CHAPTER 3

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Physical Factors

SOIL PRODUCTIVITY (ISSUE 1)

Affected Environment

The Homochitto National Forest lies in the thick loess and thin loess Major Land Resource Area of the Southern Mississippi Valley Silty Uplands. Soils were derived from coastal plain sands and clays, and floodplains with alluvium of mixed coastal plain and loessial origin. Soils within the boundaries of the proposed project formed in residuum of stratified marine sediments of sand, gravel, and clay. Ridge tops and upper side slope landforms have a mantle of loess ranging in thickness of 3-8 feet.

An extensive soil resource inventory for the Homochitto National Forest was completed in 1984 (*Soil Resource Inventory Report*, Homochitto National Forest, 1984). This survey identified the different soil types and associated soil map units along with their locations. Important characteristics of these soil types along with the implications for management were also presented as part of this report. The interpretation of the soil map units provides the limitations and capabilities of the soils to anticipated impacts related to management

The nine specific soil series that occur within the analysis area have been described in the *Soil Resource Inventory Report*. These series include: Ariel Silt Loam, Bruno Sandy Loam, Bude Silt Loam, Gillsburg Silt Loam, Lorman Silt Loam 8-20% slope, Lorman Silt Loam 20-40% slope, Providence Silt Loam Eroded 0-8% slope, Smithdale Sandy Loam 8-20% slope, and Smithdale Sandy Loam 20-45% slope.

Topography within the project is composed of gentle rolling hills with broad flat ridges and gentle sideslopes of varying percent slope that are broken by level bottomland along creeks. Many small drainages and streams dissect the area. Stream depth and bank erosion have been influenced by both natural causes and by head cutting produced by dredging of the Homochitto River.

The ridge tops consist mainly of moderately well drained soils represented by the Providence soil series. These soils have a fragipan, which restrict roots and limits available water. The loamy, skeletal Providence soil may have greater than 35% gravels mixed with the soil and for this reason has a moderate available water holding capacity.

The sideslopes and upper slopes (8-45% slopes) consist mainly of the well drained Smithdale fine sandy loam and Lorman Silt Loam soils. The loamy Smithdale soils are well drained with a medium to high available water holding capacity. Smithdale soils on sideslopes with 8-20% slopes well-drained soils that have formed in thick beds of loamy sediments of marine deposits on the gentle upper sideslopes and drainhead position. The available water holding capacity is moderate. Lorman series soils are clayey and have a high available water holding capacity. They are subject to mass wasting on steep slopes.

Soils associated with drains and slopes 0-2% are represented mainly by the silty-loam soils of the Ariel, Gillsburg, and Bude soil series. Soils on 0-2% slopes also include the Bruno soil series. Ariel, Gillsburg, and Bude soils are subject to occasional flooding, while Bruno soils are subject to frequent flooding for brief periods during winter and early spring. Ariel soils are well drained and have a very high available water holding capacity. Gillsburg soils are somewhat poorly drained, with high available water holding capacity. The somewhat poorly drained Bude series exhibits a fragipan on low stream terraces, and the available water holding capacity is moderate. Bruno sandy loam soils are excessively drained soils that have a low available water holding capacity.

Factors that may determine the level of impacts to soils include the soil type, topography, ground cover, weather, type of equipment and the intensity of the activities. For Analysis Unit 24, a soil type map has been compiled and is included in the project file. A summary of the soils potentially affected by Alternatives 2-5 is provided below.

Table 3.1 Existing Soils by Treatment and Action Alternative

Activity	Maximum Regeneration	Proposed Action w/o Herbicides	Thinning Only	Proposed Action
Regeneration	Bude Silt Loam Lorman Silt Loam Providence Silt Loam Smithdale Sandy Loam	Bude Silt Loam Lorman Silt Loam Providence Silt Loam Smithdale Sandy Loam	None	Bude Silt Loam Lorman Silt Loam Providence Silt Loam Smithdale Sandy Loam
Sawtimber Thinning	Lorman Silt Loam Providence Silt Loam Smithdale Sandy Loam	Lorman Silt Loam Providence Silt Loam Smithdale Sandy Loam	Lorman Silt Loam Providence Silt Loam Smithdale Sandy Loam	Lorman Silt Loam Providence Silt Loam Smithdale Sandy Loam
First Thinning	Lorman Silt Loam Providence Silt Loam Smithdale Sandy Loam	Lorman Silt Loam Providence Silt Loam Smithdale Sandy Loam	Lorman Silt Loam Providence Silt Loam Smithdale Sandy Loam	Lorman Silt Loam Providence Silt Loam Smithdale Sandy Loam

Source: District Geographic Information System

Surface erosion hazard relates to the soil type and the slope percentage. Surface erosion hazard is the expected loss of surface soil when all vegetative cover, including litter, is removed (Soil Resource Inventory Report 1984). Based on this, surface erosion hazard ratings do not apply to sites where ground cover is present. In general, ground cover removal associated with thinning and regeneration activities are confined to skid trails, roads and landings. For Analysis Unit 24, the soil map units and their bare ground surface erosion hazard ratings are listed as follows:

Table 3.2: Soil Erosion Hazard Rating by Soil Series

Soil Series	Slope (%)	Surface Erosion Hazard Rating
Providence silt loam	0-8%	Moderate
Smithdale sandy loam	20-45%	Severe
Smithdale sandy loam	8-20%	Moderate
Lorman silt loam	20-40%	Severe
Lorman silt loam	8-20%	Moderate
Bruno sandy loam	0-2%	Slight
Gillsburg silt loam	0-2%	Slight
Bude silt loam	0-2%	Moderate
Ariel silt loam	0-2%	Slight

Source: Soil Resource Inventory Report, Homochitto National Forest (USDA 1984)

Compaction hazard is the compression of soil, forcing the solid particles closer together, resulting in less pore space. Results of compaction are reduction of pore volume; reduction of infiltration capacity; reduction of water storage increase in surface runoff; increased erodibility; decrease in aeration; and a decrease in productivity.

Table 3.3: Compaction Hazard Rating by Soil Series

Soil Series	Slope (%)	Compaction Hazard Rating
Providence silt loam	0-8%	Severe
Smithdale sandy loam	20-45%	Severe
Smithdale sandy loam	8-20%	Moderate
Lorman silt loam	20-40%	Severe
Lorman silt loam	8-20%	Severe
Bruno sandy loam	0-2%	Slight
Gillsburg silt loam	0-2%	Severe
Bude silt loam	0-2%	Severe
Ariel silt loam	0-2%	Severe

Source: Soil Resource Inventory Report, Homochitto National Forest (USDA 1984)
Low: Course textured soils low in organic matter
Moderate: Combination of textures and organic matter that make soil resistant to compaction except under a narrow range of moisture conditions
Severe: Combination of texture and organic matter are such that soil would easily compact under a wide range of moisture conditions

Environmental Consequences

Prior to the commencement of harvesting, a pre-work meeting is held with the timber purchaser. During this meeting, skid trails, log roads, and decking areas are reviewed and approved by the Timber Sale Administrator. Whenever possible, skidding and decking would be limited to designated routes on ridge tops and gentle side slopes to protect sensitive soils and soils with a high erosion and compaction hazards.

Due to the fragile nature and erosion hazard of most soils in this forest, excessive rutting and compaction would occur if logging were done when the soils are wet. For this reason, harvesting

activities may be restricted during the wet season (November 30 through March 1). Further restrictions might be needed if rainfall is excessive during the logging season.

To reduce compaction and impede soil erosion, all skid trails, bunching areas, temporary roads, and most level D roads in these areas would be revegetated and closed either by the purchaser at completion of logging, or by the Forest Service. Roads would be opened, revegetated, and unblocked if additional use by the Forest Service is necessary. All revegetation would be accomplished with a seed mixture that would not only serve to control erosion, but would also benefit wildlife by serving as a temporary source of high quality forage. Specific seed mixtures would be applied based on the soils present and the time of year the work takes place. All of these measures are done to prevent soil movement from the land into the streams.

NO ACTION

Alternative 1 (No Action) would allow the natural processes of erosion currently in progress to continue. Management of present roads, gates, culverts and improvements would likely not receive the level of needed maintenance or reconstruction identified in the transportation survey. Normal geological erosion would continue on both Forest Service and county roads.

PROPOSED ACTION AND ACTION ALTERNATIVES

The benchmarks for evaluation of impacts to soil productivity are:

- Whether compaction is sufficient to reduce soil productivity
- Whether soil is lost at a rate that reduces soil productivity

Although thinning and regeneration of timber stands in the action alternatives could possibly have some adverse impacts, routine mitigation measures would control these impacts to an immeasurable level under normal circumstances. Silvicultural Best Management Practices of Mississippi (BMP), as given in the Mississippi Non-point Source Pollution Management Program document, would be followed in all proposed actions. Additionally, the streamside management zones and direction provided in the Forest Plan would be followed.

By following Best Management Practices and Forest Plan guidelines, cumulative impacts of forestry operations on a district wide and even a state wide scale would not cause significant adverse impacts to soil, water, and air resources. These practices have been designed to ensure good water quality. These measures would also minimize both the short and long term impacts associated with the action alternatives and keep impacts within the tolerable erosion losses cited in Table L-1 of the Forest Plan.

Timber harvesting activities have been monitored since 1987 by an interdisciplinary team, which includes a soil scientist. Based on the results of this monitoring, the Forest Plan Standards and Guides were effective in mitigating the impacts associated with the timber activity. This monitoring information is documented in the Timber Sale Reviews, which cover the Homochitto National Forest. These documents can be found in the project file for Analysis Unit 24.

The soil, air and water specialist for the Homochitto monitored six thinning units in the Homochitto National Forest in 1998. Sites included as part of this monitoring include sales in Compartments 36/50, 87, 206/207R, 242, 303R, and 306/308.

The results of this monitoring indicate that soil and water mitigation measures were implemented correctly and are working effectively. Skid trails and log landings were properly located on the landscape and erosion control measures properly functioning. Soil movement adjacent to skid trails had been trapped by the forest floor litter layer.

Observed soil movement and compaction occurred primarily on logging roads and skid trails located on moderately steep slopes (8-12 percent). Most of this movement was associated with the lead-out ditches that drain water from the road. The duff layer adjacent to all roads and trails is trapping the majority of the eroded soil moving off site, before it moves down slope into the streamside management zone. Small amounts of soil movement were observed on primary skid trail/haul roads associated with lead-out ditches. However, the sediment associated with these skid trails, haul roads and lead-out ditches had moved no more than 10-15 feet from the areas. The duff layer had trapped the majority of the eroded soil and prevented it from moving down slope. All streamside filter strips examined were free of soil disturbance and showed no visual signs of soil movement in the area.

In 1995 the Forest monitored timber harvest areas to determine the percent area in skid roads, haul roads, log landings and skid trails within conventionally harvested (rubber tire skidder) sites on the National Forests in Mississippi. The monitoring was designed to help estimate the area of potential erosion and soil compaction associated with timber harvesting. The results were published in the Fiscal Year 1996 National Forests in Mississippi Monitoring and Evaluation Report that was released to the public on 7/7/97.

Site specific information for four thinned stands on the Homochitto National Forest were:

C-246, Stand 10: 15,978 square feet (0.367 acres) of the 67-acre thinning harvest area consisted of skid trails and log landings. This represents 0.55% of the area. The grades of the skid trails ranged from 7-18% slope. Harvest area was primarily side slope landforms with a mean slope of 17%.

C-239, Stand 8, 17 & 22: 57,243 square feet (1.314 acres) of the 91-acre thinning harvest area consisted of skid trails and log landings. This represents 1.45% of the area. The grades of the skid trails ranged from 3-19% slope. Harvest area was primarily ridge top and side slope landforms with a mean slope of 20%.

C-270, Stand 16: 16,812 square feet (0.386 acres) of the 40-acre thinning harvest area consisted of skid trails and log landings. This represents 0.97% of the area. The grades of the skid trails ranged from 6-20% slope. Harvest area was primarily ridge top and side slope landforms with a mean slope of 20%.

C-270, Stand 1: 15,096 square feet (0.347 acres) of the 88-acre thinning harvest area consisted of skid trails and log landings. This represents 0.4% of the area. The grades of the skid trails

ranged from 4-13% slope. Harvest area was primarily side slope landforms with a mean slope of 13%.

Site specific information for the two regenerated stands monitored on the Homochitto National Forest were:

C-239, Stand 25: 21,084 square feet (0.501 acres) of the 19 acre clear-cut harvest area consisted of skid trails and log landings. Of this amount, landings accounted for 0.166 acres and skid trails accounted for 0.3350 acres. The grades of the skid trails ranged from 7 to 27% slope. The harvest area was primarily on ridges and side slopes with a mean slope of 30%.

C-246, Stand 13: 23,877 square feet (0.548 acres) of the 19 acre clear-cut harvest area consisted of skid trails and log landings. Of this amount, landings accounted for 0.128 acres and skid trails accounted for 0.420 acres. The grades of the skid trails ranged from 5 to 18% slope. The harvest area was primarily on ridges and side slopes with a mean slope of 15%.

In the monitored thinning units, the average area disturbed (including skid trails and landings) was 0.84 percent per acre. In the monitored regeneration harvest units, the average area disturbed by skid trails and log landings per harvest area was 2.7%. The results of this monitoring are considered representative of similar treatments on the Homochitto National Forest and are well within the Forest Plan standards.

The erosion rate recovery period is three years for logged areas. For site preparation burning, the recovery period is two years. Frequently, the recovery rate periods overlap. These erosion rates assume application of the State Best Management Practices, but not the additional mitigation measures that would be employed under the Forest Plan in implementing any of these action alternatives. Implementation of the Forest Plan mitigation would result in reduced predicted erosion rates.

Predicted erosion rates have been calculated for all alternatives. These predicted rates do not directly translate to sediment in a stream, because a good portion of eroded soil is deposited on the slope before reaching the channel (Dissmeyer, 1978). Monitoring on the Homochitto National Forest supports this finding.

In addition to the monitoring data given above, 100% of the stand is considered when predicting the erosion rate for a regeneration harvest. In addition to the skid trail disturbance, analysis for regeneration harvest units includes consideration for the landings, spur roads and dispersed skidder activity. Site preparation burns are also considered when calculating erosion rates. For all alternatives, the increase in the predicted erosion rate from the natural condition was determined to be low or minimal.

Table 3.4 displays the predicted tons of soil movement for each alternative prior to Forest Plan mitigation. Soil movement does not imply stream sedimentation: most soil is generally held on the site. For example, in a pulpwood thinning operation, more than 99% of the general area (excluding roads) is undisturbed. Monitoring has shown that the majority of soil movement occurs in distances of less than 15 feet. For the action alternatives 2-5, the amount of soil

movement attributed to natural erosion is calculated into the figures provided for proposed silvicultural treatments. These figures are based on conditions where bare soil and soil disturbance are not mitigated by Forest Plan standards and guidelines. Natural soil movement would occur throughout Analysis Unit 24 regardless of the Alternative chosen.

Photo 3.1 -- Structures like these are used to monitor the amount of soil movement on harvested areas.

Table 3.4: Per Acre Tons of Soil Movement per Alternative During a Three Year Recovery Period

Activity	No Action	Maximum Regeneration	Proposed Action w/o Herbicide	Thinning Only	Proposed Action
Natural Erosion (Per Rotation)	46,748	46,748	46,748	46,748	46,748
Increase over Natural Erosion (During Recovery Period)	0	1,811	1,795	1,785	1,827
Total Erosion (Per Rotation)	46,748	48,559	48,543	48,533	48,575
Allowable Erosion (Per Rotation)	140,416	140,416	140,416	140,416	140,416

SOURCE: Based on benchmark soils provided in Appendix L of the Forest Plan; Dissmeyer and Stump 1978; and USDA monitoring Surveys. Rotation period—80 years; Recovery Period 3 years

As shown in the table above, none of the alternatives proposed for Analysis Unit 24 would result in soil movement greater than the allowable erosion rate, which was determined based on research used for the Forest Plan, and represents the amount of erosion tolerable without impairing site productivity or stream health. None of the alternatives would cause more than a 3.9% increase in soil movement, or result in more than 34.6% of the soil movement allowable. At these activity levels these actions, with mitigation, are extremely unlikely to result in loss of site productivity or reduction instream health due to soil movement.

None of the samples showed compaction sufficient to inhibit root growth. As a result , there is no expectation that compaction will result in a measurable effect to soil productivity (USDA 2003).

This analysis validates the results found in the siltation modeling presented in Appendix I of this Environmental Assessment, as well as stream quality monitoring and testing which has been done on several streams on the Homochitto National Forest. The continued high quality of the aquatic ecosystems in these watersheds despite 30 years of continuous forest management activity similar to that proposed also indicates the validity of this analysis

Alternatives 2-5 include temporary roads, skid trails and reconstruction. Direct impacts associated with road construction include soil compaction and soil erosion. There would be some temporary disruption of the litter and organic layer on skid trails, with some exposed soil. This would result in a temporary increase in runoff and soil movement from the roads and trails. This impact would be mitigated by construction of water bars, discing and revegetating decks and skid trails, the use of filter strips adjacent to streams, and the application of spot graveling along temporary roads and at stream crossings. Long-term mitigation would include seeding and closure of the roads to vehicle use once the sale is completed.

Alternatives 2, 3, and 5 include regeneration that would create large openings and expose some bare ground. These openings may temporarily contribute to an increase in groundwater levels, water yields, and sediment. However, it is not anticipated these levels of sedimentation would significantly affect the water quality. After harvest, ground water increases would be reduced by naturally occurring vegetation and planted trees. Monitoring suggests the majority of soil stabilization on regeneration cuts typically takes place approximately one year after harvest.

Because Alternative 4 proposes thinning only, openings associated with regeneration are not created. This would minimize the amount of exposed bare ground, increased groundwater levels, water yields, and sedimentation. However, thinning would create the need for repeated harvesting entries and result in a more intricate skidding system with increased soil compaction.

Mitigation measures applied to the action Alternatives would minimize soil and water impacts to within the Forest Plan acceptable soil loss rates and meet the state water quality standards for non-point source pollution. In Alternatives 2-5, all harvesting operations would be accomplished in a manner to protect streams, inclusions, and/or streamside zones. Streamside zones are designated adjacent to all lakes, perennial or intermittent springs and streams, wetlands, or seeps.

A streamside zone has a minimum width of 33 feet. Streamside zone protection measures include: 1) no felling of trees into stream channels; 2) mechanical equipment is not allowed in any defined stream channel except to cross at designated points (designated by the Forest Service) 3) rutting is to be kept to a minimum and no more than 10 percent mineral soil may be exposed; and 4) woody understory vegetation is retained within at least five feet of the bank and slash accumulations are kept out of the stream.

Research results from Keim and Schoenholtz indicate that streamside management zones function primarily to trap sediments created within the riparian zone. The benefits of streamside management zones are: 1) reduced exposure of mineral soil near the stream, where erosion and formation of gullies are most likely to deliver sediment to the stream, and 2) the elimination of direct disturbance of stream channels and banks by skidders.

Keim and Schoenholtz recommend streamside management zones, which eliminate machine traffic within 10 meters of the stream. Additionally, they suggest that wide buffers that maintain high basal area are not critical to the function of buffers on loessial sites. Streamside management zones prescribed for Alternatives 2-5 exceed the 10-meter recommendations of Keim and Schoenholtz. It is anticipated that the proposed streamside management zones would adequately protect adjacent waterways from sedimentation.

Implementation of the action alternatives would lead to short term soil movement from the removal of vegetation and construction of skid trails and opening of temporary roads. These impacts have been successfully mitigated in the past using standard mitigation as described above.

While some movement of soil would take place along the upper ridges, the majority of this soil movement is captured in the litter on site with the remainder filtered out in the designated protection strips along the streams. Filter strips along the stream banks that collect suspended soil particles in the surface water runoff would reduce the effect of sediment accumulation. The implementation of streamside management zones has been successful in maintaining stream quality and productivity.

While harvesting may occur in stands that are in close proximity of each other, concentrations of eroded soil entering streams are not anticipated.

Irretrievable soil loss from on site soil erosion would occur from timber harvesting, road maintenance and spot reconstruction. However, this loss is well below tolerable soil loss as described in Appendix L of the Forest Plan. Tolerable soil loss is defined as a level where soil productivity and water quality can be maintained. This erosion would be temporary and would be minimized by erosion control measures. Mitigation measures as listed in the Forest Plan would decrease the soil movement on all harvest areas. The above monitoring data shows that mitigations implemented to prevent soil movement into the streams are working. Soil is being stopped before it enters the streams, thus this project which is taking place on land is having no measurable effect on water quality or the aquatic habitat.

Minerals and Special Uses

AFFECTED ENVIRONMENT

On the Homochitto National Forest, annual oil activity and development has consisted of approximately 10-12 new wells drilled and 100 wells in production. There is an extensive history of oil drilling and production in Analysis Unit 24, and the possibility of isolated shallow production and, therefore, drilling potential is likely. Currently, no drilling exploration is in progress, but 90% of Analysis Unit 24 is under oil or gas lease. Four restored wells (C 250/ stand 9) and three producing wells (C 251/ stands 4 & 5, C 252 / stand 13) exist in the area. The restored wells were exploited by primary technology from the shallow Wilcox Formation; therefore, pending economical secondary recovery methods, future drilling may occur on these sites. The producing wells are under secondary recovery technology from the lower Tuscaloosa Formation, and are expected to be plugged and restored within the next five years barring new technology. The associated pipelines are buried and transport gas and fluids to processing facilities on private property.

No active gravel pits exist on Forest Service administered land, but one old gravel pit is located adjacent to highway 33 in compartment 250, stand 1. The pit has reforested, but should be considered a logging hazard due to some remaining steep walls. The possibility of suitable gravel material exists west of the old pit on the ridgetop in stand 2.

Several special uses, rights-of-way, and improvements exist in Analysis Unit 24. These include buried high-pressure oil pipelines, buried telephone cables and above ground access boxes, electrical power transmission lines, a surface saltwater disposal pipeline, buried oil/gas pipelines, a cemetery, and a ground water study site.

As regulated by US Department of Transportation, the interstate pipeline companies are responsible for maintaining the covering over the pipelines and maintaining the rights-of-way. On other special use areas, such as pipelines, powerlines, and oil & gas wells the permittee is responsible for maintenance of improvements and rights-of-way.

Maps detailing these specific areas are included in the project file at the Homochitto Ranger District Office.

When timber removal activities occur near these minerals or special use improvements, the typical mitigations that would be used are:
·Coordinating actions with special use permittee
·Allowing crossing of pipelines and rights-of-way by equipment only at designated crossings.
·Placing additional cover over pipelines at designated crossing.
·Prohibiting skidding or driving along the rights-of-way.
·Protecting the integrity of the pipeline, powerline, or improvement.
·Protecting from damage the pipeline, powerline or improvement.

ENVIRONMENTAL CONSEQUENCES

With the above mitigation, removal of timber would have no impact on minerals or existing special uses.

None of the proposed alternatives would impact existing or planned mineral activities. There is no potential for cumulative effects.

Cumulative Effects

Cumulative effects on site productivity and water quality associated with soil loss would not be expected under any alternative. Natural processes result in soil movement even without disturbance. The No Action alternative maintains these baseline levels. Examples of baseline soil movement sources are mass wasting, stream bank erosion, and public use of existing roads. These factors are out of the scope of this decision. Alternative 2 provides the highest level of activity being considered for this project area. Alternative 2 would be used for the purpose of cumulative affects analysis.

When compared to past harvesting intensity for this analysis area, or the Homochitto National Forest, the proposed action does not represent an increase of harvest activity or road use, and their associated soil and water impacts. For previous entries in 10-year increments, regeneration acreage has ranged from 0 to 657 acres. The 279 acres of regeneration proposed under the proposed action would be regenerated in the year 2004. Thinning has been an on-going management activity since the 1960's and tends to be very low impact.

Table 3.5: Regeneration within Analysis Unit 24 from the 1973 to 2003.

