or short-term minimum level necessary to reach a long-term character goal; or (2) A long-term level of integrity achievable when the long-term goal is reached. The character goal must be an integral part of a sustainable “Desired Condition”. Long-term effects of five to over 100 plus years may result for the areas of restoration. Because many of these areas have an existing Low Scenic integrity, it may take up to 100 plus years to restore the area to the Landscape Character set forth in the Desired Future Condition. To have a

Low Scenic Integrity means that the “valued” landscape character appears moderately altered. Deviations begin to dominate the valued landscape character.

Methodology

Visual studies such as the Corridor Management Plan for the Ridge and Valley Scenic Byway, the Scenery Management System data, records of past activities, field visit information, were used to evaluate the impacts of proposed activities. The Scenery Management System Inventory taken in 1995 for the Forest Plan Revision will be used as the basis for the Visual Resource. Scenic Classes 1 through 7 were derived for the Plan Revision using Distance Zones, Concern Levels, and Scenic Attractiveness. Existing Scenic Integrity is not used to determine scenic classes. This allows for heavily altered landscapes to be reclaimed through future management activities and natural regeneration of vegetation. The methodology for determining Scenic Class can be found in the Scenery Management System (SMS) Handbook (*Agriculture Handbook #701, Landscape Aesthetics, A Handbook for Scenery Management*).

It has been over ten years since the SMS Handbook was published. The Handbook has been refined since that time to reflect the ecological approach to scenery management, which is presented in a new appendix to the SMS Handbook, Appendix J (October 4, 2007). This information is essential to meet NEPA requirements for use of “environmental design arts in planning and in decision-making” (see 40 CFR 1501.2(a)). In addition, it remains FS policy to “apply scenery management principles routinely within all National Forest System activities” (FSM 2380.3.4). Routine use of the SMS within agency plans and projects remains the “best available science” to sustain desired conditions for scenery on NFS lands while also providing important recreation, tourism, and quality of life benefits for current and future generations.

Development of Scenery Management Priorities provides a tool to prioritize activities to restore, maintain or enhance Scenic Integrity and Scenic Stability. This will be used as one tool to achieve Desired Scenic Character Management Actions.

Issues

The Pinhoti Trail will be impacted by restoration activities.

The Ridge and Valley Scenic Byway may be impacted by restoration activities.

The Desired Scenic Character and Scenic Integrity Objectives might be negatively impacted.

Affected Environment

Scenery or visuals within the boundaries of the Armuchee portion of the Conasauga Ranger District are located in the Southern Ridge and Valley Section (231D), and the Sandstone Ridge Subsection (231Dc).

Existing Landscape Character and Cultural Ecology write-ups were completed for the Sandstone Ridge Subsection when the SMS inventory was completed in 1997. These write-ups can be found in the Appendix.

VI. LandType Associations (LTAs) (similarities in geomorphic process, geologic rock types, soil complexes, stream types, lakes, wetlands, or plant association vegetation communities)

Within the Sandstone Ridge Subsection and more specifically within the National Forest ownership of the Armuchee area of the Conasauga Ranger District are three landtype associations (LTAs) as follows:

1. Armuchee Ridges – Sandstone and chert-derived soils on the major ridges. Typically rocky, droughty, and infertile. Most National Forest land is in this LTA. Vegetation is predominantly dry-mesic site upland oaks and dry-xeric site southern yellow pines. Longleaf pine occurred historically scattered throughout this entire LTA but frequency and distribution patterns are not known. Such reports as we have indicate that it occurred in association with other dry-xeric site species in a mixed composition. Mesic site hardwoods are very localized in very narrow ‘stringers’ along the short segments of perennial streams or very small ‘interfluves’ – possibly created by debris avalanching – in the junctions of steep ephemeral channels.
2. Shale Valleys – Broad, U-shaped valley bottoms between the major ridges with Floyd shale as the primary geology. Before row-cropping and forest reversion, this area was probably predominantly open upland hardwoods maintained by frequent burning. Pines, including loblolly, and Eastern red cedar were likely a minority component in mixed types and only occasionally the predominant cover.
3. East Armuchee Valley – The lower slopes and valley bottom of East Armuchee Creek. Soil parent material is limestone. This area was historically row cropped and has since reforested largely with loblolly pine. Prior to row cropping, forest cover would likely have been predominantly upland hardwoods. Scattered cedar would have occurred on xeric limestone outcrops where lower canopy cover provided more light and rock outcrops broke up fuel continuity and provided some fire protection.

Environmental Effects

Scenic Integrity

- *The degree to which a landscape is free from visible disturbances that detract from the natural or socially valued appearance*

Scenic Stability

- *The degree to which the valued scenic character and its scenery attributes can be sustained through time and ecological progression.*
 - How ecosystem dynamics will affect the long-term stability of the valued scenery
 - Is the condition within the historic range of variability (HRV), the range that indicates a properly functioning ecosystem.
 - Consider the known stressors that can affect scenery such as fire, insects/disease and infestations of noxious weeds.

3.6.1 Major Scenery Attributes:

- **Pastoral Valleys (major)**



- **Forested Ridges (major)**



- **Perennial Streams (major)**



Environmental Consequences Common to All Alternatives

Under all action alternatives, approximately 6960 acres or less of the project area are expected to be impacted by disturbance from vegetative treatments. The development of log landings, skid trails, temporary roads, and maintenance of permanent system roads will impact visual quality. Scenic Integrity and Scenic Stability are likely to be impacted by all of the above actions.