Year(s)	1973-1982	1983-1992	1993-2003	Proposed Action
Acres	350	330	285	279

all figures approximate

The potential cumulative effect on soil over time is loss of productivity. Since there would be no direct effects from compaction, there is no expectation that cumulative effects from compaction would occur. Table 3.4 and its associated discussion demonstrate that soil loss is well within the "Tolerable Erosion Losses" developed for the Forest Plan. This is defined as the level at which productivity and water quality would be maintained. Further, recovery to pre-project, baseline levels would be expected in three years. This means that disturbance from the approximately 285 acres regenerated last decade has healed and is not additive within the project area.

On this Forest, monitoring of similar activities on similar sites developed data for soil loss calculations. Typically, dispersed soil disturbance is less than 1% of a thinning area and less than 5% of a regeneration unit. Roads are in place and require only maintenance or spot reconstruction. Local roads and skid trails tend to occupy ridge tops without direct run-off into drains. This means 99% to 95% of the litter layer, depending upon the type of treatment, is available to capture soil loss from the roads and the 1% to 5% of scattered disturbed areas and soil movement from the roads. This is in addition to the filter strip provided for each perennial and intermittent stream. The long-term effect of soil movement is that displaced sediments eventually wash into streams. While Table 3.4 calculates potential soil movement, there are no

models available to capture the relationship of undisturbed areas holding actual movement to very short distances and retaining soils on the treatment area.

Over time, soil displaced by management activities could eventually wash into streams causing siltation unless recaptured on the site. Monitoring by soil and watershed specialists indicates mitigation is working and that undisturbed duff and filter strips are effective in preventing sedimentation to adjacent streams. When examined on an annual basis, actual soil loss and silt actually reaching streams directly from harvest and thinning units would be expected to be so small that it would be masked by factors such as mass wasting, stream bank erosion, and public use of existing roads. The amounts of soil displaced by timber hauling activities on collector and arterial roads are also comparatively small. These are the roads that provide access to public and interspersed private ownerships, and for recreation. Logging traffic represents a very small percentage of the total traffic on these roads over a 10-year cycle. Further, timber hauling is curtailed during inclement conditions. In contrast, heavy hunter traffic peaks during the wettest seasons and is not stopped when rutting and active run-off is at its highest.

When effects related to the interaction of this project with other projects occurring on the district are considered (cumulative effects over area), no cumulative effects can be identified. Approximately 10% of the District is inventoried annually. Habitat and vegetative management needs identified through these inventories typically result in thinning, regeneration and road use. Even though soil impacts are relatively localized, activities from adjacent analysis units are considered in this analysis. A map illustrating the area analyzed for Cumulative Effects is displayed in Appendix B. Based upon estimated entry for activities to begin, activities would also occur in Analysis Units 21 and 22 within the recovery period of this project, and are included in the analysis for this project.

Cumulative effects over time are focused on the Homochitto River drainage. Soil movement into the streams in the Homochitto River drainage as a result of the projected series of projects would also not result in an accumulation of sediment. Based upon the very small potential for soil reaching streams, large increases in sediment levels would not be expected. Sediment is flushed from streams through natural processes (Hauer and Lamberti 1996). This continuous process moves sedimentation into larger waterways such as the Homochitto and Mississippi Rivers. These rivers continuously carry large sediment loads, and do not provide habitat for biological components associated with small clear running streams. For these rivers, outputs from Analysis Unit 24, along with other activities projected for this watershed may be minutely additive, but not cumulative when compared to sediment loads from row crop agriculture and development. Natural factors, which transport sediment over time, would prevent cumulative effects on the Homochitto River. Additional information regarding non-point sediment from adjacent private lands resulting from agriculture, timber harvesting and building of home sites, is unavailable at this time. Appendix I provides expanded discussion and model calculation for siltation and cumulative effects.

WATER QUALITY (ISSUE 2)

Affected Environment

The water-related resources of Analysis Unit 24 include floodplains, riparian areas (including rivers, streams, and ponds) and wetlands. Floodplains are those portions of the river valley, adjacent to the river channel, which is covered with water when the river overflows its banks at flood stages. A riparian area is adjacent to streams, lakes and ponds that either influenced by groundwater from the water body, or are sites where ground-disturbing activities can have a direct influence on the water quality of the water body. Riparian areas can include both upland and wetland areas adjacent to water bodies or streams. Riparian areas include floodplains and areas below the slope-break on V-notch or gorge channels. Wetlands are defined as "those areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions" (40 CFR 230.41 (a)(1). "Frequency and duration" of a groundwater table sufficient to support a prevalence of hydrophytic plants can include areas where the groundwater table is 12 inches below the soil surface for as little as two weeks during the growing season.

Analysis Unit 24 contains two distinct watersheds, which flow to the Homochitto River. The Homochitto River is a major watershed of the Mississippi River.

The lower portion of the Homochitto River was channelized in the 1930's. Channelizing lowers the normal water level and increases the rate of flow, which in turn lowers the water level in associated tributaries, and increases their rates of flow. Such increased flow causes stream bank cutting, leaving stream channels in very poor condition. This condition is expected to continue until the streams are able to adjust to the changed character of the river (Soil Resource Inventory Report, Homochitto National Forest).

The Homochitto River watershed is considered a headwater basin, which includes streams ranging from perennial, intermittent and ephemeral. It includes Foster Creek, which is considered a medium to large size perennial stream. In all action alternatives, harvest stands are within the Tar Creek (Foster Creek) and Dry Creek watersheds in approximately equal proportions. The majority of projected harvest stands within adjacent Analysis Units are within the Foster Creek watershed.

Many of the smaller streams in the analysis area have no water flows during drought periods. Stream flow behavior can be described as slow to moderate, meaning that the stream level rises gradually in response to normal precipitation events. Channel substrate is dominated by sand with a sizeable organic fraction. The majority of the watersheds are composed of first and second order streams. Within the area analyzed for this project, there are approximately five major perennial and intermittent streams that flow into the Homochitto River.

Water quality on the Homochitto National Forest is generally good, although some local problems do exist. Local problems may be the result of erosion and sedimentation from Loess soils, head cutting of streams, or infrequently from oil and gas operations.

As mentioned, much of the watershed drainage originates on private lands. Primary negative impacts on water quality come from uses on private lands. These uses are generally agricultural (farming and cattle), small woodlots and residential. Erosion and sediment are impacts from these activities that may have a direct negative impact on water quality. In addition, some streams may be locally impaired from fecal coliform associated with the lack of private on-site septic treatments or improperly designed or functioning on-site systems. Other possible sources of water contamination include livestock runoff from private land, and natural sources, such as turkey, deer, and other wild animals that may increase the fecal coliform count.

Precipitation averages 50-70 inches per year for the Homochitto National Forest. Runoff for the Homochitto National Forest averages about 18-20 inches per year with 36 to 40 inches of water per year released to the atmosphere through evapotranspiration (Soil Resource Inventory Report, Homochitto National Forest). The highest potential for precipitation and associated runoff and flooding occurs in the winter and early spring. Winter rains are usually widespread and prolonged while much of the summer rains are localized thunderstorms of short duration.

Land use practices within Analysis Unit 24 within the Homochitto River watershed include the following, clear-cut harvest, thinning, midstory removal, chemical release, prescribed burning, road maintenance, grazing, farming and private residences. These examples include only a partial representation of the activities on private lands that can potentially share cumulative effects. Analysis Unit 24 is fragmented containing private ownerships of varying sizes and national forest lands of varying sizes within its boundary.

Environmental Consequences

Due to existing influences (private land uses, past harvest practices, roads, and geological processes), effects would occur to the water resources in the analysis area regardless of the alternative chosen. There are three types of effects that may occur to the water resource as a result of the proposed activities: 1) on-site direct effects; 2) on-site indirect effects, and; 3) cumulative effects. Aquatic health is an essential aspect of the water resource and is included in the term "water resource".

There are two benchmarks associated with evaluating effects on water quality. These are:

1. The cost of downstream water uses.
    - Activities that eliminate or increase the cost of downstream water uses would be considered adverse.
2. The quality of the aquatic habitat.
    - Activities that change the habitat sufficiently to reduce or change the species uses, as measured by the continued presence of aquatic management indicator species, would be considered adverse.

There are no known downstream water uses. Other than the potential for gravel and sand extraction, there is little potential for downstream use. Communities in southwest Mississippi

use deep wells for water sources. Water extraction for irrigation is not a known use. Possible downstream beneficial uses for the Homochitto River, such as non-contact recreational uses (i.e. bank fishing), warm water aquatic habitat, wildlife use, livestock watering and riparian values would not be affected by the project. The Mississippi River is used primarily for shipping and carries high silt loads from upstream. Any additions from the Homochitto River are masked by this relationship. Therefore, downstream uses would not be adversely impacted by management activities on the Homochitto National Forest. Since there are no known downstream water uses, there is no basis for analyzing cause and effect relationships.

With respect to aquatic habitat quality, the potential effects are from soil movement that increases silt loads as described under soil productivity. When compared to private and private/commercial ownerships, management activities in the Homochitto National Forest are substantially less intensive. Since acquisition, however, wind, insect, and disease losses have been salvaged; dense stands have been thinned; and regeneration has occurred. To monitor the effects of these activities, eight major fifth-order watersheds have been periodically inventoried since implementation of the Forest Plan. In 1996, two more streams were added to this periodic monitoring schedule. This is an ongoing program in which the most current data collection occurred during fiscal year 2002. These watersheds are representative of streams on the District.

The data clearly indicates that variability among individual streams affects the presence and numbers of MIS fish. It would be unrealistic to expect to find all MIS fish in all of the streams due to variability among habitat, sampling locations and times, weather and fish movement patterns, and sampling methodology.

The most current data indicates that that the presence of management indicator species has increased since the inception of the monitoring program in the 1980's. Eight of these ten streams have maintained or increased populations of various aquatic management indicator species. Five of the six streams sampled in 1996 were found have a biological integrity index of good to excellent. The exceptions are Steep Hill Creek and Pretty Creek. Steep Hill Creek was not surveyed in 1996, but was found to have decreased in the number of management indicator species present in the most recent survey. However, no Forest Service timber management has occurred in the Steep Hill Creek watershed since the 1980-84 survey was conducted. This leads to the conclusion that Forest Service activities were not the source of the reduction in species presence. Pretty Creek was damaged by saltwater intrusion from minerals extraction prior to implementation of current saltwater disposal standards. This is unrelated to the "Proposed Action," and the Pretty Creek drainage is not affected by this proposal. Therefore, the continued presence of MIS fish species indicates that aquatic habitat quality has been maintained through more than 60 years of management activities that were similar to or exceeded the intensity of the activities proposed in this project.

Additional monitoring has been ongoing in Caston Creek since 1997, and this data has been summarized and analyzed through September of 2002 in the *Preliminary Monitoring Report: Caston Creek Watershed*. This report documents monitoring of nitrates, dissolved oxygen, pH, specific conductance, water temperature, and turbidity. Harvest activities on Forest Service administered lands were commenced in the Spring of 2001. With the exception of specific stormflow events, data ranges during and after harvest were consistent with base information

established by the Mississippi Department of Environmental Quality. Mitigation and project design has held effects from forest management activities to non-measurable levels. The analysis did not indicate any significant negative impact on the soil productivity or water quality of Caston Creek as a result of forest management activities in the watershed.

Since the mitigation used to maintain the integrity of the Caston Creek Watershed are the same as those used for other projects involving similar activities on the Homochitto National Forest, it can be expected that the results or impacts would also be similar. Therefore, the assumption can be made that there would be no negative impacts on soil or water quality from timber sale management activities. Because a cause and effect relationship has not been found from the effects of the proposed management on water quality, there is no basis for cumulative effects analysis for this project.

ALTERNATIVE 1 (NO ACTION)

With Alternative 1 (No Action), water quality would be subject to the same influences and processes already in place. Changes in water yields would occur in response to storms, fire or beetle activity-creating openings in the forest canopy. No significant changes to water quality are expected from implementation of Alternative 1. The potential affects to aquatic wildlife species for this alternative would remain the same or become slightly lower over time as a result of no implementation of management activities.

ALTERNATIVES 2, 3, 4 AND 5 (ACTION ALTERNATIVES)

For the action Alternatives 2-5, the natural variation in water yields and short-term water quality would occur in response to storm, fire, and beetle activity to the same extent as for the No Action Alternative. In addition, harvesting outlined in Alternatives 2, 4 and 5 would potentially affect water quality, water quantity, channel morphology and downstream beneficial uses. The potential affects to aquatic wildlife species for all action alternatives would remain the same as a result of comparison to past harvest activities over the last decade.

Regeneration cuts and thinning have the potential to cause the following direct effects: soil displacement, changes in ground cover condition and changes in stand composition of streamside management zones (Golden et al. 1984, Ursic 1991, Belt et al. 1992, Brown and Binkley, 1994). Indirect effects could include sedimentation, changes in stream nutrient levels, increases in water yield, and changes in stream flow behavior (Golden et al. 1984, Brown and Binkley 1994).

Temporary increases in sediment yields would also occur in response to road building. New road construction and road reconstruction presents the highest potential for adverse effects, particularly sediment (Riekerk et al. 1988). Potential direct effects include soil exposure, compacted soil, and changes in surface flow patterns. Indirect effects could include erosion, sedimentation, and increased water yield (Golden et al. 1984).

Alternatives 2-5 include road reconstruction, temporary roads, and skid trails which can potentially contribute to the amount of sediment accumulated in the project area streams. Typical road reconstruction activities are completed in the same year as harvest, and usually during the same season. By employing road ditches, lead off ditches, culverts and seeding of

exposed road cuts and fills to disperse runoff, potential long-term effects of sedimentation on waterways can be minimized. Development and use of temporary roads would probably contribute some sediment in the short term. These roads are located on ridge tops, generally without direct leadoff into drainages. Potential for sedimentation reaching streams is very low. After restoration with a vegetative cover at the end of the project, the roads would not contribute to long-term effects, which could be cumulative.

Regeneration harvest practices may cause some soil displacement and reduce the amount of ground cover, however the sediment production should be minimal. Results of one study concluded that across the south, timber harvesting did not significantly increase sediment levels within any of the physiological regions (Ursic 1986). The same study indicated that any increase in sediment stabilized after the first year past treatment. Thinning should created negligible direct or indirect effects.

For Alternatives 2-5, Mississippi State Best Management Practices and standards and guidelines in the Forest Plan would be implemented. Implementation of mitigation measures (Appendix C) would minimize impacts to water quality and riparian areas. Additionally, streamside management zones are anticipated to reduce soil movement and mitigate potential impacts to water quality.

Prescribed burning may result in some minor soil exposure. On the Talladega National Forest, monitoring of prescribed burns following a herbicide treatment revealed that 75% or more of the ground cover remained intact after a moderate burn (1988). In another study, sites with slopes as steep as 30% experienced low sediment production after a prescribed burn (Shahlaee et al.1991).

Streams within the analysis watershed should be adequately protected from sedimentation and off-site effects by mitigation practices. Based on this, no additional mitigations are required beyond the standards and guidelines specified in the Forest Plan for Mississippi.

In the cumulative effects analysis, the proposed regeneration cuts, present a moderate risk of impacts related to increased water yields. Temporary roads pose a moderate risk to warm water fisheries, water quality, and aquatic organisms. The highest risks associated with the proposal would occur at the time of implementation. Within three years after project implementation, these risks are expected to be negligible. Some risks would be associated with site preparation, release treatment, existing roads and prescribed burning. Private land use practices would present slight risks in the analysis watershed and these risks would continue indefinitely. (See Appendix I)

For the project area analysis, cumulative watershed effects are represented by the potential risk of impairment to the water resource. This approach is based on a risk analysis procedure developed by Lull et al. (1995). The focus is on the potential risk to downstream beneficial uses, water quality, water yield, and aquatic organisms. Determination of potential risk was based on cited literature, professional judgment, plus the works of Reid (1993) and MacDonald et al. (1991). For the purposes of this analysis, it was assumed that the silvicultural and related activities would begin in 2004 and that mitigative benefit from Best Management Practices would be included in the potential risk.

Studies sited in the Vegetative management EIS include Red Prong Creek on this district. Soil types and terrain in the Red Prong area are similar to those in the project area watershed. As a whole, these studies predicted that under a maximum treatment activity, storm flow increases would be expected to be 2-7%. Activities in this project area are well below maximum levels and storm flow would be expected to be lower. At maximum activity levels, the EIS indicated that variations in water yields would be expected to be below normal seasonal and annual variations (Vegetation Management EIS, IV-101-102). Therefore, they would not be detectable from annual variations. Water yields return to normal levels rapidly as sites revegetate. As with soil movement and sediment loads, discussed under "Soils", other activities planned within the Homochitto would disperse the water yield and absorption over a wider area. Activities would remain within maximum levels allowable for the watershed and not increase yields over 2%. This would not be discernible over annual variation and would increase rapidly. Therefore concerns related to sedimentation and water yield would be addressed through harvest below maximum allowable activity level, and through filter strips. Effects diminish rapidly after first year and return to normal in 3 years. Effects would not extend beyond the watershed. Therefore, it is not cumulative with other projects outside the watershed.

Studies on similar streams, with similar treatments, have been completed on sites including Red Prong Creek and Brushy Creek. In 1996 Johnson and Mcwhirter surveyed Brushy Creek. At that time all, all eight out of the management indicator species for southwestern Mississippi Streams of this classification were found to be present. The study analyzed species richness and species diversity under Margalef's Index and the Shannon Weiner Index, respectively. The Index of Biotic Integrity was also calculated. Aquatic habitat of Brushy Creek was rated as "good to excellent" as a result of this study. Previous studies also reflect the appropriate indicator species.

The Creeks in Analysis Unit 24 retain similar characteristics to Brushy Creek. The base-line aquatic habitat studies in the nearby Brushy Creek drainage also tend to confirm the accurateness of the Cumulative Effects Analysis for Water Quality applied to Analysis Unit 24 watersheds. Therefore, the Cumulative Effects Analysis for Water Quality completed for the watersheds in the analysis unit should be considered accurate and shows that any additional affects would diminish rapidly over a three-year period. By combining Best Management Practices with filter strips, effective unit layout and harvest administration, and revegetation of disturbed areas, water quality is protected.

These studies occurred during and immediately after a period of elevated activity within the watershed. Due particularly to harvest activities on private commercial lands within the watershed, a large tornado which uprooted and damaged more than 500 acres immediately adjacent to the creek, and somewhat more intensive activities on Forest Service lands from 1970 through the mid 1990's, these studies measured stream quality during a period of greater disturbance than is now present. The current level of activity is expected to be lower than that over the last 2½ decades. Therefore, baseline data that includes periods of more extensive activity shows that Brushy Creek has maintained very high quality aquatic habitat throughout its management history. In addition, the Brushy Creek watershed, when analyzed for water quality was well below the interim threshold for sediment levels.

The area within Analysis Unit 24 was assumed to have similar conditions, such as soils, wildlife, and plant species as found in both Red Prong Creek and Brushy Creek. A similar outcome from treatments is expected for the Streams in Analysis Unit 24. Using this information and the results from water quality modeling (Appendix I), neither direct nor cumulative impacts are likely to adversely affect the watersheds in Analysis Unit 24.

Some water quality effects such as suspended sediment would possibly exit the watersheds, but the effects would rapidly dissipate upon mixing with the downstream receiving waters. For this project, it is assumed that all potential effects associated with the proposed project would not persist more than three years. Therefore, the temporal or timing boundary includes all known and projected land use practices within the project area three years before the proposed project and three years after implementation.

Cumulative effects are considered for a variety of factors associated with water quality. Siltation is a major factor in fisheries habitat quality as well as for a wide variety of other aquatic flora and fauna. Siltation was considered a result of soil loss and was addressed under soils.

Cumulative effects from burning would not occur. Some soluble minerals and ash may enter the water, but would be flushed from the system at the rate of flow of the stream. The long-term historical and fossil records indicate that most of the southern coastal plain burned at frequent intervals over wide areas. By firing within strict parameters, and lighting ridges and upper slopes, the fire burns dryer sites and extinguishes in the more moist areas, much like the natural processes that have taken place for thousands of years. Filter strips are maintained. The occurrence of fire is actually lower now than during pre-history and settlement times.

Cumulative effects from herbicide treatments, which are considered in Alternative 2, 4 and 5 would not occur. Any trace elements entering the water would be flushed from the system at the rate of stream flow. They would not collect at any point because the short half-life of the proposed herbicides would degrade to common, inactive elements before they could build up. These herbicides do not accumulate.

Based on long-term information gathered over extended periods of similar and higher intensity management practices, impacts would be minimized to the extent that water quality would be maintained.

AIR QUALITY (ISSUE 3)

Affected Environment

The present air quality of Mississippi is better than the National Ambient Air Quality standards.

Environmental Consequences

All modern activities tend to result in some level of effects on air, as well as water and soil. For all alternatives, the air quality is anticipated to remain within the National Ambient Air Quality Standards. Prescribed burning produces the most notable impact on air quality. Burning would

be accomplished under conditions that direct smoke and its effects away from roadways and populated areas. Prescribed burns are conducted in cooperation with the State of Mississippi air quality standards by burning only when a state issued permit is available. This permit system insures that total area pollutant outputs do not exceed the potential for dispersion of effects based upon atmospheric conditions. These measures minimize impacts to local air quality, and consider regional conditions.

The primary outputs of prescribed burning are particulate matter and carbon dioxide (CO2) and water vapor. Smaller amounts of other by-products are produced (see Appendix F, m2 & m7). Particulates settle or are washed from the atmosphere by precipitation. Carbon Dioxide is heavier than most other air gases and tends to remain in the lower atmosphere, where plants absorb it. Carbon Dioxide is an essential component of photosynthesis; the process green plants use to manufacture sugars and other carbohydrates that form the foundation of the food chain. Other by-products of prescribe burning tend to attach to water vapor or other particles and are returned to the ground over time where they are reincorporated into the biotic community. They do not accumulate in the atmosphere. There would be a local, regional and global equilibrium between total emission of all types and the rate at which these emissions are removed by natural processes. Prescribed burning proposed in Alternatives 2-5 would be a minute part of that equilibrium, but not cumulative. From a historic perspective, current wood burning levels are far below those in prehistory and settlement times.

NO ACTION

Implementing Alternative 1 would not, by itself, impact air quality. Cumulatively, selection of No Action Alternatives in proposals could lead to substituting other materials for wood. Typically, the replacement material is steel, which during the manufacturing process, uses more natural resources and produces more air pollutants. A recent publication, *Environmental Life-cycle Analysis: Wood and Non-wood Building Materials* (Appendix F, f1) indicated that when compared to steel, wood produced 1/3 the carbon dioxide and substantially lower carbon monoxide, sulfur oxides, nitrous oxides, and a variety of other gasses associated with smog and global warming. Restricting the supply of wood products makes alternate building materials more competitive. From this perspective, the National and global effects would be highest for Alternative 1, No Action, and lowest for Alternative 2, which provides the highest wood product outputs.

Also, as noted under Social and Economic Factors, residents in the counties surrounding the national forest are heavily dependent upon the harvesting and manufacturing of wood products for their livelihood. Currently there are no substitute industries. Restricting the harvest of wood would cause individuals to travel farther to find work. The fossil fuel consumed in this process would likely result in increased impacts on air quality which would off set any reductions associated with not operating logging and manufacturing equipment. Alternative 1 (No Action) is likely to result in a minutely cumulative national adverse impact on air quality. The United States of America complies with the international agreement related to air pollution and the EPA specifies which outputs are considered pollutants. Therefore, the Homochitto National Forest has no authority in determining what particulates escaping from activities are pollutants.

PROPOSED ACTION AND OTHER ACTION ALTERNATIVES

The Alternatives 2-5 would have similar impacts on air quality. Short-term effects on air quality are associated with dust from harvest activities, exhaust from heavy equipment operation, and smoke from prescribed burning. The project would result in small additional contribution of air pollutants. However, no part of the project area is having problems in meeting air quality standards (NAAQS), and Clean Air Act regulations provide for moderate increases in air pollution in the area, to accommodate economic growth. Air quality would remain substantially better than NAAQS.

Cumulative Effects

The Homochitto National Forest has produced from 45 million board feet to 60 million board feet annually (USDA--Forest Service Data Base), excluding natural events that have increased harvesting levels due to such things as southern pine beetles and wind events (storms and tornadoes). These alternatives would not increase the harvesting level, which normally occurs on the forest. The amount and type of harvest equipment, fuel consumption, and emissions would not increase or decrease from year to year and would not increase pollutants from emissions beyond that which has occurred in the past and currently. Therefore, there would be no direct or cumulative change to the air quality from what has happened in the past or is presently occurring. In terms of scale, activity would decrease from previous harvesting practices, which produce pollutants from fossil fuels.

Depending on economic demands, future activities using fossil fuels on neighboring lands may increase or decrease beyond the present level of agriculture and timber harvesting. However, give the variability in economic markets locally or regionally, this cannot be accurately determined. In the future, transportation in and out of the Forest and surrounding communities adjacent to the Forest may increase slightly with visitors to the National Forest. However, this is also dependent upon economic factors related to supply and demand and disposable income of consumers.

An increase in transportation and equipment use in the future would lead to some deterioration of air quality, but to what degree is in fact too variable to determine. Additionally, harvesting levels on the National Forest may decrease or increase dependent upon congressional direction and appropriations. If equipment usage in the future increases, that could lead to an increase in air pollutants and deterioration of the air quality

The anticipated adverse effects are production of emissions from equipment used in harvesting. With the presently accepted and utilized equipment common to the Homochitto National Forest and surrounding communities, these emissions cannot be avoided.

Short-term and long-term effects to air quality should remain at their present level as stated in the affected environment above. No cumulative short or long-term effects beyond those of Class II air quality standards are anticipated. Accumulations of highly concentrated particulates and gases are not expected since the activities are not above previous harvesting levels.

Biological Factors

VEGETATION (ISSUE 4)

Affected Environment

Vegetation in the Homochitto National Forest has changed a great deal since the time of the American Indians and the early settlers. The Homochitto River basin was surveyed in approximately 1907 and 1908 as part of a State Geological Society study of forest resources. The survey was published in 1913. At that time much of the forest was uncut, and represented the forest of Native American and early settlement times. The survey found that most of the proclaimed Homochitto National Forest showed substantial influence of fire. Pines, favored by frequent fires, occupied the ridges and upper slopes. Longleaf pine dominated with mixes of shortleaf pine and loblolly pine. Fire controlled midstory vegetation and encouraged open stands with a grass and low shrub understory.

The historic forest for the area represented in Analysis Unit 24 was described as "longleaf hills". "It is for the most part a rolling, hilly country, with deep ravines and steep slopes. …. The ravine and lower slopes for the most part are covered with hardwood forests. Oaks predominate, associated with hickory, sweet gum, ash, and others. Loblolly pine is scattered over these lower slopes, and the upper slopes and summits of the ridges are covered by shortleaf and longleaf pine with some loblolly and hardwoods. … Longleaf is the predominate species, and forms from 50 to 70 per cent of the stand over large areas. … Shortleaf and loblolly pine in varying proportions make up about 30 per cent of the forest. On the average about 10 per cent of the stand is hardwood…" (Holmes, J.S. and J.H. Foster, 1908).

On lower slopes and in the drains, where fire burned at a lower intensity, longleaf and shortleaf pine seedlings were not favored and faster-growing loblolly pines increased. In the hardwood component, low-intensity, periodic fire favored oak and hickory over less fire-tolerant species such as sweetgum, yellow poplar, American beech, and magnolias. Therefore, hardmast-producing oaks, often mixed with loblolly pine, were dominant in the drains. The report described moist areas with little fire influence as primarily hardwood. The Homochitto River floodplain and the far west side of the district in Wilkinson and Adams counties appear to have been primarily hardwood. The historic forest not only supported such game species as white-tailed deer, wild turkey, and Northern bobwhite quail, but also a large number of ground-nesting songbirds whose numbers are declining across the nation as this important habitat becomes less common.

Widespread timber harvest in the 1920's coupled with suppression of fire has resulted in the loss of most of the longleaf pine component. Longleaf has been replaced with loblolly pine, which is short-lived and less fire-tolerant. Settlement era agriculture cleared many of the wider drainages. When abandoned, loblolly pine invaded the old field sites, replacing the historic hardwoods found in bottoms and floodplains. In unfarmed areas, fire-intolerant hardwoods such as sweetgum, American beech, and magnolias have replaced many of the oaks and hickories, which were favored by the lower-intensity burns in the drainages.

This project is intended to restore this mixed-pine ridges / oak-drain ecosystem, which, in turn, will recover declining wildlife populations such as neotropical migrant birds and the endangered red-cockaded woodpecker, while continuing to support game and non-game species common to the Homochitto National Forest. When viewed from a historic perspective, it appears more appropriate to compare cumulative effects to historic conditions than to the preponderance of early-seral conditions in the 1930s or the mature loblolly conditions of today. The more recent forest communities in this Analysis Unit are more representative of "pioneer"-type conditions that can come in after high levels of disturbance and do not provide for long-term stability. Current compartment conditions by working groups and generalized age class are provided in the table below.

Table 3.7: Age Class by Forest Type of Block 24

Forest Type	Working Group	Age Class										Acres
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	90+	
13	Pine/Hardwood	37	--	--	--	--	--	--	--	29	--	66
25	Yellow Pine	--	--	--	--	15	--	47	89	163	38	352
31	Yellow Pine	248	330	350	105	--	--	--	240	465	--	1738
32	Yellow Pine	--	--	--	--	--	--	19	--	--	--	19
Totals		285	330	350	105	15	0	66	329	657	38	2175

13—Loblolly Pine/hardwood, 25—Longleaf Pine, 31—Loblolly Pine, 32—Shortleaf Pine

The Forest Service is concerned about replacing reasonable levels of early seral in order to meet habitat diversity obligations. The Mississippi Department of Wildlife, Fisheries and Parks and some hunters express interest in early seral for the production of early seral game animals. Other publics want to see "forests that look like forests" and express interest in the very large diameter trees typical in stands 60 years old or older. Interest is rarely expressed in pulpwood and intermediate stands, or managing for the differences between 30 year-old and 40 year-old stands. These age classes have little bearing on the decision to be made, beyond looking for a balance. While older age classes can be retained by forgoing regeneration, and early seral can be created by harvesting mature stands, we cannot create 50 year-old stands through this project. These age classes either exist or do not based on management decisions of past decades.

FACTORS INFLUENCING VEGETATIVE CONDITIONS AND STRUCTURE

Fire

The primary driving influence in the southern ecosystem is fire. Fire controls ground-level vegetation and the types of regeneration that are possible. Frequent fires on the ridges favor longleaf pine, and to a lesser extent, shortleaf pine. Seedlings of both of these species have fire survival strategies which allow them to regenerate under historic fire conditions. Loblolly pine is resistant to lower-intensity fire, as is oak, which readily re-sprouts and has thicker bark for insulation. Fire also controls midstory and favors a grass, forb, legume, and low shrub understory.

Historically, Native Americans and early settlers used fire to reduce understory vegetation, enhance travel, prepare for planting, and encourage grass production for browsing by wildlife. Aggressive fire suppression efforts beginning in the early 1900s severely restricted the ability of fire to influence the landscape. It is estimated that only those acres in on the west side of Wilkinson and Adams counties, as well as a few of the more prominent floodplains, were not influenced by fire. Land ownership patterns prevent return to the wide-scale burning of the past. The District, however, has identified approximately 90,000 acres that can be effectively burned on a "maintenance" frequency to support the historic ecosystems with a longleaf component. Burning is an important tool to restore and maintain pyric (fire-dependant) communities.

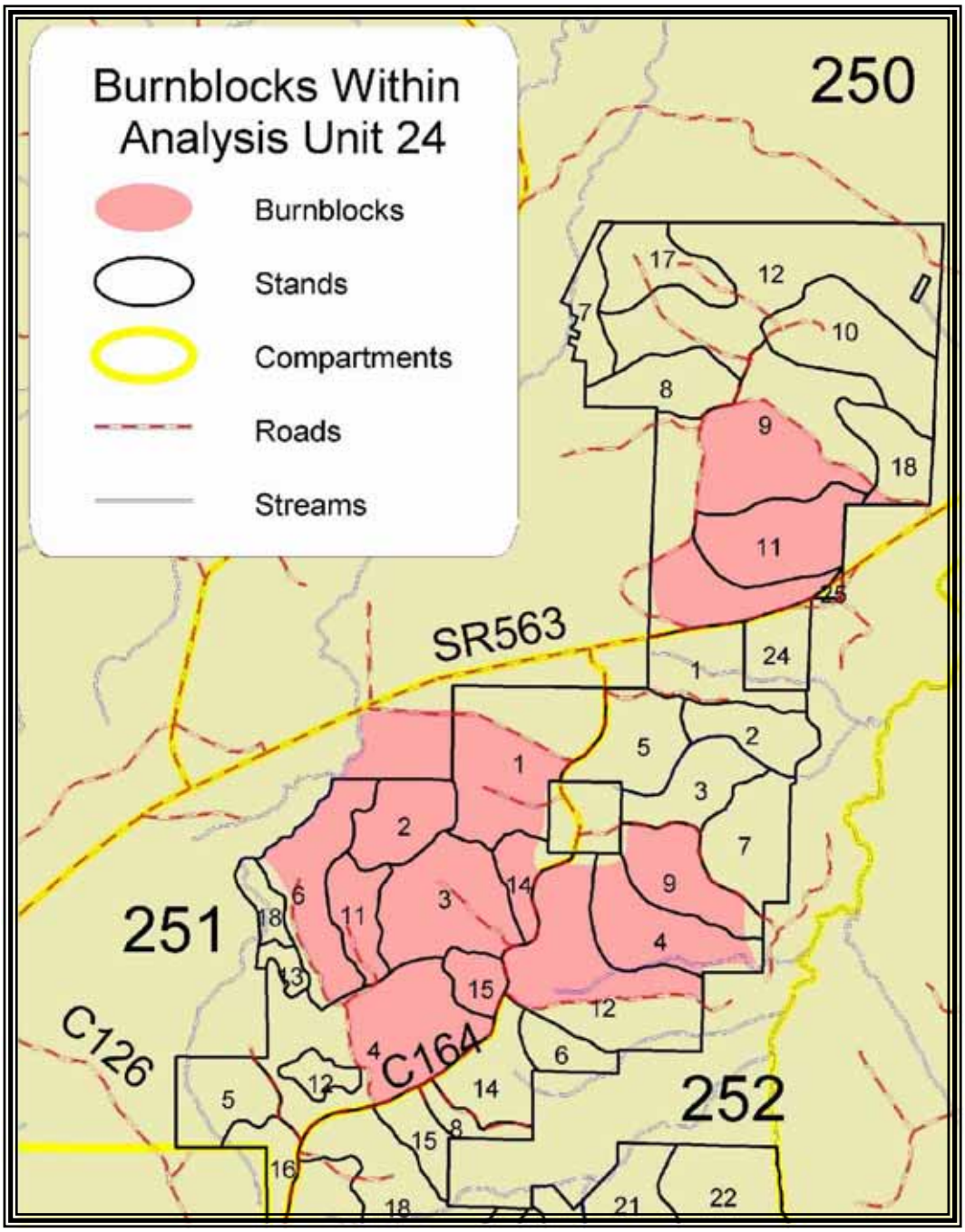


Figure 3.1: Planned Burning Areas in Analysis Unit 24: Areas in red are within the burning areas. Ridges and upland sites are suitable for regeneration to Longleaf Pine/Yellow Pine community management.

In recent years, the Homochitto National Forest has increased its prescribed burning program from approximately 6,000 acres to approximately 30,000 acres or more annually to accomplish this objective. Prescribed burning is limited to approximately 805 acres in this Analysis Unit. This is below what was likely influenced by fire in the past; however, landlines follow Government Land Office Survey boundaries and not logical prescribed fire control features. Fire must be controlled with minimal soil disturbance and safety and property risks. The planned or maximum burning area is compromised when safety and resource protection is considered.

The primary consideration of fire is that whether or not an area is burned sets the desired future condition. The longleaf/yellow pine community can be developed in areas with regularly planned burns. Outside the burning area, the natural progression is to move from pine to pine/hardwood communities over time, depending on the length of rotation. Stands tend to carry a hardwood midstory rather than low, grassy vegetation. The desired future condition would favor pine/hardwood stands by the end of a typical rotation. All areas within the burning blocks do not receive direct fire. Fire is allowed to back into drainages and pine hardwood stands at low intensity, just as it did naturally in pre-history time.

On the Homochitto National Forest, wildfires have resulted from natural ignition, accidental ignition, and intentional arson. There have been an average of twelve wildfires on the Homochitto National Forest each year, most of which are controlled with relatively few acres affected.

Southern Pine Beetle

Southern pine beetles and ips bark beetles (commonly associated with southern pine beetles, or SPB) are a constant threat to the southern pine forests. Endemic populations of SPB are a natural presence in the forest, but periodically the populations of these insects explodes, resulting in an outbreak or epidemic. The most recent southern pine beetle outbreak in Analysis Unit 24 occurred during 2002. Timber was removed as a result of that southern pine beetle epidemic. In 1995, spots occurred in un-merchantable sapling and pole timber stands. Because of the cyclic nature of southern pine beetle populations, after the last epidemic, populations decreased to endemic levels. Current evidence indicates increasing populations and outbreaks in the near future.

Many interacting factors may contribute to the start of southern pine beetle outbreaks. The most favorable condition is a large expanse of maturing and mature pine forests. This may occur in even-aged forests where trees of about the same age grow together in stands, or in uneven-aged forests where a range of tree sizes and ages may be present. An outbreak may be triggered by one or more events that reduce tree health and vigor, such as droughts, lightning, floods, and wind or ice storms. Slow-growing, unthinned or over-mature pine stands have also been associated with southern pine beetle outbreaks. Once favorable conditions exist, the very high reproductive potential of the southern pine beetle enables this pest to quickly reach outbreak status. If sufficient numbers of beetles respond to the attractant pheromones, even the healthiest trees will be successfully attacked (SSPB).

Bennett (1965) reported that dense pine stands and slow tree growth were frequently associated with outbreaks of SPB in the Gulf Coastal Plain. He further indicated the importance of stand age and composition in relation to susceptibility to bark beetle attack. Just as an abundance of suitable fuels increases the risk of forest fires, stands of dense, slow-growing natural or planted sawtimber have an increased potential for loss to southern pine beetle. Stands having these high hazard characteristics are more likely to suffer heavier losses over time than those classified as low hazard (Forester's Handbook for Reducing Bark Beetle and Disease-Caused Losses in Southern Pines, USDA 1985).

Severely damaged or weakened trees and stands are believed to serve as low-level southern pine beetle reservoirs from which future outbreaks occur when environmental conditions favor beetle development. Timely removal of these trees and stands during periods of low beetle activity may serve to prevent or slow the development of future outbreaks by removing sources of beetles that could otherwise contribute to future population buildups. Removal of high-hazard stands that harbor beetles over a broad geographic area will aid in preventing development of future outbreaks (USDA 1985). Most major outbreaks last from 3 to 5 years, and occur in irregular cycles of about 7 to 10 years. At times, the numbers of southern pine beetle are so low that multiple-tree spots may not be found in specific areas. Nevertheless, this insect is usually in outbreak status somewhere within its range (SSPB).

Photo 3.2: Current Conditions within Analysis Unit 24 include overstocked sawtimber stands of mixed pine, containing clumps of pine. (Stand 9, Comp. 252)

There are two primary integrated pest management strategies for management of southern pine beetle hazard (The Integrated Pest Management Decision Key for National Forests in Region 8):
1. Over-mature, low vigor stands should be regenerated to stands with younger, more vigorous trees. The 70-80 year old loblolly pine stands that dominate many of the upland sites in this Analysis Unit fall into this category. These sites were historically occupied by longleaf mixed with shortleaf and some loblolly pine on the lower slopes. Loblolly pine is off-site on these sites and is in deteriorating health over much of this Analysis Unit.

2. Thin over-stocked stands and stands that cannot be regenerated due to other multiple-use resource considerations in order to reduce hazards. There is a direct relationship to tree density (crowding) and the incidence and severity of southern pine beetle spots. Thinning has been demonstrated to reduce hazard.

Winds

Windstorms and tornados play a prominent part in natural stand alteration. Over the past five years, winds have caused extensive annual damage in some parts of the forest. Because of the relatively random nature of wind events, Analysis Unit 24 has not experienced any substantial wind losses in recent years; however, small areas of damage have been identified.

OTHER CURRENT CONDITION FACTORS

Late Seral

Late Seral stands have been identified (see Maps, Appendix B) for Analysis Unit 24. Late seral stands consist of large size trees, 18"-26" diameter at breast height (measured 4.5 feet up from the base of the tree) (Forest Plan, page 4-6). No activity is planned in these stands for this entry.

Threatened, Endangered, Sensitive and State Species

There are no Threatened and Endangered plant species confirmed to occur within the project area or on the Homochitto National Forest. A detailed discussion of potential project impacts on Threatened, Endangered, and Forest Service Sensitive species is found in the Biological Evaluation (BE) prepared for this analysis (Appendix D).

Forest Service Sensitive Species

The fetid trillium (*Trillium foetidissimum*), bay starvine (*Schisandra glabra*), cypress-knee sedge (*Carex decomposita*), Trachyxiphium moss (*Hookeriopsis heteroica*), and Small's wood-fern (*Dryopterus X australis*) are either considered confirmed residents or potential residents of the Homochitto National Forest. The project area was surveyed in 1992 and 2002 for the potential rare plants that could be expected to occur given known distributions, habitat requirements, and knowledge of the surveyor. None of these species were confirmed to occur ion the project area.

Hookeriopsis heteroica (Trachyxiphium moss)

Hookeriopsis heteroica (trachyxiphium moss) is a slender, green, flaccid, rather shiny moss growing in mats. It was not known to occur outside of Mexico until August, 1969 when it was collected growing on a wet, rotted log in a spring seep at Clear Springs Recreation Area, Homochitto National Forest. Between 1969 and 2000, it had been collected only two other times in the United States: both from Washington Parish, Louisiana. In September 2000, a concentrated effort was undertaken to confirm this species continued occurrence on the Homochitto. It was re-collected from the original location in September 2000. It seems that this moss is associated with decaying wood in springs and spring seeps. The specific type of seep seems to be of a type that has water flowing year-round. Water flow is obvious and mosses dominate the lowest level of the ground cover, although there are patches of bare sand and gravel present. There have been no spring seeps of this type located during field surveys between 1998 and 2001. Collections of mosses were made in 2001 but this moss was not collected. There are no known occurrences of Hookeriopsis heteroica in the vicinity of the project. All potential

habitats will be protected within expanded streamside management zones and standard wetland mitigation measures.

The proposed action and all action alternatives focus management activities on ridges and specifically avoid streamside management zones and all wetlands. Therefore, the proposed action and all alternatives may impact individuals but will not likely result in a trend towards federal listing or a loss of viability for the discussed species.

Carex decomposita (cypress-knee sedge)
The cypress-knee sedge is an aquatic sedge that is usually associated with cypress trees, logs, or knees. It occurs in areas of permanently flooded cypress timber. Frequently the cypress-knee sedge may occur on floating or partially submerged rotting logs or stumps and may form dense tussocks. It has been found in all light conditions from full sun to dense canopy. Because neither the species nor suitable habitat has been found in the vicintiy of the project, no direct impacts to the cypress-knee sedge is likely.

The proposed action and all alternatives focus management activities on ridges and specifically avoid streamside management zones and all wetlands. There are no known cypress sloughs or swamps in the analysis unit so it is very unlikely for the species to occur here. Therefore, the proposed action and all action alternatives may impact individuals but will not likely result in a trend towards federal listing or a loss of viability for the discussed species.

Dryopteris x australis (Small's wood fern)
The Small's wood fern occurs in moist to wet woodlands (shaded seeps and bald cypress swamps) comprised of several species of deciduous hardwoods and sweetbay, sometimes with baldcypress and dwarf palm. This species is known to occur on the Homochitto Ranger District but not in the planning unit and an extensive survey to locate additional populations in seemingly suitable habitat on the forest has been conducted without additional populations being located (J.A. Smith, 1995). No populations of this species were located during site surveys. No management activities are planned for areas of seemingly suitable habitat.

The proposed action and all alternatives should have No Impact for the discussed species.

Schisandra glabra (bay starvine)
The bay starvine may be locally abundant on steep slopes beneath deciduous hardwoods (beech-magnolia) and occasional pines, usually midslope or lower, and less commonly found on floodplains along the bases of mixed hardwood slopes. Because occurrences of this species within the project vicintiy should be protected by inclusion in a late seral stands or within the expanded streamside management zones, no direct effect of the project on the species is expected.

Therefore, the proposed action and all action alternatives may impact individuals but will not likely result in a trend towards federal listing or a loss of viability for the discussed species.

Trillium foetidissimum (fetid trillium)

The fetid trillium has a wide range of reported habitat preferences: ravines, floodplains, low ground, in rich woods, even on roadsides and shoulders, in silts, sandy-alluvium, and loess soils. It is often locally abundant in rich soils on steep slopes in the shade of mixed pine-hardwoods and less commonly on low ridges, in well drained soils. The fetid trillium also occurs in floodplains in mixed hardwood forests.

Fetid trillium was found by J. A. Smith "on all sites that I have covered during my endangered plant survey" (J.A. Smith, Pers. Comm., 1992). They are considered widespread on the Forest but have not been confirmed in the analysis area.

If present, populations with the largest numbers are expected within the expanded streamside management zone and in the late seral stands. Therefore, the proposed action and all alternatives may impact individuals but will not likely result in a trend towards federal listing or a loss of viability for the discussed species.

State Species of Local Concern

The silky camellia, Florida Keys hempweed, single-headed pussytoes, appendaged lobelia, swamp hickory, allegheny spurge, and crested fringed orchid are confirmed or likely inhabitants of the Homochitto National Forest. Ginseng has not been documented on the Forest and is an unlikely inhabitant, but could potentially be present.

State Species of Local Concern confirmed to occur within the project area are silky camellia (*Stewartia malacodendron*) and Florida Keys hempweed (*Mikania cordifolia*). The silky camellia can be found infrequently on steep lower slopes in the shade of mesic hardwoods or mixed pine-hardwoods and less commonly on low ridges; in well drained soil. Silky camellia does not form large stands but typically occurs as 3-10 plants on north facing bluffs and in deep ravines, nearly always associated with small trees of Witch Hazel (Hamamelis virginiana). It seldom grows in areas which have repeated, frequent fires, and it is thus doubtful if these small trees have much fire tolerance. All known occurrences are forested. The plants may survive in full sunlight after timber harvest but they show no aggressive re-establishment in forest gaps resulting from wind throw. Suggested management strategy to maintain this species is to maintain a forest cover, avoid surface disturbance that may enhance the spread of aggressive evergreen shrubs such as Yaupon, Common gallberry, Florida Anise, etc. and limit any controlled burns to winter when humidity's are high and the resulting fires are cool. Silky camellia were found in Compartment 250, Stand 9. The silky camellia would be protected from human influence by streamside management zones and reserve area inclusions. The District Botanist would mark these areas for protection during sale layout.

Florida Key's hempweed occurs in rich hardwood slopes and ravines, mixed pine-hardwood slopes, and hardwood bottomland forests and thickets. It is more abundant and predictable in the deep loess region. A small population of this species was found in past surveys, and *Mikania* spp. are now present but have not been confirmed as *M. cordifolia*. The population was found in a late seral stand in which no management activity has occurred or is planned to occur. Streamside management zones and late seral stands would protect the Florida Keys hempweed.

The single-headed pussytoes was not confirmed during this survey, however given the habitat, it could potentially occur here. The habitat for this species on the Homochitto seems to be disturbed slopes (bare soil of steep slopes where the topsoil has eroded or slipped) of steep mesic forests. The species forms dense mats of basal rosettes and the species has not been observed in open areas or in areas subject to periodic fire. The tentative management recommendation would be as above with the additional condition that the microhabitat is often extremely steep. Individuals or small groups of single-headed pussytoes could potentially be impacted by logging activities, but these species would also be somewhat protected by the streamside management zones. Impacts from logging activities would be ephemeral in nature.