3.6.2 Effects by Alternative

No Action

Direct Effects – The area would remain as it is.

Indirect Effects - If no action is taken these stands will continue to grow and mature. Desired Landscape Character conditions for natural appearing landscape character would not be met in the white pine or Virginia pine plantations. The oak/shortleaf pine stands in this area would continue to degenerate from Southern Pine Beetle mortality and degrade the Scenic Integrity Objectives. The Urban Interface would remain brushy and fire could occur at the property lines of homes interfacing the forest.

Cumulative Effects- The cumulative effects on these stands would be the continual degradation of the visual quality of the area, allowing maturation of the pine plantations, and moving the area away from a natural appearing landscape. Fire conditions at private property bordering the FS land would continue to remain uncertain with continued fuel buildup.

Proposed Action: (1) Restoration of mountain longleaf pine and shortleaf pine forests

Direct Effects:

Vegetation management treatments in these stands would involve harvesting to open up the stand canopy and allow for successful site preparation and planting increasing the successful 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. The emphasis of the 9H prescription is the restoration of historical plant associations. The landscape character can and will be changed with this action. The Desired Future Condition of the Landscape Character in this area is one of Natural Appearing, or a landscape character that expresses predominantly natural evolution, but also human intervention including cultural features and processes. A low to moderate contrast in the existing landscape character is expected to occur.

The Existing Scenic Integrity of the area has been inventoried as Low. This means that the valued landscape character “appears moderately altered.” For a time the area may appear to have a Very Low Scenic Integrity, where the valued landscape character “appears heavily altered.” To be able to change that condition to a Scenic Integrity of High, which is what Plan

Revision determined we would attempt to do in this area, some vegetative treatments are going to have to occur; the restoration activities can possibly move the valued landscape character to a state where the landscape character appears intact after a considerable length of time.

Of special concern are the Ridgeline of Strawberry Mountain, 42 acres, and the Pinhoti Trail. All these areas were typed as having an Existing Scenic Integrity of Low; however these stands will have a high negative scenic impact if totally cut. The ridgeline is especially sensitive to change of scale even though it is in Scenic Class 3. Many stands, 473 acres, are in Scenic Class 1 and will be altered. The Pinhoti Trail will be most impacted by vegetative management in stands 933007, 935018, and 935035.

The Conservation of Scenic Heritage would appear unimportant to the local community at this stage of the treatment if the FS is going to come into their backyard and cut the heck out of it. That is why communication with the public is going to be extremely critical. Quality of Life issues may involve the fire regimen that goes with the re-establishment of certain species. There will be a regular round of burning, and this could interfere with planned activities along the Pinhoti or within certain communities. The Identity and Self Image of Communities and Individuals may change because of what restoration activities occur. The forest will become more of a “working” forest and appear so visually. Recreation and Tourism Settings will be impacted as these treatments are administered. Another partner to work with would be the Chamber of Commerce so they would be prepared and could understand and relay what is going on in the forest to those seeking recreational settings. This would apply to all treatments.

Indirect Effects:

The feeling of a natural appearing landscape character where the scenic integrity appears intact will not be available in these areas for decades. The Pinhoti Trail foreground and middle ground will be impacted negatively by these actions during the first decade, and then the change into a naturally appearing landscape will begin to soften these vegetative actions. The eventual change in the ecosystem will be towards the historical range of values which are valued by the population in the area. Over time, the long range views of the restored landscapes will blend with the existing landscape and a more whole ecosystem will emerge. The identity and self image of the community will be enhanced along with the recreation and tourism settings.



Longleaf Pine

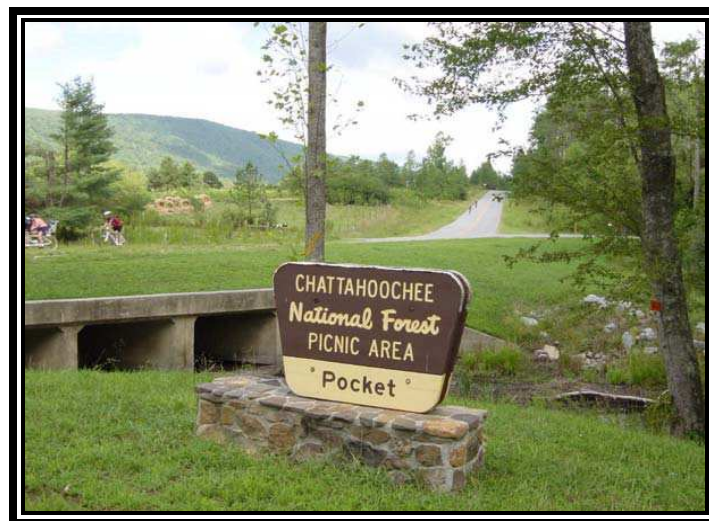
Restoration at 13 years after initial planting



A restored shortleaf pine-bluestem ecosystem

Cumulative Effects:

The recreation and tourism settings need to be shown as valued by the Forest Service. This is a large area of impact and there needs to be a clear goal that Scenery is of value, and that the community's dependence on recreation and tourism to the area is understood and valued by the Forest Service.