Appendaged lobelia is associated with grasslands. Grass-dominated understories can be found in openings and in pine stands that have been thinned and prescribed burned. While not specifically documented on the Homochitto National Forest, the likelihood exists that further survey efforts will locate the species in open, burned, thinned pine stands. The appendaged lobelia would, in the long-term, benefit from the logging activities. This species prefers grass-dominated understories in pine stands that are fire maintained.

Swamp hickory and the crested fringed orchid may occur in swamps or in the margins of swamps. The orchid occurs in shaded mucky wetlands along streams and lower slope seepages over organic soil. This is a woodland species growing with or near the green rein orchid—both occurring on streamside hummocks and in swampy woods that have abundant wet soil. These species are not expected to occur and were not found within the project area during plant surveys. Swamp hickory and crested fringed orchid would be protected by implementation of streamside management zones.

Allegheny spurge and ginseng are associated with deep moist drainages with dense canopies near perennial and large intermittent streams. The analysis area does contain suitable habitat for these species. To date, ginseng has not been documented on the Forest and Allegheny spurge has been documented at only two locations on the Forest. Neither of these two locations is within the analysis area. Ginseng has not been documented on the Forest and is an unlikely inhabitant, but could potentially be impacted in the short-term by logging activities. Allegheny spurge habitat would be partially protected by streamside management zones, however only two populations are known on the District and neither are found within this Analysis Unit.

Proper management of the streamside management zones, reserve inclusions, and late seral stands should allow at least some individuals of these species to continue to persist, despite management activities in the area.

Environmental Consequences

Proposed Action and Proposed Action Without Herbicides

The long-term age class distribution relationships are the same for these alternatives: the difference is the use or non-use of herbicides. 279 acres of mature yellow pine dominated by loblolly pine would be regenerated and established as early seral habitat this entry. Reforestation would include planting 199 acres of longleaf/yellow pine, along with seedtree regeneration of 49 acres and 31 acres of loblolly planting for pine/hardwood. 38% of the forested acres in the

Analysis Unit would remain in age classes of 60 years or older. Regeneration removes the older trees and associated risk, and replaces them with seedling and sapling stands that have little insect, disease, and wind risk. By restoring the historic longleaf pine component, future stands can be retained at higher health levels for much longer periods.

If harvest were to take place immediately, about 26% of the Analysis Unit acres would fall within the early seral age class. However, due to the analysis process and required public involvement and appeal periods, followed by sale layout and contracting, a vegetation management project such as this often takes 2-3 years between publication of the Environmental Assessment and final harvest/regeneration. Over the next several years, acres currently in early seral habitat will move into intermediate age classes, leaving only 16% early seral.

Regeneration under these alternatives falls well below the Forest Plan maximum of 548 acres, which would maximize forest health and replacement of ageing stands. To address health concerns in stands not being regenerated, these alternatives thin a total of 947 acres of pine sawtimber and small roundwood. After thinning, all stands currently rated at high hazard to southern pine beetle loss will be at medium to low hazard. For about three years after thinning, mature stands would have a somewhat higher risk of wind damage in windstorms.

When compared to past harvesting intensity for this analysis area, or the Homochitto National Forest as a whole, the "Proposed Actions" and Alternative 3 do not represent an increase of harvest activity or road use, or their associated soil and water impacts. Thinning has been an on-going management activity since the 1960's and tends to be very low impact. Regeneration does not take forestland out of production, and fragmentation in a widely forested environment does not appear to be an issue supported by current literature. These alternatives address the full range of identified purposes and needs within the standards and guidelines of the Forest Plan.

The majority of soils in stands where longleaf pine will not be planted are suitable soils for longleaf regeneration. Areas with unsuitable soils are generally located in drainage bottoms or lower slopes where longleaf pine did not historically exist. These areas are generally already protected through other mitigation measures such as SMZ's or reserve clumps. However, there is still a potential Longleaf pine will be planted on unsuitable micro sites located inside unit boundaries. This is not expected to cause a significant cumulative impact, as only those soils located on ridges or upperslopes will be planted to longleaf pine. See soil map in Appendix B.

Alternative 2, Maximum Regeneration

Alternative 2 includes thinning and regeneration. The use of seedtrees and/or Clearcutting would reduce the existing mature pine stands by the maximum allowable amount of 548 acres and create the greatest amount of early succession vegetation. Regeneration under alternative 2 includes the planting of longleaf pine, which is an accepted management practice as described by two Forest Plan amendments. These are amendments #2 and 13. With this alternative thinning acreage, at 730 acres, will be lower than the proposed action. The age class distribution will change to 27% of the total working groups over 60 years of age. Early seral habitat will increase to 27%.

When compared to past harvesting intensity for this analysis area, or the Homochitto National Forest as a whole, alternative still does not represent an increase of harvest activity or road use, or their associated soil and water impacts. Thinning has been an on-going management activity since the 1960's and tends to be very low impact. Regeneration does not take forestland out of production, and fragmentation in a widely forested environment does not appear to be an issue supported by current literature.

By using clearcuts with reserve groups, stands can be managed for a mixed pine forest type. Seedtree application provides an opportunity to utilize existing species for natural regeneration, release of desirable hardwoods, and regeneration of hardwood rootstock. Both forms of regeneration would provide opportunities for early seral species and species associated with edge habitat. Areas regenerated would also provide distinct structure changes and managed age class distribution within the analysis area.

Alternative 4, Thin Only

Thinning does not alter the age class distribution of any stand, and does not address concerns related to the large percentage of the Analysis Unit's pine stands currently in the mature age classes. It does not restore the historic longleaf pine component native to the Homochitto National Forest, and therefore, does not address longer-term management objectives identified in the purposes and needs. Thinning is applied to the same stands identified in the "Proposed Actions", adding stands requiring thinning, that would otherwise have been regenerated. Thinning alleviates over-crowding in stands and clumps within stands. As a result, low-vigor trees are removed and the remaining trees have additional room to grow, increasing individual tree health. Under Alternative 4, the southern pine beetle hazard rating for all stands will be reduced to medium or low. This is a short-term improvement, but does extend the effective life of stands addressing the issue of favoring older age-class stands. The 51% of the Analysis Unit in the 60+ age classes will remain unchanged. Eventually even thinned stands decline in health and are lost to wind, insects, or disease. This alternative addresses two identified purpose and needs: pine beetle hazard is temporarily reduced, and pine stands can be thinned to provide interior pine forest conditions of limited midstory and open grassy understories.

Thinning would not only increase the amount of forage produced, it would also affect the quality of this forage. Although the protein, phosphorous, and calcium content of forage grown under heavy shade can be greater than forage grown under full sunlight, shade can also reduce the digestibility of forage by causing a high cellulose content, and the reduced digestibility can more than negate the advantage. Increasing light from 8% to 45% of full sunlight would result in more leaf biomass produced, and the forage would tend to have increased levels of soluble carbohydrates, digestible energy, and digestible dry matter. (Hunter 1990)

No Action

The "No Action" alternative retains the 51% of the forest in older age classes. However, it also retains the forest at its highest level of risk to natural loss. Natural loss histories indicate that over the next 10 years, substantial natural losses would take place within Analysis Unit 24. Therefore, there is no guarantee that choosing this alternative would increase older age classes and reduce early seral emphasis. It does not create the historic interior pine forest conditions, and forgoes the opportunity to restore the longleaf pine component, which can remain stable for

200 or more years and offer regeneration options not readily applicable to loblolly pine. As a result, this alternative does not provide the opportunity to manage future stands for longer rotations, which is the primary means of maintaining a higher percentage of mature habitats. This alternative does not address any of the stated purposes and needs of this project.

All alternatives meet Forest Plan standards for late seral habitats. No hardwood and pine hardwood stands are being regenerated. As a result, there are no impacts or differences between alternatives with respect to these issues. Regeneration removes some mature hardwood. Much to the quality hardwood in regeneration units will be retained in streamside zones and leave clumps. Hardwood components will develop along with other components of the regenerated stands.

CUMULATIVE IMPACTS

The President's Council on Environmental Quality (CEQ) publication, Considering Cumulative Effects Under the National Environmental Policy Act states, "Evidence is increasing that the most devastating environmental effects may result not from the direct effects of a particular action, but from the combination of individually minor effects of multiple actions over time."(p 1) Cumulative impacts must be analyzed for effects over both area and time; however, the CEQ makes it clear that it is unproductive to analyze the cumulative effects of an action on the universe. The purpose of cumulative effects analysis is described as an aid to the decision maker and information for interested parties. To meet this objective, analyzed effects must be "meaningful" to the proposed action and alternatives. (p 8) The CEQ cautions against an analysis of a laundry list of all possible issues that may have "little relevance to the effects of the proposed action…." and directs the analysis to "count what counts". For example, Item 8, Table 1-3 (p 8) of the referenced document describes the characteristic of a trigger or threshold as causing "fundamental changes in system behavior or structure." An example of a secondary effect (Item 7) is commercial development following highway construction. Vegetation is the most visible forest component, however, highly visible changes such as harvest and reforestation of a mature stand is not necessarily cumulative.

There was a concern that actions proposed in this project would be cumulative because a number of other projects were also being scoped and evaluated for needs. Together, these projects seem to present the appearance of large numbers of regeneration and thinning acres, widely distributed across the District and compressed into a short time frame. The "Proposed Action" for Analysis Unit 24, along with proposed or estimated vegetative management activities on other Homochitto National Forest lands within three years of anticipated implementation, is summarized in Table 3.9. The number of projects may be somewhat higher than the long-term average because litigation delays have resulted in some projects being delayed, while other scheduled units are being inventoried and evaluated. The three-year period was chosen because the Final EIS for the Forest Plan confirmed that, with mitigation, the potential for soil and water impacts diminished rapidly over the first year after implementation and returned to normal base levels by the end of the third year.

Table 3.9: Harvest Activities within 3 years of Analysis Unit 24

Analysis Name	Year Actions Planned / Implemented	Regeneration Acres	Thinning Acres	Total Analysis Unit Acres (FS only)
AU 1	2003 μ	605 λ	720	5,697
AU 2 ξ	2006 μ	318	1,240	4,645
AU 4 ψ	2004 μ	131	1,111	4,609
AU 5 ψ	2004 μ	295	850	3,800
AU 7	2003 μ	502	915	7,290
AU 12	2003 μ	273	1,140	3,760
AU 14	2000	172	3,151	5,569
AU 16 ξ	2006 μ	291	953	4,040
AU 17	2001	719 λ	2,594	6,028
AU 20	2003 μ	351	1,645	5,097
AU 22 ψ	2004 μ	294	518	3,300
AU 23 ξ	2006 μ	360	1,328	5,230
AU 24 ξ	2005 μ	230	947	2,194
AU 27 ξ	2005 μ	294	1,174	5,872
AU 30 ξ	2005 μ	206	768	3,084
AU 32 ξ	2006 μ	245	938	4,097
AU 36 ξ	2006 μ	226	905	4,526
AU 37 ξ	2006 μ	214	1,062	3,773
AU 38 ψ	2004 μ	233	782	3,973
AU 39 ψ	2004 μ	278	856	5,886
1st Thinning 2	2000 - 2003 μ	0	2,578	2,578
1st Thinning 3 ψ	2005 μ	0	2,740	2,740
2002 SPB Spots *f*	2002	378	0	378
TOTALS:		**6,615**	**28,915**	**98,166**

ψ - Acres projected based on stand review.
ξ - Acres projected based on long-term averages.
μ - Projected implementation date.
λ - Includes only regeneration openings in uneven-age management areas. Acres between these small openings are included with "thinning acres".
f - Not planned harvest. Includes spots greater than 5 acres.

In determining significance, NEPA directs that we look at impacts rather than acres or other factors. As a result, cumulative effects determination must relate to the scale of the treated and untreated lands and the amount of actual vegetative change taking place in the natural and/or managed system. Table 3.9 estimates 6,615 acres of regeneration applied over 98,166 acres during a 6-year period. Prescriptions normally are applied to address needed vegetative management treatments over a 10-year period within the Analysis Unit. Therefore, additional reforestation would not be anticipated unless salvage or other uncontrolled natural events occurred. This represents approximately 6.7% over a ten-year period, or just over 1% of the available acres per year for the "Proposed Action" and Alternative 2. In general, 90% or more of the mature forest is pine or pine/hardwood. Loblolly pine is the dominant component. It would

require about 60 additional years to harvest these stands at the current rate of regeneration. Loblolly pine is a relatively short-lived pioneer species considered "off-site" or not well adopted to the well-drained uplands of the Homochitto National Forest. There is no expectation that the current pine component will live an additional 60 years.

Many comments the district has received over the past several years seem to presuppose that if we did not harvest, the forest would remain intact and unchanged. This is not the case. In looking at some natural loss rates, in 1995, more than 5000 acres of mature forest were lost to southern pine beetle infestations. This represents approximately 2½% of the forest base in one year – more than five times the estimated planned harvest rate shown above. Since that time we have had four major windstorms that resulted in large numbers of sub-acre gaps in the forest, and a tornado that cleared approximately 400 acres. Pine beetle activity is now increasing in accordance with its predictable cycle. It would be difficult to establish a cumulative effect for planned regeneration taking place at less than the normal loss rate expected over the next five-to-six entry cycles.

Photo 3.3: Southern pine beetle spot similar to spots in AU-24. In the absence of planned regeneration, the forest will not be stable, but will be replaced by insect, disease, wind, and fire events. This stand was representative of critical interior pine forest habitats and is an example of natural losses in high risk and older stands. This stand has a well-developed midstory, an off-site hardwood understory, and there is no advanced pine regeneration. Without site preparation or additional disturbance, the midstory hardwoods will occupy this site resulting in a forest type conversion to a community that would have little benefit to the red-cockaded woodpecker, numerous neotropical migrant birds which are declining regionally, and other species of interest.

Another consideration is that forests managed for an even distribution of age classes go through a normal progression of replacement every 10 years. Stands grow out of the early seral age classes into intermediate age classes. Some of the intermediate stands grow into the late seral age classes. The following two tables demonstrate age relationships in five years with and without regeneration. It can be seen that there is little change in early seral habitat over time for the regeneration alternatives, while the non-regeneration alternatives show a substantial reduction. There are currently few stands in the 50-year age class to progress into the 60-year

age class. However, over time, if relatively uniform early seral was created at each entry, distribution would become even by age class and regeneration reductions in mature age classes would be offset by in-growth. This situation would clearly be non-cumulative.

Table 3.10: Distribution of Forest Working Groups by Age in 5 Years with Regeneration

Forest Working Group	Early Seral	Intermediate	>60 Years	Totals	Percent
Yellow Pine	29	990	796	1815	83
Yellow Pine w/ Longleaf	199	15	0	214	10
Pine/Hardwood	117	0	29	146	7
Hardwood	0	0	0	0	0
Totals	345	1005	825	2175	
Percent	16	46	38		100

Acres and percentages are approximate

Table 3.11: Distribution of Forest Working Groups by Age in 5 years w/o Regeneration

Forest Working Group	Early Seral	Intermediate	>60 Years	Totals	Percent
Yellow Pine	29	990	1075	2094	96
Yellow Pine w/ Longleaf	0	15	0	15	1
Pine/Hardwood	37	0	29	66	3
Hardwood	0	0	0	0	0
Totals	66	1005	1104	2175	
Percent	3	46	51		100

Acres and percentages are approximate

If a cumulative effect were anticipated, it would be associated with the "No Action" or "Thin Only" alternative. These alternatives allow only natural, catastrophic events to drive regeneration and stand replacement. Stand replacement over time is a natural process. With protection from fire, a moderate to heavy midstory would occupy vacated sites, and stands would generally convert to a high percentage of low quality hardwood with limited hard mast potential.

One of the primary considerations of the interior pine forest is fire. In many instances, prescribed fire can restore many of the components of this forest community, even when loblolly or shortleaf pines make up the dominant overstory. A substantial benefit of longleaf is its 200-year plus longevity, which supports long-term, stable late seral communities. Numerous species of the Homochitto River Basin are dependent on, or benefit from, this community type, including the endangered red-cockaded woodpecker, many of the declining neotropical migrant birds, quail, turkey, and deer. The Southern Forest Resource Assessment http://www.srs.fs.fed.us/sustain/ identifies the longleaf interior pine forest ecosystem as one of the 14 critically endangered communities. The loss of interior pine forest would be considered additive to an already adverse cumulative condition. An alternative that did not restore this

community on appropriate sites would not address this concern. Restoration of longleaf is a stated purpose and need of this project.

The District fully considers activities outside the National Forest boundaries when assessing cumulative effects. Regionally, the Southern Forest Resource Assessment discloses that forested acres have been relatively stable and are expected to remain so through 2040. This report identifies forest losses associated with development, but found that conversion of farmlands back to forest offset much of that loss. Farm agricultural acreage was the shrinking component, since it was also being lost to urbanization. Appendix I, Water Quality, contains an extensive discussion and projections of activities on private lands. To summarize, an analysis of the AU-24 watershed, including private lands, indicates a very modest increase in development and some conversion to forests.

More important to cumulative impacts analysis are the habitat contributions and soil and watershed impacts of private lands. Management taking place on private and commercial forestland is primarily income-motivated. Regeneration cuts may occur not only randomly, but also over large acreages. Private land-use patterns are often short-term and subject to frequent ownership changes. Changes in ownership are commonly accompanied by changes in management objectives. As a result, predicting timber harvesting on neighboring lands and their effects is imperfect, at best.

Private forests are rarely managed past 40 years of age, and the percentage of early seral is high. There is little or no late seral habitat on privately managed forest tracts. Occasional exceptions are recreational ownerships that may or may not be harvested, and have no scheduled rotation. Burning, even on private commercial lands, is rare. Private forestland management is a primary contributor to the critical shortage of both longleaf and late seral ecosystems identified in the Southern Resource Assessment.

Because of their short rotation management, there is no cumulative relationship with respect to late seral habitats, red-cockaded woodpecker habitat, and other special habitats. Private lands generally do not provide these habitats, and the National Forests stand alone in meeting these needs. The Homochitto National Forest represents a limited resource in southwest Mississippi. Part of the associated obligation is planning for replacement of natural losses and avoiding catastrophic loss that might place species of special concern at risk. When viewed in perspective, there has been a cumulative reduction in interior pine/late seral habitat, but the loss is on a scale of 80 to 90 million acres. Regenerating the 279 acres proposed will not meet the benchmark of causing “fundamental changes in system behavior or structure” (CEQ, Cumulative Effects under the NEPA). Not harvesting will not restore past losses at a measurable level. Forest structure on National Forest lands will change over time as a result of natural losses and events, whether or not planned harvests are implemented. Planned harvest can meet the obligation of sustained management of the remaining late seral and interior pine forest habitats.

Planning harvests can reduce the risk of loss in general, and guard against wide-scale changes that could have adverse effects. The “Proposed Action” and Alternative 3 would provide for 199 acres of longleaf pine component restoration, which would be a small but incremental improvement, and provide for true late seral interior pine forest management in the future. This

option is not available with the existing loblolly pine stands. Further, the "Proposed Action", combined with past activities, future planning, and proposed actions in other analysis areas, represents an even flow of habitats through all age classes and seral stages. This is inherently non-cumulative. "No Action" would appear to add to the existing cumulative loss.
To avoid large, localized effects, the District plans harvests in such a manner that they do not add to known, ongoing harvests on adjacent private lands. Distributing regeneration areas too widely, however, tends to break up large blocks of similar habitat and is less advantageous for some species. Harvests are grouped or planned adjacent to existing established regeneration as necessary to maintain large habitat blocks and create future large habitat blocks.

No cumulative vegetative effects associated with thinning could be identified. In pine areas thinning helps to restore historic interior pine forest structure and habitat relationships. In pine/hardwood areas and pine areas with a desired future condition of pine/hardwood (outside the identified burning areas), thinning tends to remove those pines that would most likely be lost naturally over the next few years, and improve hardwood rootstock by removing low quality, soft mast producers. The openings created provide growing room for hardwood development. No hardwood stands are proposed for thinning. Thinning is a forest health treatment that tends to maintain the natural relationships, but reduces the time and health risks associated with expected changes over time.

The cumulative loss of hardwood components is another area where the public has expressed consistent concern. This stems from the fact that the Homochitto National Forest was purchased as cutover land in the 1930s. The largest share of cutting occurred in the 1920s. Upon Federal acquisition, the lands were regenerated and protected for 40 to 50 years. The first substantial harvests were thinning operations beginning in the 1960s. During this time, hardwoods developed along with the pines and often became large, productive trees. In 1970, with few exceptions, most stands on the Homochitto National Forest were reaching maturity with large trees, including hardwoods. Faced with more than 160,000 acres of pine stands approaching an age when health would decline, the District began even-aged management. There is no question that when mature stands are reforested, the number of large hardwoods is reduced. However, the period from 1930 – 1970 was not an even-flow period. This period was marked by a cumulative increase in older aged classes and large diameter hardwoods when compared to forest conditions in 1930.

This does not represent a cumulative loss in hardwoods or lands allocated to hardwood and pine/hardwood management. Information gathered for the Southern Forest Resource Assessment indicates a gradual increase in upland hardwoods between 1950 and 1990. The Assessment predicts that there will be some decline between 1995 and 2040, but that upland hardwoods will remain the forest type with the greatest area. The acreage allocated to hardwoods is not declining regionally.

The published Forest Survey data for Mississippi, "Forest Resources of Mississippi, 1994", Table VI, http://www.srs.fs.fed.us/pubs/viewpub.jsp?index=2482 shows increases in the acreage allocated to hardwood in all categories of ownership. Table 19 of that document shows that hardwood growth exceeds the rate of hardwood removals, for a net increase in hardwood growing stock. In contrast, pines are being cut at a rate greater than growth, for a net reduction

in growing stock. A subset of data for the Homochitto National Forest and surrounding counties indicates similar relationships. Stand inventory data for the Homochitto National Forest shows more than twice the acreage allocated to hardwood and pine/hardwood now when compared to 1981.

With more land allocated to hardwoods, there is no basis for considering the potential for a cumulative loss in hardwoods. A reduction in the number of large diameter hardwoods must be considered, but does not appear likely since with maturation, hardwood components are being retained in reforested areas. The entire Homochitto National Forest was cut at about the same time: hardwoods in our current stands are about the same age as the pines. On the appropriate site, 20-24" DBH hardwoods can be grown in 50 to 60 years. This corresponds favorably with the pine diameters and demonstrates that hardwoods in reforestation areas can be expected to develop into large-diameter trees, as they have in the past.

A number of mitigations are provided to insure appropriate hardwood components. Large streamside zones and leave tree clumps are retained to maintain some of the best hardwoods on the site. In interior pine forest thinning, hard mast producing hardwoods over 12” DBH are generally retained. Areas outside the identified burning blocks are managed based on a long-term desired future condition of pine/hardwood. The combination of allocating more acreage to hardwood and pine/hardwood management and the expectation that hardwood components in reforested stands would develop as they have in the past, would indicate that in the long-term there are likely to be more mature hardwoods on the forest, and a steady supply of replacement hardwoods as new areas are regenerated. This relationship would apply to all alternatives for this project.

Confirmation of this condition is provided by Forest Plan 1981 data, which indicated that only 11% of the forest had a stand initiation date prior to 1910. The forest developed through the mid 1960s went from seedlings and saplings to intermediate and large sawtimber. Thinning was the primary treatment during this period, and regeneration was generally limited to replacement of natural losses such as pine beetles or tornados, or reforestation of non-forested acquisitions. Forest Plan data indicates that only about 2% of the forest has a stand initiation date falling between 1940 and 1960. These age relationships were appropriate because the forest was immature and developing. Both past and current laws governing timber harvests on National Forest lands set maturity as one of the primary considerations in planning for regeneration. However, the entire forest was maturing as a single unit. In 1960, more than 95% of the forest was mature or rapidly approaching maturity. Historically, the majority of the pine component had been longleaf. Because of the unique regeneration characteristics of longleaf pine, this component had been lost and replaced with the shorter-lived loblolly and shortleaf pines. The need to regenerate longleaf was an important consideration.

Because large tracts of land were harvested at the same time, much of the forest moved into a high hazard condition for southern pine beetle at the same time. The Homochitto National Forest consisted of approximately 170,000 acres of maturing forest, increasingly susceptible to natural losses. This situation was not unique to the Homochitto National Forest: most of the National Forests in the East had been harvested since the turn of the 20th century and were maturing together. Loblolly had replaced longleaf on nearly seventy million acres across the region,

limiting the time available to replace this ageing, short-lived species in an orderly basis. The initial laws dealing with harvest from National Forests limited harvest to mature single trees. However, since forests were even-aged and all trees were maturing together, new legal and procedural directives were legislated (the National Forest Management Act) to deal with these new challenges on USFS land.

Even-aged harvests and regeneration began in the late 1960s, but less than 4,000 acres were initiated on the Homochitto National Forest during that decade. Beginning in the 1970s, regeneration has taken place at a relatively uniform pace: 1970-1979 = 21,877 ac.; 1980-1989 = 24,910 ac.; and 1990-1998 = 24,877 ac. Thinning records are not readily available for the Forest: until recently updated, the Region 8 stand database was designed to maintain only current conditions and needs. On-the-ground observations of professionals during field inventory indicate that many stands were thinned in the 1960s, prior to initiating a sizable regeneration program. By the mid-1980s these stands had grown and required thinning again, and regeneration areas began to reach merchantable size. Thinning treatments have grown steadily since that time to meet the silvicultural needs.

When viewed with regard to the approximately 191,000 acres of Federal land within the proclamation boundary of the Homochitto National Forest, only 3.4% of the forest is projected to be regenerated within 3 years of Analysis Unit 24. This does not represent a cumulative impact. Interspersed among these acres are approximately 224,000 acres of private land, used mainly for private or commercial short-rotation forest, pasture and cropland, and residential dwellings. Management taking place on private and commercial forestland is primarily income-related.

Vegetation is not an end unto itself: the true purpose of managing for particular vegetative conditions is to produce or maintain the habitats of the forest community, and to serve the public through a mix of multiple-use benefits, including a variety of recreation uses. The real measures of accomplishment for forest vegetation manipulation is not in numbers of trees in any given condition, but in the response of Management Indicator Species and other species of special concern, and in public use patterns of National Forest users. Analysis of past and present activities indicates that the "Proposed Actions" and other action alternatives will not negatively affect MIS and species of special concern, and in many cases, will cause a short- or long-term positive effect. Issues 6 and 7 discuss this further. In addition, over the past 30 years there has been steady or increasing public use of the Homochitto National Forest for a variety of recreation activities, despite the continued presence of active management activities such as thinning and regeneration. It would appear, therefore, that these activities do not produce a negative cumulative impact over time for the species discussed or for public forest users.

FOREST HEALTH (ISSUE 5)

Affected Environment and Environmental Consequences

FIRE

Resource managers generally consider periodic burning to be a maintenance activity in the fire-dependent biological communities such as what this project is intending to foster. Reduced burning would likely result in a continuation of the cumulative effect that fire suppression has

had since the Homochitto National Forest was harvested prior to acquisition. During that period, fire-dependent communities have declined on the district and across the south. Many of the listed species, sensitive species and state species of local concern in this region, both plants and animals, are associated with that habitat, and are an example of the regional cumulative effect of long-term loss of fire-dependent communities.

Accumulation of fuels within the project area would be combined for fuel models nine and two. Using a two- to three-year cycle, a prescribed burn typically removes approximately three tons of fuel per acre. Without prescribed burning, accumulated fuels would present an additional fire hazard. Because of the high humidity and warm temperatures, rapid decomposition typically limits the accumulation of fuels to a 5-10 year build-up, depending on a variety of site/location factors. Fuel and deadfall buildup would not be cumulative beyond that point. However, this higher level of deadfall and the increase in woody brush and understory components create competing habitat and populations that were not typically present prior to reductions in burning. Developing the historic, fire-dependent, interior pine forest conditions is a stated purpose and need for this project.

The "Proposed Actions" and other action alternatives will all result in thinning stands such that prescribed fire can be effectively used to control midstory vegetation and create a grass/herb/low shrub understory typical of the historic forest. This would contribute to a forest-wide effort to restore pyric communities. Maintaining or restoring long-term historic community relationships would not be considered a cumulative effect.

Prescribed burning may result in some minor soil exposure. On the Talladega National Forest, monitoring of prescribed burns following a herbicide treatment revealed that 75% or more of the ground cover remained intact after a moderate burn (1988). In another study, sites with slopes as steep as 30% experienced low sediment production after a prescribed burn (Shahlaee et al.1991). Because wildlife prescribed burns are generally of low to moderate intensity, they have very few adverse effects to the water resource. Some minor soil exposure may occur. Water yields would not be affected since the overstory is retained. Nutrients are usually lost due to consumption of the forest floor duff, yet soil quality is not usually impaired

The Proposed Action and Alternatives 2, 3, and 4 would all generate sale area improvement funds that can be utilized to support prescribed burning in the project area. This contributes to a forest wide effort to restore pyric communities. Thinning in particular allows a full potential of burning. Maintaining or restoring long term historic community relationships would not be considered a cumulative effect.

Prescribed fire may be applied to stands under the "No Action" alternative, however, without thinning to address midstory trees and to open stands to sufficient light to develop a grass and low shrub understory, fire would be largely ineffective in developing the historic interior forest conditions once common to the Homochitto National Forest. Therefore, "No Action" does not address this purpose and need.

SOUTHERN PINE BEETLE

The most recent southern pine beetle outbreak in Analysis Unit 24 occurred during 2001. A small amount of timber was removed as a result of that southern pine beetle infestation. Larger areas were affected in the epidemic of 1995-96, mainly in un-merchantable pulpwood stands. Sites most affected by the southern pine beetle infestation included stands of mature pine and pine/hardwood.

Many interacting factors may contribute to the start of southern pine beetle outbreaks. The basic requirement is a large expanse of maturing and mature pine forests. This condition may occur in even-aged forests where trees of about the same age grow together in stands, or in uneven-aged forests where a range of tree sizes and ages may be present. An outbreak may be triggered by one or more events that reduce tree health and vigor, such as droughts, lightning, floods, and wind and ice storms. Slow growing, unthinned or overmature pine stands have also been associated with southern pine beetle outbreaks. Once favorable conditions exist, the tremendous reproductive potential of the southern pine beetle enables this pest to quickly reach outbreak status. If sufficient numbers of beetles respond to the attractant pheromones, even the healthiest trees would be successfully attacked. (SSPB)

Bennett (1965) reported that dense pine stands and slow tree growth were frequently associated with outbreaks in the Gulf Coastal Plain. He further indicated the importance of stand age and composition in relation to susceptibility to bark beetle attack. Just as an abundance of suitable fuels increases the risk of forest fires, stands of dense, slow-growing natural or planted sawtimber have an increased potential for loss to southern pine beetle. Stands having these high hazard characteristics are more likely to suffer heavier losses over time than are those classified as low hazard. See Appendix K (Forester's Handbook for Reducing Bark Beetle and Disease-Caused Losses in Southern Pines, USDA 1985).

Severely damaged or weakened trees and stands are believed to serve as low-level southern pine beetle reservoirs from which future outbreaks develop when environmental conditions favor beetle development. Timely removal of these trees and stands during periods of low beetle activity may serve to prevent or slow the development of future outbreaks by removing sources of beetles that could otherwise contribute to future population buildups. Removal of high-hazard stands that harbor beetles over a broad geographic area would aid in preventing development of future outbreaks (Forester's Handbook for Reducing Bark Beetle and Disease-Caused Losses in Southern Pines, USDA 1985). Most major outbreaks last from 3 to 5 years, and occur in irregular cycles of about 7 to 10 years. At times, the numbers of southern pine beetle are so low that multiple-tree spots may not be found in specific areas. Nevertheless, this insect is almost always in outbreak status somewhere within its range. (SSPB)

The Proposed Action and Alternative 2 and 3

Regeneration would reduce pine bark beetle hazard for most of the next 20 years on those acres receiving that treatment. The proposed thinning would reduce hazard to the extent reasonable for the remaining portions of the Analysis Unit. Other stands were thinned in previous entries, or do not have sufficient pine density to warrant thinning for forest health purposes. Beetle spots

can still occur in thinned stands, but they are likely to be less frequent, spread slower, and affect fewer trees. The benefits of thinning may last one to two entries, but are not long-term. Intermediate stands grow rapidly into an over-stocked condition, and older stands continue to age and become more susceptible.

The purpose of forest health treatments is to reduce catastrophic loss of forest and associated habitat. As development and short-rotation forestry has increased on private lands, the limited number of acres in Mississippi and the Southern Region managed for an even flow of multiple-use benefits has become more critical. Large, uncontrolled losses on National Forest lands are not acceptable to the public. The entire forest health/vegetation management program is intended to reduce such risks by using a programmed, even-flow process to regenerate or thin stands to manage risk. Higher regeneration options would further reduce risk, and were considered for the Analysis Unit 24 area. However, the Forest Plan specifies standards and guidelines that could not be met at higher regeneration levels. Within constraints, the "Proposed Actions" and alternatives 2 and 3 address forest health issues.

A secondary forest health benefit of these alternatives is that longleaf-dominated yellow pine stands will be established. Longleaf pine will remain healthy on well-drained upland sites two-to-three times longer than loblolly pine. It also offers practical long-term regeneration options not easily implemented with loblolly pine. The result would be that stands could remain healthy for a longer period without the need to regenerate on a 60-80 year rotation.

Streamside management zones and leave tree clumps are protected in regeneration areas. Retaining these areas for extended periods means that many of the current dominants and co-dominants will be lost to wind, insects, and disease. They are probably at little higher risk than the same trees would be if "No Action" alternatives were chosen as a long-term management strategy. They provide multiple-use benefits that are considered to offset value loss.

Thinning places trees at somewhat higher risk of wind-throw for several years. However, long term averages indicate Homochitto National Forest losses of one to two million board feet per year for wind, but as high as to six to eight million board feet for southern pine beetle. Many of the wind losses are from tornados and would occur with or without thinning. Long-term losses from high, straight-line winds are much lower. There is a clear advantage to reducing pine beetle risk and accepting a short-term potential for wind loss.

Alternative 4, Thin Only

This alternative would not take advantage of regeneration to replace ageing, high hazard stands. In addition, it would not have the long-term benefits of establishing longleaf pine to manage hazard for longer rotations. It would however reduce the immediate risk to the extent reasonable by thinning low vigor trees and high-density areas where infestations normally start. As with the "Proposed Action" and alternatives 2 and 3, the effects of thinning are temporary. Wind loss relationships are the same as those noted above. This alternative only partially satisfies the purpose and need of improved forest health.

Alternative 1, No Action

"No Action" defers opportunities for regeneration and thinning. The project area will continue to be influenced by natural processes such as insects, disease, wind damage, and wildfires. As pine stands mature, particularly in the absence of thinning, they become more vulnerable to southern pine beetle infestations and disease. Tree mortality from red heart rot, wood borers, and defoliators are likely to become more prevalent in the project area as older trees become less able to resist disease and insect infestations.

As an example of the risk, forest health treatments prescribed for several projects were withdrawn due to a lawsuit settlement agreement to re-analyze and provide for additional public comment. In the interim, pine beetle activity increased in these areas. This has given a unique opportunity to view the validity of the forest health purpose and need and the information gathered during the field inventories that were used to identify stands as having a high hazard of southern pine beetle infestation.

These southern pine beetle outbreaks would result in openings of varying size and with a random distribution pattern. Openings of 10,000 acres were recorded in Texas wilderness areas where suppression was not immediate. Immediate suppression reduces spot sizes. In the 1994-1995 Mississippi epidemic nearly 3000 spots were recorded. In 2001, another small epidemic occurred. Spot sizes ranged from just a few trees, to over 100 acres, with an average spot size of 7 acres. These openings would provide benefits to early seral species and species associated with openings and edges.

Southern pine beetle infestations would seldom result in stands with the appearance of thinning. Rather than reducing canopy closure throughout the stand, rapid and effective suppression efforts at best produce an effect of scattered openings. Without suppression, catastrophic changes in forest composition and structure are likely to occur. Because of their random distribution and varying size, these openings are often problematic for regeneration and fragment the vegetative cover. The thinnings proposed in the Proposed Action and Alternatives 2-4 would greatly reduce the risk of southern pine beetle outbreaks. (SSPB). Although, no treatments can completely eliminate the possibility of southern pine beetle infestations, treating southern pine beetle reservoirs and reducing the risk of future outbreaks would contribute to a forest wide situation of improved forest health.

HABITAT DIVERSITY

Based on the types of forest classes and their expected age limitations, vegetative conditions are actually biased towards late seral conditions. Under Alternative 1, "No Action", habitat normally created by periodic harvesting and thinning would not occur at the rate historically and currently managed for on the Homochitto National Forest. Previously treated stands would move into later succession age classes unless returned to active management. "No Action" would continue the imbalance of age classes.

Without regeneration, opportunities for creating edge habitat are reduced. Edge habitat will result from the small openings created by individual trees as they die. Creation of larger openings will result from events such as fire, insects, disease, and wind damage.

Retention of high-density pine stands would also be the end product of "No Action". This alternative creates an environment that favors southern pine beetle attack. "Intermediate cuttings in heavily stocked plantations and natural stands will reduce the probability of southern pine beetle attack." (SSPB, page 171) Leaving poletimber stands and high-density mature stands unthinned reduces tree growth and vigor. Additionally, unthinned stands are characterized by a closed canopy, resulting in understory conditions of reduced vegetative diversity.

Growth rates and long-term productivity would be reduced since these stands are presently overstocked and are at or above acceptable stocking levels. Thinning typically results in accelerated growth for a period of approximately ten years after the treatment. Without thinning, this opportunity for accelerated growth and increased productivity would be lost.

The "Proposed Actions" and alternatives 2 and 3 each provide opportunities to maintain early seral conditions and edge habitats within Analysis Unit 24. "Thinning Only" provides only for maintaining diversity in the understory. During 1991-1997, annual harvesting activity on the Homochitto National Forest included approximately 6,825 acres of regeneration and thinning. In the 1980s and through much of the 1990s, regeneration represented approximately 3000 of these 6,825 acres (USDA-Forest Service Data Base). In recent years, total regeneration has been much lower, between 1,500 to 2,000 acres per year. The "Proposed Action" does not represent an increase in early seral habitat when compared to activities over the past three decades.

Neighboring private lands may or may not compensate for losses of open mid-successional canopy structure. Diversity of habitat structure and mid-successional habitat may be provided on neighboring lands in both the short-term and long-term, but would be dependent on the objectives of the landowners. The distance to private land may exceed the home range of some species. Management of private lands cannot be accounted for due to ownership changes and changing management objectives of those owners over time. The primary difference is that private lands are rarely burned to maintain the open understory and grass, legume, and forb components that were historically present. Numerous neotropical migrant bird species and the red-cockaded woodpecker are among the species benefited by that condition.

Cumulative Impacts

Cumulatively, regeneration and thinning of stands distributed across the Homochitto National Forest, reduces the risk of southern pine beetle epidemics by reduction of tree density and stagnation. The stands are less susceptible to insect and disease attack in the future because the vegetation becomes more vigorous since there is less competition for available nutrients, moisture, and light. When compared to past treatments and their current stocking levels and health, the proposed action does not represent a negative impact to forest health.

Choosing "No Action" does not exclude the use of fire as an independent management action, limited to areas where burning can reasonably be applied at acceptable environmental and social risk. In addition, research conducted at the Crossett Experimental Forest in Arkansas has found that substantial site preparation and understory control is necessary to regenerate most southern pines in small gap openings. Fire alone does not always control competition, and the research found that fire is not compatible with most uneven-aged management strategies because it destroys or damages seedlings and inhibits reforestation efforts. There is sufficient evidence that

longleaf pine may be an exception, but the natural longleaf component on this forest was lost and the species must be artificially restored. As a result, catastrophic events would generally result in wide-scale conversion from the historic interior pine forests to stands of pine mixed with relatively low value hardwoods.

THREATENED, ENDANGERED, & SENSITIVE SPECIES (ISSUE 6)

Affected Environment

A Biological Evaluation was prepared for Threatened, Endangered and Sensitive (TES) Species. This document is included as Appendix D of this Environmental Assessment. The effects (environmental consequences) and impacts of each alternative were discussed for each species.

THREATENED OR ENDANGERED SPECIES

Within Analysis Unit 24, the red-cockaded woodpecker is the only known threatened or endangered species confirmed to occur. This analysis area is within the proposed red-cockaded woodpecker habitat management area. The analysis area now contains one recruitment stand and is adjacent to one inactive colony.

There is no creditable evidence of black bears in or near the analysis area, however, black bears are known to move large distances and there is a possibility of a bear using the analysis area. Black bears exist primarily on bottomland hardwood and floodplain forest, although use of upland hardwood, mixed pine-hardwood and coastal flatwoods and marshes has been documented. Black bears are adaptable and opportunistic and forest management practices, in general, have much less impact on black bear than road density with unrestricted traffic.

Bald eagles are generally limited to winter occupancy in Mississippi. The bald eagle is a large bird that generally occurs in the vicinity of lakes, rivers, and marshes and along seacoasts. Nesting usually occurs in areas with mature trees near large bodies of water. Although bald eagles winter and breed on St. Catherine's Creek National Wildlife Refuge (ca. 36 miles West of this Analysis Unit), no suitable habitat is known to occur in the project area and this area is generally considered unsuitable habitat for the bald eagle.

SENSITIVE SPECIES

Forest Service Sensitive species that occur on the Homochitto National Forest and which have apparently suitable habitat present in the analysis area include: Bachman's sparrow, pearl blackwater crayfish, Natchez stonefly, chukcho stonefly, Rafinesque's big-eared bat, Arogos skipper, trachyxiphium moss, fetid trillium, cypress-knee sedge, Small's woodfern, and bay starvine.

Forest Service sensitive species not likely to occur in the project area include the Alabama shad, crystal darter, broadstripe topminnow, Webster's salamander, and rayed creekshell. Dr. Stephen Ross, fisheries biologist at the University of Southern Mississippi confirmed that broadstripe topminnows are not considered potential residents of the Homochitto River drainage. The result of statewide fish surveys indicates that they are confined to the Pontchatrain drainage. Additionally, Dr. Ross confirms the low probability of the crystal darter occurring in the project

area. This determination is based on the fact that only one collection has been made from the Homochitto River and also because the crystal darter is associated with mainstream rivers and less likely their tributaries (Dr. Ross, pers. comm. 9/16/98). Both the Alabama shad and the rayed creekshell are known from the Amite River drainage, but not currently believed to occur in the Homochitto River drainage.

STATE SPECIES OF LOCAL CONCERN (ANIMALS)

The only animal that is a state species of local concern that potentially occurs in the project area is the hoary bat (Lasiurus cinereus). Hoary bats roost in the foliage of a variety of trees and therefore have a wide distribution. In general, the high densities of insects that can be found around bodies of water, such as streams and ponds, makes these very important foraging habitat for this species of bat. Surveys for these bats have not been conducted in the analysis area. However, the analysis area is known to contain habitat preferred by this bat species.

Environmental Consequences

A Biological Evaluation (BE) has been prepared and documents the determination of effects for Threatened, Endangered or Forest Service Sensitive species. The US Fish and Wildlife Service has provided concurrence for this Biological Evaluation. The Biological Evaluation is included in the project file for Analysis Unit 24, and is attached as Appendix D. It was determined that the actions of all Forest Service alternatives do not contribute to the loss of viability of any listed Threatened, Endangered or Forest Service Sensitive species.

THREATENED OR ENDANGERED SPECIES

Potential effects to Threatened and Endangered Species including the RCW, Louisiana black bear, and bald eagle are discussed in detail in the Biological Evaluation and summarized in Table 3.12. There will be a "no effect" determination for the bald eagle and the RCW, and a "not likely to adversely effect" for the Louisiana black bear.

Table 3.12: Threatened and Endangered Summary of Conclusions of Effects

Species	Occurrence on Homochitto NF	No Action Alt 1	Maximum Regeneration Alt 2	No Herbicide Alt3	Thin Only Alt 4	Proposed Action Alt 5
Red-cockaded woodpecker	Confirmed	NE	NE	NE	NE	NE
Louisiana black bear	Confirmed	NLAA	NLAA	NLAA	NLAA	NLAA
Bald eagle	Confirmed	NE	NE	NE	NE	NE

NE = No Effect
NLAA = Not Likely To Adversely Affect
LAA = Likely To Adversely Affect

Management to restore the longleaf pine/bluestem grass pyric ecosystem to sites where it was historically present (as in the "Proposed Action" and Alternative 2) would increase the long-term availability of habitat for species dependant on that ecosystem, such as the red-cockaded

woodpecker and other Partners In Flight (PIF) priority species such as brown-headed nuthatch. The photo below shows an example of this community, which is the desired future condition of the proposed longleaf restoration.

Photo 3.4: Desired future condition of blue-stem grass/longleaf pine stand as suitable Red-Cockaded Woodpecker habitat. Hazard of southern pine beetle is reduced and is low to moderate.

FOREST SERVICE SENSITIVE SPECIES

Potential effects to Forest Service Sensitive species of each management alternative are discussed in detail in the Biological Evaluation and summarized in Table 3.13. We determined that the No Action Alternative will have "no impact" on any species except Bachman's sparrow. Because the No Action alternative fails to create and maintain habitat, a determination of "may impact individuals but not likely to cause a trend to federal listing or a loss of viability" was made for Bachman's sparrow. It was determined that all action alternatives will have "no impact" on the Alabama shad, crystal darter, broadstripe topminnow, rayed creekshell, and Small's woodfern because the known ranges and habitat characteristics indicated that they do not occur in Analysis Unit 24 or their habitats were not being impacted and were expressly protected by mitigation measures. Because impacts to their their habitats are minimized in all action alternatives, the determination of "may impact individuals but not likely to cause a trend to federal listing or a loss of viability" is made for Pearl blackwater crayfish, Rafinesque's big-eared bat, trachyxiphium moss, cypress-knee sedge, bay starvine, Webster's salamander, Arogos skipper, fetid trillium, Natchez stonefly, and chukcho stonefly

Table 3.13: Sensitive Species Summary of Conclusions of Effects

Species	Occurrence on Homochitto NF	No Action Alt 1	Maximum Regeneration Alt 2	No Herbicide Alt 3	Thin Only Alt 4	Proposed Action Alt 5
Webster's salamander	Possible	NI	MII	MII	MII	MII
Bachman's sparrow	Confirmed	MII	MII	MII	MII	MII
Pearl blackwater crayfish	Confirmed	NI	MII	MII	MII	MII
Alabama shad	Unlikely	NI	NI	NI	NI	NI
Crystal darter	Unlikely	NI	NI	NI	NI	NI
Broadstripe topminnow	Unlikely	NI	NI	NI	NI	NI
Natchez stonefly	Confirmed	NI	MII	MII	MII	MII
Chukcho stonefly	Confirmed	NI	MII	MII	MII	MII
Rafinesque's big-eared bat	Confirmed	NI	MII	MII	MII	MII
Rayed creekshell	Unlikely	NI	NI	NI	NI	NI
Arogos skipper	Possible	NI	MII	MII	MII	MII
trachyxiphium moss	Confirmed	NI	MII	MII	MII	MII
Cypress-knee sedge	Confirmed	NI	MII	MII	MII	MII
Small's woodfern	Confirmed	NI	NI	NI	NI	NI
Bay starvine	Confirmed	NI	MII	MII	MII	MII
Fetid trillium	Confirmed	NI	MII	MII	MII	MII

MII = "may impact individuals but not likely to cause a trend to federal listing or a loss of viability"
L = "likely to result in a trend to federal listing or a loss of viability"
BI = "benefitial impact"
NI = "no impact"

STATE SPECIES OF LOCAL CONCERN (ANIMALS)

A majority of the bats foraging habitat (bodies of water) should remain undisturbed by the management activities in Analysis Unit 24 through the maintenance of SMZs. Hardwoods left in areas targeted for burning will slowly drop out of the stand, but in these areas hardwood inclusions and SMZs should remain intact. In areas to be thinned, the majority of trees that are 12 inches DBH and greater will be left, as well as all trees with cavities (wildlife trees).