The Pocket Recreation Area and Ridge and Valley Scenic Byway

Proposed Action: (2) Restoration and maintenance of oak or oak/pine forests**Direct Effects:**

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 desired condition is to transition these stands to an oak or oak/pine forest by reducing the density of loblolly and Virginia pine, and then introducing shortleaf pine into the stands by planting. This treatment would require harvesting using commercial thinning on an estimated 492 acres and then planting the areas with adequate canopy openings to shortleaf pine seedlings.

Three years following the successful establishment of shortleaf seedlings a mechanical release would be planned, using hand tools. Once the shortleaf trees can withstand fire, usually around 6 to 8 years of age, a dormant season burn will help reduce competition and begin to restore the fire tolerant species associated with oak/oak-pine ecosystem. Prescribed burns would take place every 3 to 5 years thereafter, in these stands to continue the restoration of this native ecosystem.

Maintenance of oak/pine forests are identified for stands that have a good balance of oak and pine but contain loblolly and Virginia pine as opposed to shortleaf pine. This would be accomplished by commercially thinning an estimated 26 acres, and pre-commercially thinning 129 acres.

About 120 acres within this treatment is found within the 7.A – Scenic Byway Corridors prescription. The emphasis of the 7A area is to provide visitors outstanding scenery of natural and cultural landscapes along a well-maintained road. The byway corridor is defined by the area visible during the leaf-off season for up to one-half mile from either side of the road. Management will be focused on protecting and showcasing the unique and scenic natural and cultural resources, which were the basis for the corridor's designation as a scenic byway.

Natural-appearing managed change will occur, but will affect a limited area either individually or cumulatively at any one time. Active management may occur to moderate visual contrasts of natural change. The stands being restored within this particular treatment a widely scattered along the RVSB.

The Scenic Integrity of most stands will be enhanced, even though selective thinning will take place. A move towards restoration will be a plus in these overgrown and dense stands.





Stand 916016 is located where the Ridge and Valley Scenic Byway (RVSB) Directional Portal Sign is located as shown above. There is an opportunity to show-case the vegetative work being done throughout the District by putting up informational signing at this spot. This will be one of the most sensitive stands as it will be showcased as the entry to the RVSB and should follow all mitigations. Scenic Benefits could include an opportunity to create a park like effect in these stands. This would create spatial diversity and a visual mosaic of vegetation along the RVSB. The other areas within the Foreground of the RVSB are dispersed away from the main roadway.

About 180 acres are found within the 7.E.1 – Dispersed Recreation Areas. The emphasis in these areas is to improve settings for non-formal outdoor recreation while protecting and restoring the health, diversity and productivity of watersheds. The Narrows Picnic Area Shown below is one such area.



Insect and disease outbreaks may be controlled when necessary to protect the values for which the area was allocated; to reduce hazards to visitors; for safety or legal reasons; to protect adjacent resources; or to protect ecosystem composition, structure, and function.

These lands are classified under NFMA as unsuitable for timber production; not appropriate; however salvage sales, sales necessary to protect other multiple-use values, or activities that meet other Plan goals and objectives are permitted. The Landscape Character of Naturally

Appearing would change, the Scenic Integrity would remain Low as it is now, and the Scenic Benefits would not immediately be apparent.

The 9H prescription applies to about 373 acres. Emphasis in this prescription is to restore historical plant associations and their ecological dynamics to ecologically appropriate locations. Although there are some sensitive areas within the 9H prescription, such as the Narrows Road area, the existing Scenic Integrity is low. The treatments recommended will not impair the Scenic Integrity and in time will enhance it.

Indirect Effects:

The feeling of a natural appearing landscape character where the scenic integrity appears intact will be impaired somewhat in these areas for decades. The Pinhoti Trail foreground and middle ground will be impacted negatively by these actions during the first decade, and then the change into a naturally appearing landscape will begin to soften these vegetative actions. The eventual change in the ecosystem will be towards the historical range of values which are valued by the population in the area. Over time, the long range views of the restored landscapes will blend with the existing landscape and a more whole ecosystem will emerge. The identity and self image of the community will be enhanced along with the recreation and tourism settings.

Cumulative Effects:

The recreation and tourism settings need to be shown as valued by the Forest Service. This is a highly visible area of impact and there needs to be a clear goal that Scenery is of value, and that the community's dependence on recreation and tourism to the area is understood and valued by the Forest Service. Informational signs like the one below used in Alabama along the Pinhoti Trail will explain to our customers what is going on around them.



Coleman Lake Sign in Alabama

Proposed Action: (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.

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.

Direct Effects:

Over 3100 acres of Loblolly thinning would occur in 9H and 117 acres of shortleaf thinning. Of this acreage, about 1,117 acres are in Scenic Class 1, which include the Ridge and Valley Scenic Byway and the Pinhoti Trail. These areas will be changed with this action. The Desired Future Condition of the Landscape Character in this area is one of Natural Appearing, or a landscape character that expresses predominantly natural evolution, but also human intervention. A low to moderate contrast in the existing landscape character is expected to occur.

Over 1240 acres of thinning would occur in 7A, Scenic Byway Corridors prescription. The emphasis of the 7A area is to provide visitors outstanding scenery of natural and cultural landscapes along a well-maintained road. The byway corridor is defined by the area visible during the leaf-off season for up to one-half mile from either side of the road. Management will be focused on protecting and showcasing the unique and scenic natural and cultural resources, which were the basis for the corridor's designation as a scenic byway. All of these acres are in Scenic Class 1 with a High Scenic Integrity Objective. However, all these areas have also been typed as having Low Existing Scenic Integrity.

Over 261 acres fall within the prescription of 7.E.1, Dispersed Recreation Areas. These areas receive moderate to high recreation use and are managed to provide the public with a variety of recreation opportunities in a setting that provides quality scenery, numerous trails and limited facilities. The Pocket Recreation Area, the Pocket Trail and the RVSB fall within this prescription.

A visually-appealing landscape is achieved by providing vista openings, featuring special attractions like rock outcroppings and waterfalls, and by providing park like stands and a diversity of vegetation species and age classes. The predominant landscape is natural appearing with variations of structurally diverse mid- to late- successional communities. Various

treatments in conjunction with the thinning may open the area up to provide the park like stands that are sought. I would try to include the Pocket Recreation Area in this thinning also to take care of hazard trees within the campground.

Over 178 acres are in 6.D, Core Areas of Old Growth Surrounded by areas with extended Forest Rotations. These areas are in the middle ground and Scenic Class 2. The direct effect will be little noticed from the RBSB. The emphasis is on restoration of old growth conditions in the core area. Outside it, the emphasis is maintenance to supply a flow of old-growth replacement stands over time using an even-aged silvicultural system with an earliest regeneration age beyond the minimum old growth age of each component old growth community type.

The landscape character is a mixture of natural-appearing outside the core and natural-evolving within it. Natural processes, including fire, are the primary agents of strong change in visual elements of form, line, color, and texture within the core. Outside the core, natural-appearing managed change occurs but affects a limited area either individually or cumulatively at any one time.

Natural-appearing managed change will occur, but will affect a limited area either individually or cumulatively at any one time. Active management may occur to moderate visual contrasts of natural change.

The Scenic Integrity of most stands will be enhanced, even though selective thinning will take place. A move towards thinning will be a plus in these overgrown and dense stands.



Overgrown pine stand with down trees across trail

Indirect Effects:

The Existing Scenic Integrity of the area has been inventoried as Low. This means that the valued landscape character “appears moderately altered.” Almost all Scenic Classes and Scenic Integrity Objectives are found within this treatment area.

These actions will bring us closer to achieving the Desired Future Condition, which is usually Naturally Appearing. For a time the areas may appear to have a Very Low Scenic Integrity,

where the valued landscape character “appears heavily altered.” To be able to change that condition to a Scenic Integrity of Moderate or High some vegetative treatments are going to have to occur. Thinning activities can possibly move the valued landscape character to a state where the landscape character appears intact after a considerable length of time.

Cumulative:

The recreation and tourism settings need to be shown as valued by the Forest Service. This is a highly visible area of impact and there needs to be a clear goal that Scenery is of value, and that the community’s dependence on recreation and tourism to the area is understood and valued by the Forest Service.

The fire and insect danger of the whole area should be reduced. The area currently is highly flammable and prone to insect disease because of the overcrowded conditions of the vegetation. The treatments will add integrity and improve the Landscape Character to more correctly represent the Historic Range of Variability.

Proposed Action: (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.

All acres fall within the prescription of 7.E.1, Dispersed Recreation Areas. These areas receive moderate to high recreation use and are managed to provide the public with a variety of recreation opportunities in a setting that provides quality scenery, numerous trails and limited facilities. The Dry Creek Equestrian trail falls within these acres.

A visually-appealing landscape is achieved by providing vista openings, featuring special attractions like rock outcroppings and waterfalls, and by providing park like stands and a diversity of vegetation species and age classes. The predominant landscape is natural appearing with variations of structurally diverse mid- to late- successional communities.

Direct Effects:

The treatment proposed will do exactly what is within the prescription to do. This area would appear more open. The Landscape Character would still be Natural Appearing. The Scenic Integrity is classified as low, so treatments will move this towards moderate or high.

Indirect Effects: The Landscape Character would move towards a more appropriate one for Riparian Hardwood. The Scenic Integrity would move towards High over a period of time.

Cumulative: The watershed would be more whole as an ecosystem

Proposed Action: (5) Riparian Corridor Restoration

Alternative 2 includes the treatment of 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 of hardwoods and 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. The amount of acres of riparian corridor that has the potential to be treated is estimated at 528 acres.

Direct Effects: One of the major visual components of the area is perennial streams. The immediate effect would be one of visual disturbance in an environmentally sensitive area. The road and stream crossings would be move visually disturbing along the Ridge and Valley Scenic Byway. Moving the Landscape Character towards a more ecologically sound basis would have to be explained to the public at the same time the actions occur.

Most of the Scenic Integrity throughout the area is Low, so the actions will probably look like an improvement to what is existing. The Scenic Benefits of such actions would be long-term.

Indirect Effects: The stream corridors throughout the area will become healthier and function as they should, providing habitat for species that occur when the ecosystem permits. Watchable Wildlife is a popular component of the recreation spectrum of activities. By providing habitat along major roadway corridors or throughout dispersed recreation areas, it may be possible to have a new activity of viewing wildlife throughout these corridors.

Cumulative: These actions would move the riparian corridors towards a more functioning ecosystem. This would benefit the recreation program in this area. Visually a working ecosystem is always more inviting than one that has been clogged by overgrowth or dense growth or a pine plantation.



C. Alternative 3- Minimize Harvest of Mature Oak

The intent of Alternative 3 is to address the issue relating to harvesting of mature oaks in the project area. The mountain longleaf and shortleaf restoration and the oak-oak/pine restoration and maintenance proposals have the potential to remove mature oak trees from the stands in order to meet restoration or maintenance objectives. The objective of the pine thinning is to remove 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, Alternative 3 would treat the stands identified for pine thinning and the stand identified for riparian hardwood restoration as described under Alternative 2- Proposed Action. 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.