Therefore, a majority of roosting trees should remain intact within areas designated for management.

Cumulative Effects

Cumulative effects are effects from multiple projects that over time or area become additive. In their cumulative effects analysis manual "Considering Cumulative Effects Under the National Environmental Policy Act", The President's Council on Environmental Quality clearly states that cumulative effects analysis is applied to a "project impact zone", which is an area within which the effects can be measured. The council further states, "Not all potential cumulative effects issues identified during scooping need to be included in an EA or an EIS. Some may be irrelevant or inconsequential to decisions about the proposed actions and alternatives. Cumulative effects analysis should "count what counts"…." This places the benchmark for cumulative effects as effects that can be measured and have a real and consequential relationship to the decision when viewed over time and/or area.

THREATENED OR ENDANGERED SPECIES

To summarize the potential cumulative effects on proposed, threatened, endangered and sensitive species, it is important to recognize that these species are of special interest because they have special habitat and/or management needs. Decline of species such as the red-cockaded woodpecker are attributed to declines in the quantity and quality of that habitat. The threatened status of species such as the Louisiana black bear may be associated with uncontrolled historical take combined with habitat reductions and human encroachment.

Red-cockaded Woodpecker

The availability of pine forests will not satisfy the habitat requirements for this species. The special, critical needs of this species are "over-mature" (preferably longleaf pine) pine stands with some redheart diseased trees for natural cavity construction, and limited hardwood midstory vegetation. Midstory vegetation was historically controlled by fire, and other economically feasible, broad scale controls have not been developed. Fire also encourages a grassy ground cover, which is the primary source of insects, which migrate to the boles of overstory trees and provide the bird's food source. Regionally, forested acres are relatively stable and are not predicted to decline substantially for the foreseeable future (See Vegetation discussion, Issue 4). Local trends seem to confirm regional projections as substantial acreage of row crop and pastureland have been reforested in recent years.

Private lands do not meet the specialized habitat needs of the red-cockaded woodpecker: they are rarely burned and carry substantial midstory; midstory and overstory shade out grasses and insect production is low; and rotations are short. Commercial forest rotations rarely exceed 35 years and private forest rotations rarely extend beyond 40 years. The mature trees with redheart never develop for prolific natural cavity construction. Currently the Endangered Species Act places little or no management burden on private or commercial owners beyond prohibition of take. In rare cases, clusters may reside on private lands, but they do not represent a recovery landscape. From a practical sense, local habitat is restricted to the Homochitto National Forest, and regional habitat is restricted almost exclusively to other National Forests in the South.

Cumulative effects analysis that includes private lands is not appropriate or productive to this project analysis or the decision to be made.

Even on public lands across the region, ageing red-cockaded woodpecker habitats or potential habitats have been lost to pine beetles over the past several years. As a result, the small, geographically isolated populations of RCW in Kentucky are no longer present, and thousands of acres of mature pine have been lost in north Alabama. As recovery efforts for this species become more successful, these habitats might some day have hosted this species. Due to the insect damage, however this habitat will not be available again in those locations for many decades.

This project, and all other projects implemented or planned on the Homochitto National Forest, is designed to comply with the direction in the recovery plan for the red-cockaded woodpecker, the RCW EIS, and the 1991 interim guidelines. This direction includes the level, distribution, and type of harvests allowed. Coordination for these documents was set through formal Fish and Wildlife Service consultation. Fish and Wildlife Service biologists also reviewed and concur with the findings of the Biological Evaluations for all projects. In fact, direction, supported by the Fish and Wildlife Service, encourages restoration of longleaf, sufficient regeneration of other pine types to maintain a steady flow of replacement habitats as pines in older stands are lost, and thinning for habitat improvements, pine beetle hazard reduction, and midstory control. There are no potential, area-related cumulative effects identified when past, current, and planned projects are considered.

Cumulative effects can occur over time. However, like spatial effects, forested areas beyond the Homochitto National Forest Boundary are not expected to represent habitat in the future, and their consideration isn't relevant to the decision. A second consideration is the selected time frame. If forest conditions prior to 1910 are the reference, then large tracts of longleaf/yellow pine were present. These stands experienced frequent burning, and supported populations of the red-cockaded woodpecker. After 1930, much of the forest was in early seral condition and burning was suppressed. There was little preferred red-cockaded woodpecker habitat, and populations declined through about 1991 when landscape level midstory control was implemented. The ID team recognized the pre-1910 conditions as the basis for comparing cumulative effects, since they represented conditions that supported healthy populations – the intent of the Endangered Species Act.

This project area is not in the proposed habitat management area for the red-cockaded woodpecker, but does have extensive suitable habitat. Active clusters are not located in close proximity to currently active red-cockaded woodpecker colonies. Based on this time frame comparison, all aspects of the "proposed action" and "proposed action without herbicides" comply with recovery direction to restore historic habitat and/or establish an even flow of future habitat, prolong the life of existing habitat, reduce pine beetle hazard, or advance the development of habitat. Moving towards an even flow of habitat restoration is inherently not cumulative, either within the project area or across the Forest. Standards and guidelines associated with the Forest Plan and RCW recovery direction limit regeneration, and it is estimated that ageing habitat may be lost at a greater rate than it is being replaced.

The greatest potential for cumulative effects can be expected under "No Action". This alternative allows all habitats to age without replacement. By not implementing forest health thinning, which can also be used to control midstory, potential RCW habitat degrades and is at greater risk of insect and disease loss. Since current pine stands are dominated by off-site loblolly pine that is over-mature and actively deteriorating, this habitat will eventually be lost to insects, disease or wind (See Issue 4, Vegetation). In a climate of protection that does not control the understory of shade tolerant species, the returning stands would likely be dominated by mixed hardwoods with a preponderance of shade tolerant species. Such stands do not support the recovery objectives for the Homochitto National Forest.

The loss of longleaf pine stands and fire dependent communities across the South can clearly be considered cumulative. The Southern Forest Resource Assessment identified longleaf pine communities as one of seven rare communities (>2% of original range) of the southern region. These communities represent the preferred and most stable habitat for the red-cockaded woodpecker; "No Action" would continue a clear and substantial, and clearly cumulative, loss of this habitat region-wide.

There is little difference between "No Action" and "Thin Only". Under "Thin Only", midstory would be controlled and health maintained to the extent possible. However, even with forest health thinning, the off-site loblolly stands would eventually break up with the same results as "no action". These alternatives have no means of countering the cumulative regional loss of the longleaf ecosystem.

Louisiana Black Bear

The biological evaluation found the project would not likely adversely affect this species. A portion of the west side of Homochitto National Forest may be designated as recovery habitat for the Louisiana black bear at some point in the future. There is sufficient distance between this project area and the possible habitat area (Sandy Creek WMA) that there is no expectation of resident populations of bear in the foreseeable future. The Vegatation Analysis (Issue 4) indicates that for all alternatives the habitat for Louisiana black bear remains within the normal variability of the habitat diversity required by black bear eliminating the potential for cumulative effects.

The black bear is an omnivore eating everything from mast and grubs in older forests to berries and small rodents found in early seral forests. Food availability is seasonal by forest type and seral stage, and diverse habitats are a feature of recovery habitats. Another feature of quality bear habitat would be a sufficient number of large hollow trees for den use. Brush piles and blow-down are also used for dens. This project creates early seral at a level which can be considered even flow, while protecting the streamside zones where quality mast and older hollow trees are most likely to occur. Late- and mid-seral forests are maintained at sufficient levels. The "No Action" and "Thin Only" alternatives forego the early seral component. However, because of the bears' extended home range, some of this habitat will be available on private lands. No new roads are being developed or managed as open, when compared to current conditions. Residential development on private lands is potential, but does not appear to be prevalent within the project area. Even if bears were present, there is no feature of any alternative that would be considered a cumulative impact on the bear population.

SENSITIVE SPECIES

The Biological Evaluation (Appendix D) made a determination on the Sensitive Species that could occur in Analysis Area 24. The reader is referred to that document for details concerning why species are included or excluded from discussion. It was determined that the actions of all Forest Service action alternatives do not contribute to the loss of viability of any Sensitive Species. Most species are associated with mesic conditions along drainages. By maintaining critical habitats, and protecting populations, the potential for cumulative effects appears to be remote.

STATE SPECIES OF LOCAL CONCERN (ANIMALS)

The hoary bat could potentially be disturbed during management activities. However, foraging and roosting habitats should, for the most part, remain intact by maintaining streamside management zones and hardwood inclusions. Most hardwood trees 12 inches or greater will not be cut and trees that have cavities (wildlife trees) will be left. If disturbance occurs during management activities, there is potential roosting habitat over most of the National Forest, which occurs adjacent too and is not isolated from the Analysis Unit. The National Forest could potentially act as a refuge for this species of bat.

Changes in land use on surrounding private land cannot be predicted with any certainty but could include re-forestation of abandoned farmland, clearing of forest for pasture or cropland, building of homes and other structures, construction and improvement to county and private roads, and others. The proposed vegetation management project would implement events that are temporary and mitigated for; these actions will not add to the cumulative effects of private land action. The Forest Service cannot predict or control actions on private land; the only actions for which we can plan are those that occur on National Forest land. In the past ten years, the land use patterns of the private lands within analysis unit have remained relatively stable. The majority of the land is in small farm ownership and this is expected to remain constant throughout the planning period. There has been a small amount of re-forestation of abandoned pastureland (with a corresponding decrease in agriculture acreage). The industrial base of Gloster and Liberty are not likely to change greatly so home site development will probably continue to increase by a small amount as it has for the past ten years.

MANAGEMENT INDICATOR SPECIES (ISSUE 7)

Affected Environment

Under the National Forest Management Act (1976), the Forest Service is charged with managing National Forests to provide for a diversity of plant and animal communities consistent with multiple-use objectives. Management Indicator Species (MIS) are one tool used to accomplish this objective as they and their habitat needs are used to set management objectives and minimum management requirements to focus effects analysis, and to monitor effects of plan implementation. MIS were selected in the 1985 Land and Resource Management Plan to serve three major functions: 1) represent issues of hunting demand, 2) consider species for which population viability may be a concern, and 3) species which serve as ecological indicators of

certain communities or habitats. In this analysis, MIS affected by the project are used to focus analysis of effects of this project on these issues.

Available Management Indicator Species information has been compiled and consolidated to provide as clear a picture as possible of how indicator species have responded to management activities or the absence of such activities. The current report, Dated March 8, 2002, is available to the public on the National Forests in Mississippi web site (http://www.southernregion.fs.fed.us/mississippi/). Information from this report, along with additional information available to the Interdisciplinary Team, is summarized below and used to assist the responsible official in reaching a decision.

NFMA intends use of management indicator species, in part, to ensure that national forests are managed to "maintain viable populations of existing native and desirable non-native vertebrate species." Because indicator species cannot adequately represent all species (Landres et others 1988), new strategies are emerging for accomplishing this goal. One strategy is the coarse and fine filter approach (Nature Conservancy 1982, Noss 1987, Hunter 1990). This strategy assumes that most species can be maintained at viable levels by providing a diversity of habitat conditions across a landscape. Providing a diversity of habitat types serves as the coarse filter. However, some species with narrow habitat requirements or for which viability is of concern require special attention (or a fine filter) to ensure viability. This analysis uses habitat availability for management indicator species as the coarse filter for ensuring that a mix of habitat types is provided across the landscape. The Biological Evaluation serves as the fine filter to ensure that those species most at risk of losing viability (threatened, endangered, and sensitive species) are not negatively affected. This combination of approaches ensures that all species on the Homochitto National Forest are maintained, or are moving toward, viable population levels.

TERRESTRIAL HABITATS

Management Indicator Species (MIS) for terrestrial habitats were selected as provided in Section 6, 219.12(g)(2) of the National Forest Management Act (1976), planning regulations. The species and the habitats represented by them are presented in the following table.

Table 3.14: Management Indicator Species for Analysis Unit 24 of the National Forests in Mississippi as presented in the Forest Plan

Management Indicator Species	Habitats Represented In Analysis Unit 24	Considered in Analysis
White-tailed deer	0-10 years, all forest types	Yes
Bachman's sparrow	0-10 years, longleaf/mod. yield slash pine	Yes*
Bobwhite quail	0-10 years, longleaf/yellow pine	Yes*
Eastern meadowlark	0-10 years, yellow pine	Yes
American kestrel	0-10 years, pine/hardwood	Yes
Rufous-sided towhee	0-10 years, hardwood	No
Eastern wild turkey	40+ years, all forest types	Yes
Pileated woodpecker	40+ years, all forest types	Yes
Red-cockaded woodpecker	40+ years, all pine forests except slash	Yes*
Fox squirrel	40+ years, longleaf pine	No
Pine warbler	40+ years, yellow pine	Yes
Eastern gray squirrel	40+ years, pine/hardwood and hardwood	Yes
Screech owl	40+ years, pine/hardwood	Yes
Hooded warbler	40+ years, hardwood	No
Southwest stream fish (8 species listed)	Streams south of Interstate-20 and west of Highway 49	Yes
Lake and pond fish (8 species listed)	Lakes and ponds	Yes

* The original Forest Plan did not acknowledge the presence of Longleaf Pine on the Homochitto District. Longleaf occurs on the Homochitto primarily in mixed stands with shortleaf and loblolly. The MIS indicators for Longleaf forest are used here to represent these mixed pine stands which are the functional equivalent of Longleaf forest elsewhere.

Rufous-sided towhee, fox squirrel, and hooded warbler were NOT considered further in the analysis because none of the alternatives had any impact on the specific habitats they were selected to represent (Table 3.14).

AQUATIC HABITATS

Streams on the Homochitto National Forest are characteristically slow flowing, clear, warm, sand-gravel bottom, 1st - 3rd order streams. These streams are moderately shaded, wide and shallow with low conductivity and with an acid pH. The species of fish selected as Management Indicator Species for Southwest Mississippi Streams represent an assemblage of fish from all trophic levels. Lampreys, darters, and madtoms require very good water quality and low turbidity and are rarely found in degraded habitats. Spotted bass are the major carnivore in the system and with the longear sunfish comprise the major game species. The blacktail redhorse, longnose shiner, and bluntface shiner are significant forage species in the system. In contrast to terrestrial MIS, which were to represent changes in habitat (the conversion of acres of late seral

forest into early seral forest), the aquatic MIS serve to indicate changes in water quality, not quantity of habitat.

Fish are sampled by seining or electro-shocking short segments of streams. Fish species are highly sensitive to flow rates and water temperature, with respect to their seasonal locations within streams. Because of differences in size and flow rates, not all streams have habitat to support the full range of management indicator fish species. The expectation is highly variable samples over time, with multiple surveys required to establish the full range of species inhabiting a stream. Table 3.15 lists the fish MIS associated with the Homochitto National Forest.

Table 3.15: Common and scientific names of MIS fish

Common Name	Scientific Name
spotted bass	*Micropterus punctulatus*
banded darter	*Etheostoma zonale (Etheostoma lynceum)*
rainbow darter	*Etheostoma caeruleum*
brindled madtom	*Noturus miurus*
longnose shiner	*Notropis longirostris*
bluntface shiner	*Notropis camurus (Cyprinella camura)*
blacktail redhorse	*Moxostoma poecilurum*
southern brook lamprey	*Ichthyomyzon gagei*

The fish fauna of the Homochitto National Forest are reasonably well known considering the general state of knowledge of stream fishes in southwest Mississippi. Douglas (1975) reported on rare fishes of the Homochitto. He considered the bluntface shiner, northern studfish, rainbow darter, and northern hogsucker to be fishes of significance due to their geographic isolation from more northern populations. Danny Ebert, fisheries biologist with the U.S. Forest Service, conducted an intensive survey of the fishes of the Homochitto River drainage over a six-year period, which included 96 fish collections representing 81 fish species (Ebert, et. al. 1985).

Additional sampling was conducted on selected streams during 1996 as part of an on-going Forest Service study of the fish fauna of the Homochitto National Forest. Both diversity and species richness were reported as high and the Index of Biotic Integrity (IBI) characterized the streams of the forest as generally "good" to "excellent" (Johnston and McWhirter, 1996). It was confirmed by both studies that all eight of the aquatic Management Indicator Species occurred on the Homochitto National Forest.

Streams on the Homochitto National Forest are, for the most part restricted to the Homochitto River drainage, with relatively small acreages in the Amite, Bayou Pierre, and Buffalo drainages. Because of the relative homogeneity of these streams, the stream fauna throughout the forest consists of the same suites of species in the same habitat from one stream to another. Streams within Analysis Unit 24 are included in the Fifteenmile Creek and Steep Hill Creek drainages. Both streams flow into the Homochitto River.

Ebert sampled in Fifteenmile Creek and Steep Hill Creek and collected seven of eight aquatic MIS from the watershed (southern brook lamprey was not collected) during the period 1981-1983. As a part of the established aquatic MIS monitoring protocol, Fifteenmile Creek was

surveyed in the summer of 2000. This was the third year of an extended drought, and likely represents a high stress period for the habitat and it's associated species. In total, six of the eight MIS fish were present in the samples (southern brook lamprey and spotted bass were not collected).

SUMMARY OF SURVEYS

Wildlife surveys conducted within the project area include the following: quail point counts (ongoing Mississippi State University), Neotropical bird point counts (ongoing Mississippi State University), Natchez and chukcho stonefly surveys (ongoing Forest Service), amphibian and reptile surveys (Mississippi Natural Heritage Program 1992), and crayfish surveys (Mississippi Natural Heritage Program 1992-1993). Forest Service surveys for Threatened or Endangered, sensitive and state concern species were conducted in May of 1999.

Environmental Consequences

TERRESTRIAL HABITATS

For terrestrial Management Indicator Species analysis, the amount of habitat gained or lost due to alternative treatments was determined with two runs of the Forest Service CISC database, one for the proposed project year of 2004 and another for the year 2009. This gave the present acreage and the acreage for the No Action alternative (year 2009). By adding or subtracting acreages from each alternative for each species, the net change for each species was determined. This analysis is limited strictly to the effects of regeneration. Effects of thinning and other management alternatives are not addressed. The analysis is further limited by the sometimes artificial restriction of a certain age class or forest type as the only habitat for that species. For example, the whitetail deer is a Management Indicator Species for early seral forest (0-10 years), even though other habitats are utilized. As a result, these conclusions tend to be conservative and may overestimate the effect on some species.

The following two tables give a comparison of current and future acreage of suitable habitat for management indicator species in Analysis Unit 24 for all alternatives. Current condition acres are calculated for the year 2004 and future conditions are calculated five years from that point, assuming all planned management actions were implemented during that period. Percentages indicate percent increase or decrease over year 2004 conditions.

Table 3.16: Acres of Habitat by Alternative and Percent Change from Current Condition for Early Succession MIS* for Analysis Unit 24 of the Homochitto National Forest

MIS	Current Conditions	Proposed Action Alt. 5	No Action Alt. 1	Maximum Regeneration Alt. 2	No Herbicide Alt. 3	Thinning Only Alt. 4
Whitetail Deer	285	345 +21%	66 -77%	583 +105%	345 +21%	66 -77%
Bachman's Sparrow	0	199 +∞	0 0%	240 +∞	199 +∞	0 0%
Bobwhite Quail	248	199 -20%	29 -88%	240 -3%	199 -20%	29 -88%
Eastern Meadowlark	248	199 -20%	29 -88%	240 -3%	199 -20%	29 -88%
American Kestrel	37	117 +216%	37 0%	380 +927%	117 +216%	37 0%

* As defined in the Forest Plan, early succession includes plant communities associated with early successional stages, primarily within the grass/forb age strata with overlap into shrub/seedling type (0-10 years).

Table 3.17: Acres of Habitat by Alternative and Percent Change from Current Condition for Late Succession MIS* for Analysis Unit 24 of the Homochitto National Forest

MIS	Current Conditions	Proposed Action Alt. 5	No Action Alt. 1	Maximum Regeneration Alt. 2	No Herbicide Alt. 3	Thin Only Alt. 4
Eastern Wild Turkey	1458	811 -44%	1090 -25%	573 -61%	811 -44%	1090 -25%
Pileated Woodpecker	1458	811 -44%	1090 -25%	573 -61%	811 -44%	1090 -25%
Red-Cockaded Woodpecker	1429	782 -45%	1061 -26%	544 -62%	782 -45%	1061 -26%
Pine Warbler	1429	782 -45%	1061 -26%	544 -62%	782 -45%	1061 -26%
Eastern Gray Squirrel	29	29 0%	29 0%	29 0%	29 0%	29 0%
Screech Owl	29	29 0%	29 0%	29 0%	29 0%	29 0%

* As defined in the Forest Plan, late succession includes plant communities associated with late seral successional stages, generally dominated by a large sawtimber component (>40 years).

Any analysis of the effects of management on wildlife species must recognize that attempts to benefit species utilizing early seral stages will ultimately be done at the expense of those species utilizing older forest stands. The decision to forgo replacement of early seral habitat as older regeneration units move to mid-seral conditions and mid-seral stands move into late-seral classes is made at the expense of early-seral species. On the same area, it is difficult, if not impossible,

to satisfy the needs of all "wildlife" at the same time. The goal of the manager is to attempt to balance the needs of all, giving special consideration to those species most at risk of extinction/extirpation.

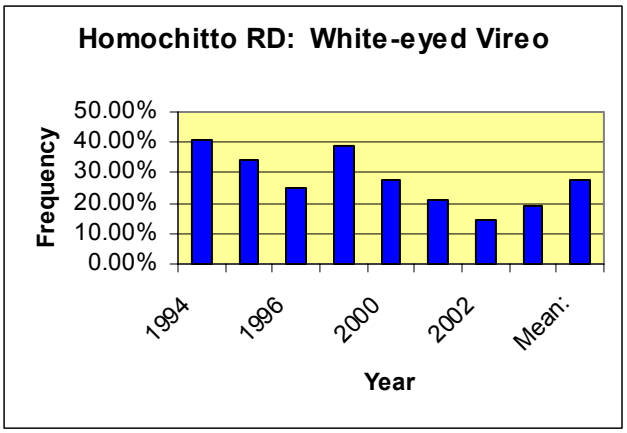
It must also be recognized that management must be done in the context of the land and its present as well as future capabilities. This must include the fact that at the present time Analysis Unit 24, because of its past management history, contains a large amount of rapidly aging loblolly pine. Loblolly pine is an early successional, invader species, which does not reseed itself under its own shade and when left unmanaged will start dying alone and in clumps, releasing hardwoods to grow. This process eventually results in an uneven-age pine-hardwood or hardwood forest with sparse stocking. Species composition tends to favor late successional, shade tolerant overstory species such as beech and magnolia, with midstory of hornbeam and other shade-tolerant species. The shade conditions inhibit the development of many groundcover herbs, grasses, and legumes. These are not the historic, relatively open pine and oak dominated forests that were once common to the land now designated as the Homochitto National Forest.

"Proposed Action" (Alternative 5)

The preferred habitat of whitetail deer and bobwhite quail will continue to decrease over the years as regeneration areas grow older and succession progresses. However, the "Proposed Actions" will create minimal positive effects by creating early successional habitat for these species.

The eastern meadowlark was selected for early age yellow pine forests. It was noted in the Forest Plan that this species occurred primarily in open farmlands, but was thought to be found in cleared, grassy areas such as what would be created during forest regeneration a management application in the "Proposed Actions". Analysis of preliminary results from the Breeding Bird Census indicates, however, that this survey is not detecting the eastern meadowlark in habitats in which it was expected. During the 2,095 point-counts conducted on the National Forests in Mississippi spanning five years, only one eastern meadowlark has been counted (Breeding Bird Census). This deviation from the expected may reflect the fact that the eastern meadowlark is a grassland bird and the regeneration acres in the yellow pine group are too small, too ephemeral, or too forest-like to provide habitat for this species. This could also indicate that early seral stages within the National Forests in Mississippi are not representative of a fragmented habitat.

Bobwhite quail was selected as a management indicator species for both longleaf and yellow pine early successional conditions. Therefore, quail are representative of the same habitat the Eastern meadowlark was intended to represent. In addition to being favored by early-seral conditions, quail also benefit from combinations of thinning and burning. The effects of this project on quail are summarized later in this section. While not selected Management Indicator Species, a number of other birds share early-seral yellow pine habitats. Looking at population information available for these species can provide additional insight into the effects of management activities.