COMPARISON OF ALTERNATIVES

The following tables summarize and compare 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 3-26: 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

Direct Effects: All treated stands would undergo less visual disturbance. The Scenic Benefits would be immediate, rather than long-term. The areas that are not restored would remain Low in Scenic Integrity.

Indirect Effects: The areas not restored would remain Low in Scenic Integrity and not move towards improvement in Scenic Integrity, therefore the Scenic Integrity Objectives set forth in Plan Revision would not be met.

Cumulative Effects: The Landscape Character would appear more intact in the entire area. The Scenic Integrity would remain Low, or Moderate, and would not be moved to the High end of the scale if the ecosystem is not restored to its full potential.

Visual Mitigation Measures

There are many mitigation measures that can be applied for Scenery Management. They can be found in the Appendix and will be displayed by treatment and by Scenic Integrity Objective.

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3.7 Economic Analysis

The following tables summarize the financial analysis for comparing the “No Action” Alternative to Alternatives 2 and 3. Dollar amounts of costs and revenues are an estimate based on cost/price information in July, 2007. All alternatives include costs for environmental analysis and NEPA documentation. Only the harvest alternatives have revenues associated with them. Table 3-27 displays the present net values of the three alternatives. Alternative 2 provides the highest Present Net Value while Alternative 3 provides the highest Benefit/Cost Ratio.

Table 3-27. Present Net Values of the Armuchee Ridges Alternatives

Alternative	PV-Costs	PV-Benefits	Present Net Value	Benefit/Cost Ratio
1 – No Action	-\$87,000	0	-\$87,000	0
2 – Thinning and Restoration (Proposed Action)	\$-1,142,000	\$3,282,000	\$2,140,000	2.87
3 – Thinning Only	-\$784,000	\$2,855,000	\$2,071,000	3.64

The assumptions used in the economic analysis are: 1. Discount Rate = 4.0%; 2. Implementation will occur for all treatments and harvests in a one-year time frame; 3. Average timber harvest volumes and product mixes; and 4. Non-monetary benefits associated with wildlife habitat or recreation values are not considered.

The environmental analysis and documentation costs are the same for each alternative in the initial year of the project. These costs total \$44,200. Additional environmental analysis costs are built into Alternative 2 and 3 as they occur over time for their vegetative treatments.

The costs and benefit values for the various treatments and products are provided in Table 3-28.

Table 3-28: Cost and Benefit Values used in the Economic Analysis

Description	Measure	Cost (\$)	Benefit (\$)
Environmental Analysis	Person - Day	260	
Heritage Resource Survey	Person - Day	260	
Silvicultural Exams	Person - Day	260	
TES Survey	Person - Day	260	
Cruise/ mark timber	Acre	40	

sale			
Pine Thinning	CCF		80
Oak/Oak-Pine Thinning	CCF		60
Pine Regen. Harvest	CCF		80
Hardwood Regen. Harvest	CCF		60
Longleaf Planting	Acre	100	
Shortleaf Planting	Acre	90	
Oak-Oak-Pine Planting	Acre	60	
Release and Burn	Acre	140	
Release	Acre	160	
Pre-commercial Thinning	Acre	160	
Sale Preparation	Acre	40	
Sale Administration	Acre	80	

3.8 Heritage Resources

3.8.1 Resource Impacts Addressed

The indirect, direct, and cumulative effects of the proposed activities were considered for known and unknown historic resources within the project activities under the three alternatives. These effects include soil compaction and displacement, erosion, high temperatures generated by prescribed fire, and accessibility within the project area.

Scope of the Analysis

The area analyzed for heritage resources includes all National Forest lands which may be affected by project activities associated with any of the alternatives considered (Area of Potential Effect). The “area of potential effect” is the geographical boundaries within which there is reasonable and foreseeable potential for heritage resources or their setting to be directly or indirectly affected by the undertaking.

Methodology

The data presented for heritage resources result from a review of existing cultural information for the Armuchee Ridges project area. Documents reviewed include previous archeological survey reports, land records, maps, and local and regional histories. All reference materials are held at the Heritage Resources Department, Chattahoochee-Oconee National Forests Supervisor’s Office.

Issues

No issues identified.

3.8.2 Affected Environment

The project area lies within the Armuchee Ridges Subregion of the Ridge and Valley Province. High, narrow ridges ranging from 1,400 to 1,600 feet above sea level characterize the physiographic subregion. The ridges are predominantly composed of Red Mountain sandstone Silurian age, with shales and limestones occurring in valley floors (Wynn, et al. 1994). Soils are typically rocky and contain silt and clay.

Seven previous archeological surveys totaling approximately 3,388 acres, or 50% of the project area, were conducted between 1984 and 1995. Twenty-one historic properties ranging in age from the Early Archaic period (8,000 B.C.) to the twentieth century are located within the project area. The twenty-one sites have been determined eligible for nomination to the National Register of Historic Places or their eligibility status is unknown. These sites will require protection pursuant to guidelines established by the Chattahoochee-Oconee National Forest's Heritage program and Georgia State Historic Preservation Officer (SHPO) and Eastern Band of Cherokee Indians Tribal Historic Preservation Officer (THPO) consultation.

Phased compliance of Section 106 of the National Historic Preservation Act (NHPA) would be required of project areas that do not have documentation of previous archeological survey. The Forest is currently consulting with the SHPO and THPO to develop guidelines for using this approach to compliance with the NHPA.

3.8.3 Environmental Effects

Environmental Consequences Common to All Alternatives

Under all action alternatives, there is a potential for soil compaction, rutting, mixing of surface soils, and removal of ground cover from thinning activities. Shallow artifact deposits, less than 4 inches in depth, and surface features are more prone to be affected by commercial thinning activities. Horizontal and vertical movement of shallow artifact deposits could result in the loss of contextual information.

Prescribed burning can potentially alter, or in the case of certain materials such as wood, destroy historic properties. The effects of fire on cultural resources are largely determined by temperature and the duration of exposure to heat. Artifacts and features on the ground surface are at the greatest risk of the thermal effects of fire. The potential for fire to affect cultural resources greatly diminishes when cultural material is covered by a layer of soil (Hanes 2001).

Heat generated by prescribed fires typically subject prehistoric ceramics to temperatures lower than original firing temperatures; however, effects can include discoloration, and structural changes. Thermoluminescence (TL) dating of prehistoric pottery can be

compromised, but current studies suggest temperatures below 752 F (400 C) do not affect TL dating (Winthrop 2004). The glaze of historic ceramics may crackle or spall even at low temperatures (Winthrop 2004).

Lithic materials such as chert, sandstone, and quartzite may become discolored or disfigured (pot lid fracture or spalling). High temperatures and long duration to heat are generally needed before fire effects lithic materials.

Alternative 1: No Action

Direct/Indirect

Since no action would take place, there would no direct or indirect effect to historic properties.

Cumulative

Existing historic properties would continue to deteriorate from natural environmental effects including high intensity wildfires.

Alternative 2: Proposed Action

Direct /Indirect

Twenty-one previously documented historic properties have the potential to be affected by the proposed action. Any ground-disturbing activity has the potential to disturb historic properties. The greatest potential is from temporary road construction, skid trails, and log landings during commercial thinning activities, and control line construction associated with prescribed fire. Prescribed fire and thinning do have the potential to reduce adverse effects of wildfires by limiting fire intensity and unplanned fire suppression.

Cumulative

Activities considered during the cumulative effects analysis have the potential to affect historic properties. All project activities would be conducted pursuant with the National Historic Preservation Act, the Forest Plan, and mitigation measures determined in consultation with the SHPO and THPO. Such procedures would create little potential for the project activities to contribute to negative effects that would be cumulative with other actions.

Alternative 3

Direct/Indirect

The direct and indirect effects of alternative 3 would be similar to alternative 2.

Cumulative

Cumulative effects under this alternative would be similar to alternative 2.

3.9 Recreation

Measure: Effects on trail experience, dispersed camping and hunting, and driving on forest roads and the Scenic Byway.

Bounds of Analysis: Spatial: Recreation issues will be analyzed for each annual project area by compartment and stand. **Temporal:** Recreation issues related to project activities will occur for the next twelve years with this project as a whole and one to four years locally for each annual timber sale.

3.91 Existing Conditions:

The Armuchee Unit of the Conasauga Ranger District provides the public with a variety of recreational opportunities. The Pinhoti Trail is a multi-use trail that is present in a large portion of the proposed project areas. This trail is designed to be used by hikers, bicyclists and horseback riders. The Pocket Trail is a short trail near the Pocket Campground that is used by hikers. Dispersed camping is popular along East Armuchee Creek, West Armuchee Creek, Hidden Creek, Johns Creek and Taylor Ridge. Hunters can be found throughout the Armuchee Unit and especially in the Johns Mountain Wildlife Management Area. The alternatives that have timber harvest are accessed through a series of state, county and forest roads, including the Ridge and Valley Scenic Byway.

3.92 Effects of Alternative 1 (No Action)

Direct, Indirect and Cumulative Effects: Under the no action alternative trail experience, dispersed camping and hunting, and driving on forest roads and the Scenic Byway will have the least impacts of the three alternatives. Trails would remain open and the seeing and hearing heavy equipment would not occur. Dispersed campers and hunters would not have portions of the forest closed down during timber harvest and they would not encounter heavy equipment on the roads or in the woods. Recreational users of the forest roads and the Scenic Byway would have no timber harvest traffic from this project.

Effects of Alternative 2 (Proposed Action – Thinning and Restoration)

Direct and Indirect Effects: Table 3-29 lists the stands by compartment that have timber activities and have a trail located within or adjacent to their boundaries. Trail users would be negatively affected by noise and the presence of heavy equipment during harvest activities. In cases where trail users safety would be a concern, portions of a trail would be closed during harvest activities and prescribed burns. The duration of these effects would range from one day to four weeks depending on the orientation of the trail to the project area. An annual timber sale for a geographic location would take from 1 to

4 years to complete. Trail users would see slash and signs of vehicle travel in the woods which would negatively impact their experience. These impacts would be evident during harvest activities and for a period of 1 to 2 years after they close down. Long distance trail users could be impacted if a portion of the trail is closed for safety reasons.