One such species, the white-eyed vireo is being considered as a replacement MIS for the eastern meadowlark. The Homochitto National Forest's breeding bird surveys have collected data for the white-eyed vireo since 1994. It utilizes a shrubby type of habitat, which more closely represents early-seral yellow pine conditions, as opposed to the northern bobwhite, which represents the grassier end of the spectrum, and the eastern meadowlark, which utilizes prairie or grassland conditions. Because the breeding bird survey data for the white-eyed vireo is not available in the Forest's Management Indicator Species analysis, the following graph provides frequency data (the percent of the total sites sampled on which the white-eyed vireo occurred) for this species.

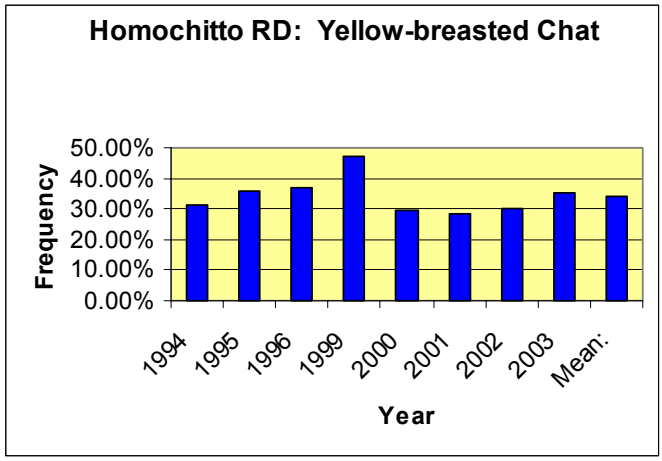
As with all early seral habitat species, preferred habitat has declined for the white-eyed vireo. Early seral yellow pine is currently at only about 50% of that available in 1981. In contrast, populations of the vireo have fluctuated in a pattern more typically associated with normal, short-term breeding cycle responses dependent on weather and disease. There appears to be a slight downward trend, but not to the extent that preferred habitat has diminished. Like quail and a number of ground and shrub-nesting Neotropical migrants, populations seem to be increasing or stable as these birds take advantage of the early seral vegetation relationships which develop in the understory of stands that are burned and/or managed for the red-cockaded woodpecker.

The results presented in the analysis table for the Bachman's sparrow are somewhat misleading. While the Forest Plan does select the species as an indicator of the early successional longleaf pine forest, this species does well in all older pine forest of all types as long as they are burned and thinned. There is no reported decline in habitat for this species in any of the alternatives in the short term, but with the "Proposed Actions" Bachman's sparrow habitat would be perpetuated in the long term with increase in habitat of 385 acres.

The American kestrel was selected for early age pine - hardwood forests. Data on populations of American kestrel on the National Forest in Mississippi are sparse, despite considerable effort expended on point counts. As regional data indicate a stable population trend, it would appear that this species either is not an adequate indicator for early-age pine-hardwood habitat or a different monitoring protocol is needed. It is likely that this species, which is more typically found in pasture and field habitats, is not commonly found in the forested landscapes such as those on National Forests in Mississippi. Therefore, this species is likely poorly suited to serve as ecological indicator of early successional pine-hardwood forests.

The yellow-breasted chat is being considered as a replacement MIS for the American kestrel representing 0 – 10 year old pine-hardwood. Because the breeding bird survey data for the yellow-breasted chat is not available in the Forest's Management Indicator Species analysis, the

following graph provides frequency data (the percent of the total sites sampled on which the yellow-breasted chat occurred) for this species . These data show that this species is well represented on the Homochitto National Forest.



Acres of available suitable habitat have decreased for all inhabitants of this type due to reduced regeneration activities in this forest type. Overall, this habitat type has declined since adoption of the Forest Plan, but has recently nearly reached pre-Plan levels. As with other early successional habitats, current availability is below that anticipated by the Plan, but such habitats are not rare on national forests or surrounding private lands.

The preferred habitat of both American kestrel and yellow-breasted chat will continue to decrease over the years as regeneration areas grow older and succession progresses. However, the "Proposed Actions" will create minimal positive effects by creating 102 acres of early successional habitat for this species (The same acres as for "Maximum Regeneration" and "No Herbicide"). Present mitigations could benefit American kestrel by leaving snags in cleared areas. The kestrel often sits on exposed perches and drops on potential food sources such as small mammals, (Hamel 1992). Breeding habitat consists of cavities in snags already excavated.

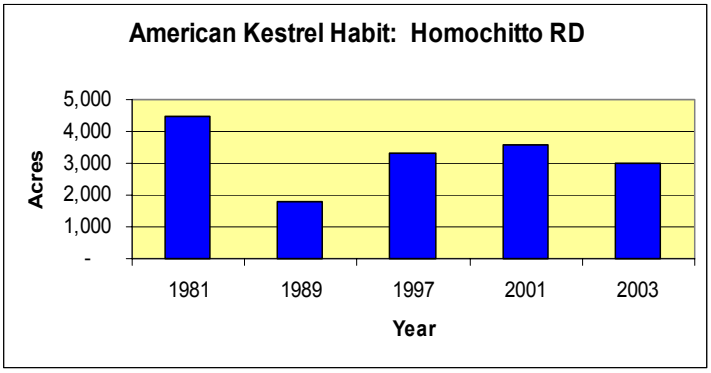
The wild turkey, while considered an indicator for the late successional habitat type, requires some early successional habitat for nesting and brooding. The 11% loss of habitat for the wild turkey from the loss of the over 40 year old forest will be offset by habitat gains for the species from creation of openings. The same 11% habitat loss shown for the pileated woodpecker will be partially offset by leaving clumps of trees and single trees and snags within the regeneration areas. Full impact of proposed actions on both species is reduced by mitigation measures such as hardwood clumps/inclusions in pine stands and retention of hardwoods in SMZ's.

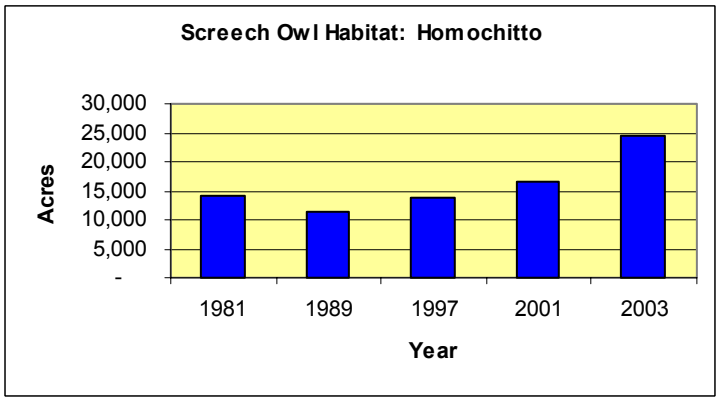
There are no red-cockaded woodpeckers in the analysis area. The analysis area is inside of the proposed red-cockaded woodpecker Habitat Management Area boundary. However, the "Proposed Actions" would, in the long term, benefit the RCW by creating nesting and foraging habitat.

Fox squirrels are known to be present in the older pine communities of the analysis area, but because there is presently no older longleaf pine forest within the analysis unit, the fox squirrel was excluded from further analysis. This alternative would, however, in the long term (80+ years from now), create this type of habitat.

The pine warbler shows a loss of 26% in the "Proposed Actions", based on the assumption that the pine warbler is restricted to late seral pine forests. That this assumption is not correct can be seen in the breeding densities published for the pine warbler for sawtimber loblolly pine – shortleaf pine (25 birds per 40 hectares) versus sapling/poletimber loblolly pine – shortleaf pine

(30 birds per 40 hectares). Any loss of habitat for the pine warbler would be temporary and would not take 40 years before the habitat would be again acceptable.





"No Action" (Alternative 1)

Early successional Management Indicator Species would see habitat reduced by up to 89% from the current situation. Some species such as the whitetail deer will have their habitat needs met to some extent in other habitats (habitat generalists) and will persist, although at lower population levels. The bobwhite quail, which is reported in decline throughout the southeastern region, is a species that needs early seral or edge habitat with some degree of disturbance (such as burning) to persist in any area. The 89% reduction in available habitat for the bobwhite is a true reflection of lost habitat. This species is more of a habitat specialist, as it needs open, burned mature pine forests in juxtaposition with escape cover (often hardwood bottoms), and open areas such as the first few years of a regeneration cut. Of all the early successional Management Indicator Species, this alternative will have the largest negative effect on the bobwhite quail.

With the "No Action" Alternative, no suitable new habitat acreage for the Bachman's sparrow would be created.

No change would occur in the habitat acres for the American kestrel, at least in the short term. The "No Action" alternative does not, however, insure the creation of new American kestrel habitat in the future. The "No Action" Alternative (along with all other alternatives), does,

however, maintain the habitat of gray squirrel, screech owl, wild turkey, and pileated woodpecker.

Fox squirrels are known to be present in the older pine communities of the analysis area, but because this animal is an indicator of older longleaf forest, the "No Action" alternative foregoes creation of longleaf pine forests suitable for this species forty or more years in the future. The "No Action" Alternative will not create positive or negative effect on the eastern meadowlark. This birds preferred habitat seems to be open grasslands (see "Proposed Actions" discussion above), which apparently is not a habitat created by our management practices.

"Maximum Regeneration" (Alternative 2)

The preferred habitat of whitetail deer will increase 25% under this alternative. This alternative has the most beneficial impact on early seral species and the largest amounts of negative impacts on late seral species than any other considered. The impacts are essentially the same as "Proposed Actions" but the acreages are larger.

The eastern meadowlark was selected for early age yellow pine forests. It was noted in the Forest Plan that this species occurred primarily in open farmlands, but was thought to be found in cleared, grassy areas such as what would be created during forest regeneration a management application in the "Proposed Actions". Analysis of preliminary results from the Breeding Bird Census indicates, however, that this survey is not detecting the eastern meadowlark in habitats in which it was expected. During the 2,095 point-counts conducted on the National Forests in Mississippi spanning five years, only one eastern meadowlark has been counted (Breeding Bird Census). This deviation from the expected may reflect the fact that the eastern meadowlark is a grassland bird and the regeneration acres in the yellow pine group are too small, too ephemeral, or too forest-like to provide habitat for this species. This could also indicate that early seral stages within the National Forests in Mississippi are not representative of a fragmented habitat.

Bobwhite quail was selected as a management indicator species for both longleaf and yellow pine early successional conditions. Therefore, quail are representative of the same habitat the Eastern meadowlark was intended to represent. In addition to being favored by early-seral conditions, quail also benefit from combinations of thinning and burning. The effects of this project on quail are summarized later in this section. Habitat for the bobwhite quail will be only 6% less than present condition.

There is no reported decline in habitat for this species in any of the alternatives in the short term, but with the "Maximum Regeneration" Bachman's sparrow habitat would be perpetuated in the long term with increase in habitat of 479 acres.

The preferred habitat of American kestrel will continue to decrease over the years as regeneration areas grow older and succession progresses. However, the "Maximum Regeneration" will create minimal positive effects by creating 102 acres of early successional habitat for this species (The same acres as for "Proposed Actions" and "No Herbicide"). Present mitigations could benefit this species by leaving snags in cleared areas. The kestrel often sits on exposed perches and drops on potential food sources such as small mammals, (Hamel 1992). Breeding habitat consists of cavities in snags already excavated.

The wild turkey, while considered an indicator for the late successional habitat type, requires some early successional habitat for nesting and brooding. The 17% loss of habitat (the most of any alternative) for the wild turkey from the loss of the over 40 year old forest will be offset by habitat gains for the species from creation of openings. The same 17% habitat loss shown for the pileated woodpecker will be partially offset by leaving clumps of trees and single trees and snags within the regeneration areas. Full impact of proposed actions on both species is reduced by mitigation measures such as hardwood clumps/inclusions in pine stands and retention of hardwoods in SMZ's.

There are no red-cockaded woodpeckers in the analysis area. The analysis area is inside of the proposed red-cockaded woodpecker Habitat Management Area boundary. However, the "Proposed Actions" would, in the long term, benefit the RCW by creating nesting and foraging habitat.

Fox squirrels are known to be present in the older pine communities of the analysis area, but because there is presently no older longleaf pine forest within the analysis unit, the fox squirrel was excluded from further analysis. This alternative would, however, in the long term (80+ years from now), create this type of habitat.

The pine warbler shows a loss of 36% in the "Maximum Regeneration" alternative, based on the assumption that the pine warbler is restricted to late seral pine forests. That this assumption is not correct can be seen in the breeding densities published for the pine warbler for sawtimber loblolly pine – shortleaf pine (25 birds per 40 hectares) versus sapling/poletimber loblolly pine – shortleaf pine (30 birds per 40 hectares). Any loss of habitat for the pine warbler would be temporary and would not take 40 years before the habitat would be again acceptable.

"No Herbicide" (Alternative 3)

The preferred habitat of whitetail deer and bobwhite quail will continue to decrease over the years as regeneration areas grow older and succession progresses. However, the "No Herbicide" alternative will create minimal positive effects by creating early successional habitat for these species. The acres of habitat affected by this alternative are the same as for "Proposed Actions" but the results may be more costly to achieve by using mechanical methods of vegetation control to the exclusion of chemical herbicides.

The eastern meadowlark was selected for early age yellow pine forests. It was noted in the Forest Plan that this species occurred primarily in open farmlands, but was thought to be found in cleared, grassy areas such as what would be created during forest regeneration a management application in the "No Herbicide" alternative. Analysis of preliminary results from the Breeding Bird Census indicates, however, that this survey is not detecting the eastern meadowlark in habitats in which it was expected. During the 2,095 point-counts conducted on the National Forests in Mississippi spanning five years, only one eastern meadowlark has been counted (Breeding Bird Census). This deviation from the expected may reflect the fact that the eastern meadowlark is a grassland bird and the regeneration acres in the yellow pine group are too small, too ephemeral, or too forest-like to provide habitat for this species. This could also indicate that

early seral stages within the National Forests in Mississippi are not representative of a fragmented habitat.

Bobwhite quail was selected as a management indicator species for both longleaf and yellow pine early successional conditions. Therefore, quail are representative of the same habitat the Eastern meadowlark was intended to represent. In addition to being favored by early-seral conditions, quail also benefit from combinations of thinning and burning. The effects of this project on quail are summarized later in this section. While not selected Management Indicator Species, a number of other birds share early-seral yellow pine habitats. Looking at population information available for these species can provide additional insight into the effects of management activities.

There is no reported decline in habitat for this species in any of the alternatives in the short term, but with the "No Herbicide" alternative Bachman's sparrow habitat would be perpetuated in the long term with increase in habitat of 385 acres.

The preferred habitat of American kestrel will continue to decrease over the years as regeneration areas grow older and succession progresses. However, the "No Herbicide" alternative will create minimal positive effects by creating 102 acres of early successional habitat for this species (The same acres as for "Maximum Regeneration" and "No Herbicide"). Present mitigations could benefit this species by leaving snags in cleared areas. The kestrel often sits on exposed perches and drops on potential food sources such as small mammals, (Hamel 1992). Breeding habitat consists of cavities in snags already excavated.

The wild turkey, while considered an indicator for the late successional habitat type, requires some early successional habitat for nesting and brooding. The 11% loss of habitat for the wild turkey from the loss of the over 40 year old forest will be offset by habitat gains for the species from creation of openings. The same 11% habitat loss shown for the pileated woodpecker will be partially offset by leaving clumps of trees and single trees and snags within the regeneration areas. Full impact of proposed actions on both species is reduced by mitigation measures such as hardwood clumps/inclusions in pine stands and retention of hardwoods in SMZ's.

There are no red-cockaded woodpeckers in the analysis area. The analysis area is inside of the proposed red-cockaded woodpecker Habitat Management Area boundary. However, the "No Herbicide" alternative would, in the long term, benefit the RCW by creating nesting and foraging habitat.

Fox squirrels are known to be present in the older pine communities of the analysis area, but because there is presently no older longleaf pine forest within the analysis unit, the fox squirrel was excluded from further analysis. This alternative would, however, in the long term (80+ years from now), create this type of habitat.

The pine warbler shows a loss of 26% in the "No Herbicide" alternative, based on the assumption that the pine warbler is restricted to late seral pine forests. That this assumption is not correct can be seen in the breeding densities published for the pine warbler for sawtimber loblolly pine – shortleaf pine (25 birds per 40 hectares) versus sapling/poletimber loblolly pine –

shortleaf pine (30 birds per 40 hectares). Any loss of habitat for the pine warbler would be temporary and would not take 40 years before the habitat would be again acceptable.

"Thin Only" (Alternative 4)

Early successional Management Indicator Species would see habitat reduced by up to 84%. Some species such as the whitetail deer will have their habitat needs met to some extent in other habitats (habitat generalists) and will persist, although at lower population levels. The bobwhite quail, which is reported in decline throughout the southeastern region, is a species that needs early seral/edge habitat with some degree of disturbance (such as burning) to persist in any area. The 89% reduction in available habitat for the bobwhite is a true reflection of lost habitat. This species is more of a habitat specialist, as it needs open, burned mature pine forests in juxtaposition with escape cover (often hardwood bottoms), and open areas such as the first few years of a regeneration cut. Of all the early successional Management Indicator Species, this alternative as well as the "No Action" alternative, will have the largest negative effect on the bobwhite quail.

With this alternative, the present suitable habitat (0 – 10 year longleaf pine) acreage for the Bachman's sparrow would continue to age and this alternative forgoes opportunities to create additional acreage for the future.

This alternative has no effect on habitat for the American kestrel since no regeneration would take place in the pine-hardwoods component. This alternative (along with all other alternatives), does, however, maintain the habitat of gray squirrel, screech owl, wild turkey, pileated woodpecker, and hooded warbler.
The fox squirrel is currently found within the planning area, therefore this alternative should have no adverse impacts in the short term, however in the long term as this older component of loblolly pine leaves the stand, suitable habitat will no longer exist in the future within this Analysis Unit.

AQUATIC HABITATS

The MIS fish are a primary benchmark for water quality. Their presence, absence and densities represent a means of determining if water quality supports appropriate habitats. Data clearly supports the conclusion that variability of individual streams affect presence and numbers of MIS fish found in these streams. It is unrealistic to expect to find all of the MIS fish in all of the streams due to variability among habitat, time of sampling, weather, soil chemistry, fish movement, and sampling methodology. Although MIS fish show fluctuations in numbers, all MIS fish are present within the Homochitto National Forest.

Many MIS fish were not found during the surveys conducted in the 1980's, but were found during surveys conducted in 1996-2002. When looking at presence absence data, MIS fish appear to have been found in more streams in 2000-01 and in 2002 than in the eighties, with the exception of Brushy Creek, which continues to sustain all MIS fish species. Lick Creek and Walker Branch remained stable, but changed MIS composition. Steep Hill Creek was the only creek that appeared to have lost MIS in 2000-01.

Table 3.18: MIS Fish Presence/Absence Data

SPECIES	BRUSHY CREEK				FIFTEEN MILE CREEK				LICK CREEK				MCGEHEE CREEK			
	1980-84	1996	2000-01	2002	1980-84	1996	2000-01	2002	1980-84	1996	2000-01	2002	1980-84	1996	2000-01	2002
SouthernBrook Lamprey	P	P	P	P	A	NA	A	NA	A	NA	P	NA	A	P	P	P
Bluntface Shiner	P	P	P	P	P	NA	P	NA	P	NA	A	NA	P	P	P	P
Longnose Shiner	P	P	P	P	P	NA	P	NA	A	NA	P	NA	P	P	P	P
Blacktail Redhorse	P	P	P	P	A	NA	P	NA	A	NA	A	NA	P	P	P	P
Brindled Madtom	P	P	P	P	A	NA	P	NA	A	NA	A	NA	A	P	P	P
Spotted Bass	P	P	P	P	P	NA	P	NA	P	NA	P	NA	A	P	P	P
Brighteye Darter	P	P	P	P	P	NA	P	NA	P	NA	A	NA	P	P	P	P
Rainbow Darter	P	P	P	P	P	NA	P	NA	A	NA	A	NA	A	P	P	P

SPECIES	MIDDLETON CREEK				RICHARDSON CREEK				WALKER BRANCH			
	1980-84	1996	2000-01	2002	1980-84	1996	2000-01	2002	1980-84	1996	2000-01	2002
Southern Brook Lamprey	P	A	P	P	A	P	P	P	A	NA	A	NA
Bluntface Shiner	A	P	P	P	A	P	A	P	P	NA	P	NA
Longnose Shiner	P	P	P	P	P	P	P	P	A	NA	P	NA
Blacktail Redhorse	A	P	A	A	A	A	A	P	A	NA	A	NA
Brindled Madtom	A	P	P	P	A	P	P	A	A	NA	A	NA
Spotted Bass	A	P	P	P	A	A	A	A	P	NA	A	NA
Brighteye Darter	A	P	P	P	A	P	P	P	A	NA	A	NA
Rainbow Darter	A	P	P	P	A	A	A	A	A	NA	A	NA

SPECIES	DRY CREEK				PRETTY CREEK				STEEP HILL CREEK			
	1980-84	1996	2000-01	2002	1980-84	1996	2000-01	2002	1980-84	1996	2000-01	2002
Southern Brook Lamprey	NA	A	A	NA	A	NA	A	A	NA	A	A	A
Bluntface Shiner	NA	A	P	NA	P	NA	A	A	NA	P	A	A
Longnose Shiner	NA	A	P	NA	P	NA	A	A	NA	P	P	P
Blacktail Redhorse	NA	P	P	NA	A	NA	A	P	NA	A	A	A
Brindled Madtom	NA	A	P	NA	A	NA	A	A	NA	A	A	A
Spotted Bass	NA	A	P	NA	A	NA	A	A	NA	A	A	A
Brighteye Darter	NA	A	P	NA	A	NA	A	A	NA	A	A	A
Rainbow Darter	NA	A	P	NA	P	NA	A	A	NA	A	A	A

Five MIS fish were sampled from Fifteenmile Creek in 1980-84. In 2000-01, seven MIS fish were collected. Since 1980, there have been 1,520 acres of forest regeneration by timber harvest on Forest Service land within this watershed.

Three MIS fish were found in Lick Creek in 1980-84. In 2000-01, three MIS fish were sampled. Although the species present appeared to change over time, the number of MIS remained the same. Between 1980 and 2003, there have been 1,397 acres of forest regeneration by timber harvest on Forest Service land within this watershed.

In 1980-84, five MIS fish were found in McGehee Creek. All MIS fish were found in each subsequent survey. Since 1980, there have been 2,211 acres of forest regeneration by timber harvest on Forest Service land within this watershed.

In1980-84, only two MIS species were found in Middleton Creek. In 1996, all MIS fish were found except for the southern brook lamprey. In 2000-01 and 2002, all MIS were found except for the blacktail redhorse. Timber sales were occurring within the Middleton Creek watershed in 2000-01. Since 1980, there have been 3,822 acres of forest regeneration by timber harvest on Forest Service land within this watershed.

In 1980-84, only one MIS fish was sampled in Richardson Creek. In 1994 five MIS fish were found. Between 2000-01 four MIS fish were sampled. In 2002 five MIS fish were found. Since 1980, there have been 1,823 acres of forest regeneration by timber harvest that have occurred on Forest Service land within this watershed.

In 1980-84, all MIS fish but one were found in Steep Hill Creek. In 2000-01 only four MIS fish were found. The last timber harvesting activities that occurred in this drainage were in the early eighties and were first thinnings only. No timber management has occurred in this drainage since that time. Most of this watershed is on private land and impacted by private land activities.

In 1980-84, only two MIS fish were found in Walker Branch. These fish were the bluntface shiner and spotted bass. In 2000-01, only two MIS fish were found: the blunface shiner and the longnose shiner. Acres of forest regeneration is not listed for the Walker Branch watershed because it is a tributary within the Brushy Creek watershed.