Table 3-29 Timber Sale Activities in Armuchee Ridges Project Affecting Trail Experience

Year	Sale Name	Compartments – Stands
2008	Dry Slough	922-35 932-7
2009	North Pocket	917-3,4,7,9,10,11,14
2010	Taylor Ridge	935-7,18,35 946-42
2011	Furnace Valley	915-7,11,24 916-23,36,38
2013	E. Strawberry Mtn.	918-34,56 923-17 924-13,14
2014	Furnace Creek	916-22

A large part of the dispersed camping takes place along the streams on the Armuchee Unit and the impacts to these users would be limited to noise disturbance from timber harvest equipment. Campers who enjoy camping on secluded forest roads would be impacted the most. Some camping sites could be closed down for safety reasons when near on-going timber harvest activities or prescribed burns. These sites would be closed for 1 day to 4 months. Campers would have to choose another area during closures. Hunters would be negatively impacted if their favorite hunting areas were closed for a prescribed burn or occupied by harvesting equipment. Like the campers they would have to choose another area or delay their hunt. The vegetation management and burning treatments in Alternative 2 would have positive benefits for hunters by improving wildlife habitat in the years following the treatments.

Forest users driving on forest roads and the Scenic Byway would be negatively impacted by the timber harvesting traffic and by the smoke from prescribed burning. Generally, timber hauling will only have a few trips per day so these should be minor impacts. Smoke impacts to roads would be limited to a few hours a day per prescribed burn. At times the forest roads become damaged and make passage difficult driving public. Additionally, harvest activities and prescribed burning detract from the natural setting and would negatively impact forest drivers. Table 3-30 lists the timber sale access routes that would affect recreational driving.

Table 3-30 Timber Sale Activities Affecting Recreational Driving-Armuchee Ridges Project

Year	Sale Name	Access Routes
2008	Dry Slough	Hwy 27, Scenic Byway, Gore-Subligna, W. Armuchee, Narrows, FS 325, FS 255, FS 259, FS 259A, FS 257, FS 257A, FS 257B, FS 257C
2009	North Pocket	Hwy 27, Scenic Byway, Hwy 156, Hwy 482, Hwy 195, Floyd Springs, Pocket, FS 203, FS 234, FS 354, FS 106, FS 231, FS 231B, FS 368
2010	Taylor Ridge	Hwy 27, Scenic Byway, Hwy 329, Fs 205, FS 254, FS 259, FS 259C
2011	Furnace Valley	Hwy 27 or 136, Scenic Byway, Subligna-Gore, Villanow-Gore, County 12, FS 353, Pocket Road, FS 253, FS 361, FS 359
2012	E. Armuchee Creek	Hwy 27, Scenic Byway, Gore-Subligna, FS 226, FS 226B, FS 226C, FS 216, Dry Creek
2013	E. Strawberry Mtn.	Hwy 27, Scenic Byway, Gore-Subligna, FS 260, FS 260A, FS 227, FS 227A, Manning Mill, FS 310, FS 226
2014	Furnace Creek	Hwy 27, Scenic Byway, Hwy 156, Floyd Springs, Pocket, FS 208, FS 702, FS 356, FS 232, FS 233, FS358B, FS 356, FS 231
2015	Hidden Creek	Hwy 27, Scenic Byway, Hwy 156 Rock Creek, FS 955, F955E, FS 955B, FS 955A, FS 955D, FS 955G, FS 955F

Cumulative Effects: When considering other Forest Service projects (past, present and future) and private projects, which include timber harvest and prescribed burning, Pinhoti Trail users would have some additional negative effects. The effects of all known projects combined in the vicinity of the Pinhoti Trail, does not significantly affect the trail user experience, dispersed campers and hunters, and those driving on forest roads and the Scenic Byway.

Effects of Alternative 3 (Thinning Only)

Direct, Indirect and Cumulative Effects: Alternative 3 would have slightly less negative effects on trail users than Alternative 2 because timber harvest would occur in 6 fewer stands along the trails. Table 3-31 lists the stands by compartment that have timber activities and have a trail located within or adjacent to their boundaries.

Table 3-31. Timber Sale Activities Affecting Trail Experience

Year	Sale Name	Compartments - Stands
2008	Dry Slough	932-7
2009	North Pocket	917-3,7,9,10,11,14
2010	Taylor Ridge	946-42
2011	Furnace Valley	915-7,11,24 916-23,36,38
2013	E. Strawberry Mtn.	918-34, 923-17 924-13,14
2014	Furnace Creek	916-22

The effects on dispersed campers and hunters would be slightly less in Alternative 2 than Alternative 3 because there are 24 fewer stands of harvest activities and subsequent restoration treatments in Alternative 3. Likewise, Alternative 3 would have slightly less impacts to the recreational drivers than Alternative 2 with the fewer stands being harvested. However, the same access routes displayed in Table 3-28 would be used in Alternative 3. The only difference in the two action alternatives would be a slight reduction in harvesting traffic in Alternative 3.

3.10 Roads

Measure: Miles of roads and maintenance needed for this project.

Bounds of Analysis: The spatial bounds of analysis will be the Armuchee Ridges Watershed Project Area. The temporal bounds of analysis will be for project activities that occur for the next ten years.

Existing Conditions

Road access is an integral element in managing and protecting National Forest resources, including the vegetation management projects proposed in the Armuchee Ridges thinning and restoration project. The project area has an existing network of Forest Service, county and state roads in place to provide adequate access to the locations proposed for treatments. Several of the Forest Service roads in the project area are used on a daily basis by forest visitors and by local residents traveling to nearby towns and cities. County road access into the project area exists via the paved Gore-Subligna Road, East Armuchee Road, Floyd Springs Road, U.S Highway 27 and Georgia State Highway 136. Approximately 68 miles on 40 permanent system road have been identified as needed for primary access as listed in Table 3-32.

Effects of Alternative 1 (No Action)

Gravel and unimproved roads have been identified as a source of water quality impacts in the Armuchee Ridges project watersheds. The existing Forest Service system roads will require routine maintenance of travel surfaces and drainage structures to minimize drainage problems. If no action is taken, these roads will likely have increased impacts on water quality in the Armuchee Ridges watersheds.

Effects Common to Action Alternatives and the Proposed Action

The treatments proposed in the project area will provide an opportunity to improve road conditions and update maintenance. Drainage improvements on roads in the project area will lead to a decrease in sedimentation and have a positive impact on water quality in the Armuchee Ridges Watershed.

Existing locations and alignments of the roads listed in Table 3-32 have been evaluated for the proposed projects and are acceptable for the proposed treatments, requiring no reconstruction or changes in maintenance level. However, several road segments will require maintenance treatments prior to operation periods for the proposed treatments.

These maintenance treatments may include blading of the roadbed surfaces, improvement to drainage structures, addition of gravel on roadbed surfaces, and revegetation of road shoulders or other soil exposure areas to stabilize areas disturbed along roads. A short road has been identified on a tract acquired within the past five years about one quarter mile west of Pierce Cemetery. This road, about 1000 feet in length, is not needed for the project treatments and will be closed to vehicle use and revegetated to stabilize exposed soils.

Effects of Alternative 3

There will be no direct or indirect effects other than those described in the effects common to the proposed action and action alternatives.

Cumulative Effects

Periodic routine maintenance will occur on the roads in the project area, especially those that are open to year-round use. There are no other projects currently proposed in the area for the next 10 years, so cumulative effects will include those listed in the effects common to the proposed action and action alternatives and those that come from future road maintenance.

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Table 3-32 Roads to be used in Armuchee Ridges Thinning & Restoration by Proposed Year of Entry

Year	Sale Name	Acres	Log Decks	Temp Rd Miles	Compts.	Access Routes
2008	Dry Slough	1124	37	3.5	922, 931, 932	Hwy 27, Gore-Subligna, W. Armuchee, Narrows, FS 325, FS 255, FS 259, FS 259A, FS 257, FS 257A, FS 257B, FS 257C
2009	North Pocket	983	33	2.8	917, 927, 928, 929, 939	Hwy 27, Hwy 156, Hwy 482, Hwy 195, Floyd Springs, Pocket, FS 203, FS 234, FS 354, FS 106, FS 231, FS 231B, FS 368
2010	Taylor Ridge	1094	36	4.6	932, 933, 935, 946	Hwy 27, Hwy 329, Fs 205, FS 254, FS 259, FS 259C
2011	Furnace Valley	1094	36	1.4	915, 916, 917	Hwy 27 or 136, Subligna-Gore, Villanow-Gore, County 12, FS 353, Pocket Road, FS 253, FS 361, FS 359
2012	East Armuchee Creek	686	23	1.8	925	Hwy 27, Gore-Subligna, FS 226, FS 226B, FS 226C, FS 216, Dry Creek
2013	East Strawberry Mountain	1246	42	4.8	918, 923, 924, 925	Hwy 27, Gore-Subligna, FS 260, FS 260A, FS 227, FS 227A, Manning Mill, FS 310, FS 226
2014	Furnace Creek	561	19	2.3	916	Hwy 27, Hwy 156, Floyd Springs, Pocket, FS 208, FS 702, FS 356, FS 232, FS 233, FS358B, FS 356, FS 231
2015	Hidden Creek	727	24	2.0	928, 940, 943, 952	Hwy 27, Hwy 156 Rock Creek, FS 955, F955E, FS 955B, FS 955A, FS 955D, FS 955G, FS 955F

3.11 Irreversible or Irretrievable Commitment of Resources

There would be no irretrievable commitment of resources as a result of the Armuchee Ridges action alternatives, as there are no areas proposed for construction of new roads.

3.12 Consistency with Laws

None of the alternatives threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment. As documented in this EA or in the project file, alternatives would be consistent with the following applicable laws and Executive Orders:

American Indian Religious Freedom Act of 1978
Antiquities Act of 1906 (16 USC 431433)
Archaeological and Historical Conservation Act of 1974 (16 USC 469)
Archaeological Resources Protection Act of 1979 (16 USC 470)
Cave Resource Protection Act of 1988
Clean Air Act of 1977 (as amended)
Clean Water Act of 1977 (as amended)
Endangered Species Act (ESA) of 1973 (as amended)
Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (as amended)
Historic Sites Act of 1935 (16 USC 461467)
Multiple Use Sustained Yield Act of 1960
National Environmental Policy Act of 1969, (as amended) (42 USC 43214347)
National Forest Management Act (NFMA) of 1976 (as amended)
National Historic Preservation Act of 1966 (16 USC 470)
Organic Act 1897
Prime Farmland Protection Act
Wild and Scenic Rivers Act of 1968, amended 1986
Forest Service Manuals such as 2361, 2520, 2670, 2620, 2760
Executive Order 11593 (cultural resources)
Executive Order 11988 (floodplains)
Executive Order 11990 (wetlands)
Executive Order 12898 (environmental justice)
Executive Order 12962 (aquatic systems and recreational fisheries)
Executive Order 13112 (NNIS)