In 1996, the blacktail redhorse was the only MIS that was found in Dry Creek. In 2000-01, no MIS fish were found. In 2002, the blacktail redhorse was found. This creek, as its name suggests, dries periodically. Therefore, it is expected not to contain a very large or diverse assemblage of fish. Since 1980, there have been 2,168 acres of forest regeneration by timber harvest on Forest Service land within this watershed.

In 1996, two MIS fish were found in Pretty Creek. In 2000-02, only one MIS fish was found. This stream, contrary to its name, is a degraded stream. It's salinity content is very high due to contamination from oil well drilling that occurred before USDA Forest Service purchased the land. So, it is expected that very few fish species would be found. Since 1980, there have been 801 acres of forest regeneration by timber harvest on Forest Service land within this watershed.

The following tables show MIS fish occurrence in all the sampled streams in South West Mississippi, including those discussed above.

Table 3.19: Estimated abundance of lampreys (all lamprey species)

Forest Plan Watershed	Year	Total Sites Sampled	Total Sites Where Present	Percent Occurrence	Total Fish Collected	Mean Fish/100 M
Southwestern Streams	1996	8	5	62.5	64	12.8
Southwestern Streams	2000	12	5	41.7	19	2.4
Southwestern Streams	2001	15	2	13	3	.95
Southwestern Streams	2002	14	8	57	22	1.55

Table 3.20 : Estimated abundance of bluntface shiner

Forest Plan Watershed	Year	Total Sites Sampled	Total Sites Where Present	Percent Occurrence	Total Fish Collected	Mean Fish/100 M
Southwestern Streams	1996	8	7	87.5	444	63.4
Southwestern Streams	2000	12	8	66.7	498	17.0
Southwestern Streams	2001	15	8	53	278	4.6
Southwestern Streams	2002	15	7	50	420	13.7

Table 3.21: Estimated abundance of longnose shiner

Forest Plan Watershed	Year	Total Sites Sampled	Total Sites Where Present	Percent Occurrence	Total Fish Collected	Mean Fish/100 M
Southwestern Streams	1996	8	7	87.5	591	84.4
Southwestern Streams	2000	12	9	75.0	583	15.1
Southwestern Streams	2001	15	11	73	718	15.1
Southwestern Streams	2002	14	9	64	481	20.4

Table 3.22: Estimated abundance of blacktail redhorse

Forest Plan Watershed	Year	Total Sites Sampled	Total Sites Where Present	Percent Occurrence	Total Fish Collected	Mean Fish/100 M
Southwestern Streams	1996	8	6	75	18	3.0
Southwestern Streams	2000	12	4	33.3	33	3.4
Southwestern Streams	2001	15	4	27	13	2.1
Southwestern Streams	2002	14	8	57	56	2.6

Table 3.23: Estimated abundance of brindled madtom

Forest Plan Watershed	Year	Total Sites Sampled	Total Sites Where Present	Percent Occurrence	Total Fish Collected	Mean Fish/100 M
Southwestern Streams	1996	8	6	75	124	20.7
Southwestern Streams	2000	12	9	75	79	4.1
Southwestern Streams	2001	15	4	27	13	1.4
Southwestern Streams	2002	14	7	50	60	2.4

Table 3.24: Estimated abundance of spotted bass

Forest Plan Watershed	Year	Total Sites Sampled	Total Sites Where Present	Percent Occurrence	Total Fish Collected	Mean Fish/100 M
Southwestern Streams	1996	8	5	62.5	11	2.2
Southwestern Streams	2000	12	6	50.0	21	1.5
Southwestern Streams	2001	15	5	33.0	9	1.2
Southwestern Streams	2002	14	6	43	7	2.4

Table 3.25: Estimated abundance of brighteye darter

Forest Plan Watershed	Year	Total Sites Sampled	Total Sites Where Present	Percent Occurrence	Total Fish Collected	Mean Fish/100 M
Southwestern Streams	1996	8	5	62.5	444	88.8
Southwestern Streams	2000	12	9	75.0	139	7.5
Southwestern Streams	2001	15	5	33.0	23	2.1
Southwestern Streams	2002	14	8	57	144	4.5

Table 3.26: Estimated abundance of rainbow darter

Forest Plan Watershed	Year	Total Sites Sampled	Total Sites Where Present	Percent Occurrence	Total Fish Collected	Mean Fish/100 M
Southwestern Streams	1996	8	5	62.5	110	22.0
Southwestern Streams	2000	12	8	66.7	340	20.2
Southwestern Streams	2001	15	8	53	84	5.0
Southwestern Streams	2002	14	7	50	80	3.4

We considered that the fluctuation in MIS fish densities and decline in numbers shown above could be tied to timber management. However, when looking at presence/absence data (1980-2002) on the Homochitto National Forest, MIS fish species were found in more streams sampled during 2000-02 than during 1980-84, even though considerable forest management activity had taken place during this time period. Therefore, we could not draw the conclusion that these changes were tied to timber management activities on the Homochitto National Forest, nor could we establish a cause and effect relationship between forest management and impacts to water quality due to the continued presence of MIS fish.

The proposed vegetation management for Analysis Unit 24 is less extensive than that done historically, so there is no expectation that there would be a loss of any aquatic MIS due to

decreased water quality. The proposed action alternatives all utilize wider streamside management zones than the minimum required by the Forest Plan and less acreage is being harvested than was done historically, so even less effect on aquatic management indicator species should be expected. Because we are proposing the same or better management and mitigations that occurred in the past, our expectation is that any impacts on MIS habitat from our management will be below any measurable threshold, and MIS fish will persist in streams where suitable habitat exists. The CEQ advises that we should analyze only meaningful effects in our analyses. Since there would be no measurable impacts to MIS habitat from this project, there is no basis for analyzing a cause/effect relationship. Therefore, we did not look further into this analysis. Additional effects analysis for aquatic Management Indicator Species are considered under the effects analysis for water quality.

The soil monitoring showed no measurable amount of soil entering the streams. The water quality monitoring data supported the soil analysis findings, that no measurable amount of soil moved in the steams. The MIS fish data verifies both the soil and water quality data showing, a "no effect or below threshold effect" relationship between timber harvesting in this project, water quality, and aquatic habitat.

Cumulative Impacts

TERRESTRIAL HABITATS

All evaluated alternatives will affect Management Indicator Species, including the "No Action" Alternative. Regeneration and thinning will benefit species that utilize early seral habitats at the expense of those species that utilize late seral habitat. Balance is the key to National Forest Management Act compliance. By deferring regeneration, Alternative 1 ("No Action") will benefit species associated with mature habitat. However, this benefit may be temporary if the unthinned mature stands continue to become more vulnerable to losses associated with southern pine beetles and disease. Overstocked mature stands are more vulnerable to southern pine beetle mortality, which could result in large-scale losses of this habitat type. Species requiring dead, diseased, or dying trees would benefit from the un-harvested trees in mature stands in the short term, however the resulting sparsely-stocked forest would not long meet the needs of those species requiring late seral forest for habitat.

Table 3.27: Acres of Represented Habitat for Terrestrial Management Indicator Species on the Homochitto National Forest (since 1980 baseline)

MIS	Natural Community Represented	Acres in 1980	Acres in 2003	Percent Change
White-tailed Deer	0-10 years, all forest types	40,531	11,377	-78%
Bachman's Sparrow	0-10 years, longleaf pine		1,251	
Bobwhite Quail	0-10 years, longleaf/yellow pine	33,297	8,318	-75%
Eastern Meadowlark	0-10 years, yellow pine	33,297	7,818	-77%
American Kestrel	0-10 years, pine/hardwood	4,482	3,018	-33%
Rufous-sided Towhee	0-10 years hardwood	2,752	41	-98%
Eastern Wild Turkey	40+ years, all forest types	133,291	109,534	-18%
Pileated Woodpecker	40+ years, all forest types	133,291	109,534	-18%
Red-cockaded Woodpecker	40+ years, longleaf/yellow pine	110,070	77,667	-30%
Fox Squirrel	40+ years, longleaf pine		1,575	
Pine Warbler	40+ years, yellow pine	110,070	74,758	-32%
Gray Squirrel	40+ years, pine/hardwood and hdwd.	23,221	34,776	+50%
Screech Owl	40+ years, pine/hardwood	14,001	24,435	+75%
Hooded Warbler	40+ years, hardwood	9,106	10,341	+14%

The regeneration planned in the "Proposed Actions" and in Alternatives 2 & 3 will benefit Management Indicator Species associated with early seral and edge habitat. However, when compared to projections in the Forest Plan, regeneration has been lower than predicted over the past two entries and will continue to be lower this entry, regardless of the alternative chosen. The cumulative effect will be reduced habitat available for the white-tailed deer and similar species using early successional forest habitats. In contrast, the mid- and late-seral habitat available to species such as the pine warbler and the pileated woodpecker is cumulatively greater.

Because of the historic burning regime in the South, an abundant hardwood midstory was not characteristic of upland sites, and wildlife species using these lands found open canopy with low groundcover conditions. For this reason, thinning combined with prescribed burning can create some of the understory conditions often associated with early succession, even where overstory remains. In essence, thinning and burning can expand the range of beneficial habitats available in mature stands, offsetting some of the cumulative reduction in early-seral habitat and associated species benefits when compared to Forest Plan projections. In addition, because thinning in mature stands may prolong the life of these stands, the thinning planned in the "Proposed Actions" and Alternatives 2 and 3 will benefit species associated with mature habitat. Eventually the current overstory of any stand or forest type will mature and deteriorate, moving

the stand into an early-seral condition or a species composition less favorable to the wildlife species that previously occupied the area. The first thinning proposed for poletimber stands will allow these stands to more quickly obtain characteristics of older stands, creating benefits for mature and late-seral species.

Temporary displacement of wildlife may occur during project implementation. Loss of individuals in these alternatives may also occur but is not anticipated to cause a loss of population viability for any Management Indicator Species within the project area. This determination is based on the long-term management objectives stated in the forest Plan and an understanding of habitat associations for the various Management Indicator Species, the relative rarity of these species and their habitats, and the potential impact of the proposed alternatives on these habitats. The objective is to generate a long-term even flow of healthy early, mid, and late seral habitats, which by their nature cannot be cumulative. In comparison, protection and absence of harvest (the "No Action" Alternative) would represent a cumulative movement towards older stands with substantial midstory. This progression would be disrupted by periodic catastrophic natural losses that would not likely be subject to events such as the unrestricted fires that occurred in nature after such losses. The result would be lower populations of most early and later seral management indicator species, which would likely be cumulative over time, but would not necessarily lead to loss of viability or listing. The analysis shows that population viability for all Management Indicator Species would be maintained under all of the listed alternatives over the next 10-year entry cycle.

To assess the diversity of habitat types on the Homochitto National Forest, the cumulative effects analysis presented earlier is bounded geographically by the Forest boundary. Trends in acres of habitat types represented by management indicator species are monitored directly as a measure of habitat diversity and capability. This assumes that if a particular type of habitat is available, species associated with that habitat will be maintained. This analysis provides a cumulative picture of the habitat types available on the National Forest to support viable populations. This mix of habitat types is the result of past management actions. Current and future actions, as guided by the Forest Plan, are designed to maintain similar mixes of habitat, except that increasingly loblolly pine forests are being converted to mixed pine with a longleaf component (reintroducing a historic habitat component); and many acres of forest previously classified as yellow pine has through time converted itself to pine-hardwood as bug epidemics and old age have taken out over mature loblolly. Declines in acreage of both early-seral and mature pine forest habitats reflect an increase in acreage of intermediate-aged (10-40 years old) pine forest, which are not represented by any management indicator species. These habitats are generally of less value to most species of wildlife. Their increase is a result of moving toward a more balanced age-class distribution from the bimodal age distribution that existed in 1980 (many acres of mature forest and some acres of very young forest, but few acres of intermediate forest).

Although the red-cockaded woodpecker shows a reduction of habitat (on paper) of some 30% forest wide, the Forest Plan description of 40+ year-old longleaf and yellow pine does not adequately define the needs of this species. The red-cockaded woodpecker is listed as endangered, and is a species of special concern. Critical to its habitat is reduced midstory. The species has shown a 155% increase in population on the Homochitto National Forest from a low of 22 in 1991 to a present total of 67 active clusters in 2004. This is the result of aggressive

burning and midstory control programs that effectively increased suitable nesting and forage habitat, even though harvest has resulted in an apparent habitat reduction. Thinning and burning will result in an immediate benefit, adding 686 (approximate) acres of improved habitat. The "Proposed Action" and "Proposed Action without Herbicides" would replace approximately 385 acres of ageing loblolly pine stands with longleaf pine. Alternative 2 "Maximum Regeneration" alternative would replace 479 acres. Longleaf pine is considered preferred habitat, as well as being longer-lived and more resistant to insects and disease. These actions represent a net increase in long-term suitable habitat for the RCW. Whether or not this is cumulative is based on time perspective. At the turn of the 20th century, a high percentage of the Homochitto River basin was in fire-dependent longleaf/yellow pine communities and had a flourishing red-cockaded woodpecker population. Wide-scale cutting prior to public acquisition of the Homochitto National Forest nearly eliminated this habitat, and only about 2000 acres of scattered mature longleaf remain. From 1930 conditions, restoring longleaf components could be viewed as cumulative increases. However, the district views this project from a historical perspective of a non-cumulative return to native forest communities. "No Action" would result in a cumulative reduction in both short- and long-term habitat. As an endangered species, additional discussion about effects of this project on the RCW is provided in this chapter under Issue 6, and in the Biological Evaluation attached as Appendix C.

Bachman's sparrow and fox squirrel do not have changes in habitat acreage computed because the 1980 data did not capture longleaf pine as a community type. Because of recent national trends favoring restoration of longleaf pine forest throughout the southeast, there is a continuing trend to convert areas supporting off-site loblolly pine to longleaf pine dominated mixed pine stands. Also, few if any, stands of longleaf are being regenerated at present so the only 0-10 age class acres of longleaf result from the planting of longleaf pine seedlings.

No management activities are proposed in the natural communities represented by the American kestrel, rufous-sided towhee, fox squirrel, gray squirrel, screech owl, or hooded warbler. As per the Forest Plan, hardwood areas are not to be regenerated before age 90, and most of the hardwoods in this Analysis Unit are below that age. The more critical need is to regenerate aging, off-site loblolly pine. For these reasons species utilizing older hardwood and pine-hardwood stands have shown appreciable gains in acreages of habitat. There are therefore no expected negative cumulative effects for these species and their habitat.

Statewide results of harvest data for deer, turkey, squirrel, and quail are reported in the Management Indicator Species Population and Habitat Trends report for the National Forests in Mississippi. This data is collected on State of Mississippi Wildlife Management Areas (WMA) and is aimed at checking the effectiveness of overall management programs at maintaining stable populations of high demand game species (some of which are also Management Indicator Species). The most telling numbers are the number of game harvested per unit of effort, since this lessens the swing in harvest numbers seen due to more or less hunters in any given year due to weather, changes in hunting regulations, and availability of other lands to hunt.

For the Homochitto National Forest, preferred deer habitat (early seral) has declined. This is in contrast to Forest Plan projections that early seral habitat and deer populations would increase. Deer harvest has been relatively steady when adjusted to a decrease in Wildlife Management

Area acres. Hunting has declined somewhat, but there has been a slight increasing trend in harvest per hunter-day. These figures suggest that deer populations are robust and able to absorb increasing hunting pressure. Increased burning and thinning are credited with offsetting losses in preferred habitat for this MIS.

In contrast, turkey harvest has declined in the face of increasing hunting demand, resulting in declining trends in harvest per hunter-day. Much of this decline occurred in the early to mid-1990s during a period of documented disease losses. Populations and harvest were very high in the mid to late 1980s and large disease and weather related population swings are common to turkey and other game bird populations. Beginning in 1994, data shows increasing turkey harvests despite a 12% reduction in WMA acres. These figures indicate a rebuilding turkey population. Population declines do not appear to be habitat related. The Forest Plan predicted a reduction in turkey habitat units, but expansion of the population into existing units. Preferred habitat has declined by 21%, but rapid population declines occurred during a period of only moderate habitat reduction. The population is rebuilding as additional reductions in habitat are occurring. Reductions in preferred turkey habitat are below Forest Plan predictions, and the population appears healthy.

The effects of management activities on quail can be more accurately assessed through breeding bird survey data and a quail research project conducted on the Homochitto National Forest. Populations appear to be declining across their range. Quail hunting numbers have also declined in the early 1990s, even though listening point and research data showed increasing populations. Hunters reporting harvest on the WMAs report only a slight reduction in success rates. Two factors are considered to be relevant. Quail hunting is a high-cost sport requiring specialized equipment and trained dogs. Hunters appear to have dropped out of quail hunting, even though huntable birds are available. Quail populations have responded favorably to red-cockaded woodpecker habitat management (See Table 3.19). This type habitat is not common in the Wildlife Management areas where hunting data is collected, and much of the best habitat was removed when WMA acreage was reduced by 12%. Hunting may be occurring in areas where data isn't collected. Because reforestation rates have not kept up with growth out of the early seral conditions, quail habitat has dropped by approximately 50% over the past 15 years. Research indicates that red-cockaded woodpecker habitat management has offset some of this loss. The appearance is that surplus birds are available for hunting, and that quail populations will be stable under the action alternatives for this proposal. The "No Action" alternative would produce neither early seral, nor red-cockaded woodpecker habitat, and would likely be adverse to the northern bobwhite quail.

Hunting interest in squirrel has declined steadily. This is attributed to substantial extensions in the deer season in recent years: hunters must choose between hunting squirrel or deer. Total squirrel harvest (fox and gray squirrel combined) has decreased, but the trend line for hunter success has nearly doubled, showing considerable surplus squirrels compared to hunting demand. This corresponds to a steady increase in preferred squirrel habitat as harvests have fallen behind Forest Plan objectives. Even in harvested areas, much of the prime squirrel habitat is being preserved in wide streamside management zones and large reserve clumps, which can represent as much as 20% of the total stand acres. This project does not harvest mature hardwood stands and is not likely to have a noticeable effect on squirrel. The restoration of

historic longleaf/yellow pine communities is likely to benefit fox squirrel in the distant future as restored habitats mature.

Although surrounding private lands do contribute habitat for Management Indicator Species, these lands are in no way legally bound to provide such habitat, as are National Forest lands. Therefore, they cannot be counted on to provide such habitat in the future. The analysis in Table 3.19 takes a conservative approach by considering primarily National Forest lands, for which viable population requirements apply. In general, private lands in and surrounding the Homochitto National Forest are primarily managed and unmanaged forest lands harvested on short rotations, cropland and pastures, and scattered residential housing. There were a number of questions related to cumulative effects of vegetation management (Issue 4). Many of these were also related to the both MIS (Issue 7) and PETS (Issue 6). Unless otherwise stated, these concerns are addressed under the vegetation analysis in Issue 4.

AQUATIC HABITATS

Since there would be no measurable direct or indirect effects to aquatic habitat, there is no expectation of cumulative effects on fish species for any alternative. Unlike forest habitat, where changes in composition and seral stage outside the analysis unit may have some effect, water quality concerns that may affect adjacent streams are not likely to affect Dry Creek or Porter Creek drainages. The watershed has been surveyed and found to support populations of management indicator fish appropriate to southwestern Mississippi, even though several management entries have been implemented. MIS surveys have confirmed the effectiveness of standard mitigation measures, and no cumulative effects to water quality or aquatic MIS species are expected from this project.

Game Species

AFFECTED ENVIRONMENT

It has been Forest Service Policy to look at the most appropriate management in the most natural manner. In many cases this involves the restoration of the historical forest. In the case of large parts of the Homochitto National Forest, this historical forest was a mosaic involving a longleaf pine-shortleaf pine dominated ridge community with loblolly pine occurring more frequently on lower slopes and within drainages. Hardwoods species were found in mesic ravines, river and creek bottoms where the microhabitat conditions prevented frequent occurrence of fire. One of the best surviving descriptions of the native forest indicates that 50 to 70 percent of the ridge forest was composed of longleaf pine with shortleaf pine and loblolly combining for up to 30 percent of the forest with hardwoods making up about 10 percent of the stand (Holmes, J.S. and J.H. Foster, 1908). There is a concern that removal of hardwoods through intensified management intended to recreate this historical forest is creating a forest that is less valuable to game species. Present management is aimed at restoring this historic fire-dependent community on those portions of the Homochitto National Forest where fire management is possible. In Analysis Unit 24 approximately 3,016 acres are managed with prescribed fire.

The hardwood of most-perceived value to game species is the oak because of the acorn crop that falls during the fall hunting season and may, in good mast years, help to fatten game animals

against the winter. In most cases, the actual dominant species of hardwood present in today's pine stands are generally not oak but rather sweetgum, black gum, and red maple, which became established due to historical exclusion of fire. In the historical upland mixed pine forest, hardwoods were a relatively minor component of the forest (approximately 10 percent according to Holmes and Foster, cited above) because the frequent burning precluded their establishment. Hardwoods, including oaks, were restricted to stream sides, and lower slopes wherever moisture or topography protected the trees from any but the most severe fire events.

Primary game species within the project area include deer, turkey, quail and squirrel. Management of these game species is the responsibility of the state Department of Wildlife, Fisheries and Parks with the U.S. Forest Service taking a secondary role. To the extent that the populations respond to habitat management, the Forest Service can impact species abundance. Factors limiting population levels of these species include, but are not limited to hunting pressure, predators, and limited availability of suitable habitat. Other factors such as changes in hunting regulations can have as great an effect for some species such as whitetail deer and wild turkey.

ENVIRONMENTAL CONSEQUENCES

The perception by some parts of the public that we are trying to create a "pine monoculture" without any hardwoods is based on the effort of the Forest Service to restore the historic fire-dependent community on a forest that has for years had hardwood species growing "off-site" on ridgetops and upper slopes where natural historic fire events would never have allowed them. The proposed management for the analysis area allows for hardwoods to be present in areas where fire would have allowed them to grow historically, thus creating a mosaic of forest types on a landscape scale similar to what the original forest would have been like.

"Proposed Actions"

The "Proposed Actions" and Alternatives 2 & 3 allow for both thinning and restoration of the historic mosaic of types of forest across the landscape. In the "Proposed Actions" and Alternative 3, clearcutting will replace 385 acres of loblolly forest with the desired longleaf mixed pine forest. An additional 73 acres would be naturally regenerated to loblolly pine-hardwood. In Alternative 2, an additional 66 acres of the desired longleaf mixed pine forest would have been created. Under these alternatives there will be a perceived loss of hardwoods from the landscape as the historic forest is restored but the loss of hard mast producers will not be as great as perceived. Loss of hardwoods is being mitigated for by the retention of clumps of the best hardwoods in groups 0.5-2 acres in size. Where practical the clumps are located so as to retain the best mast producing hardwoods on the site. Single trees with good form and potential for developing as mast producers also are left as 1- to 3-tree inclusions in the regeneration areas. Thinning in and around these selected trees will allow for greater crown development than would otherwise occur in a closed canopy and increased production of mast. Further mitigation for loss of mast-producing hardwoods is compensated by the inclusion of wide streamside buffers in excess of that needed for water quality issues or required in the Forest Plan.
For areas to be thinned within the burn block, most hard mast producers larger than 12 inches dbh (and therefore fire resistant) are retained. Occasional trees of down to 10 inches are left if they are well formed and show the potential for development as mast production. Thinning

within the riparian zone (SMZ) will thin only where pines are over-dense, and then only where removal of pines can enhance hard mast production.

"No Action" (Alternative 1)

The "No Action" alternative defers opportunities to further the restoration of the historical forest community on a landscape basis. The project area will continue in its present loblolly pine forest cover until natural processes such as insects, disease, wind damage, or wildfire remove the current canopy. Without a native seed source and suppression of seeding by loblolly pine remaining around the natural opening, there is no chance for the restoration of longleaf pine to the site. Off-site hardwoods such as sweetgum would continue to occupy mid-canopy space in the forest and reduce crown development of oaks that are present.
"Maximum Regeneration" (Alternative 2): This alternative proposes an additional 66 acres of regeneration by clearcut with reserves to create the desired longleaf mixed pine forest.

Other affects on game species should be similar to those discussed for the "Proposed Actions".

"No Herbicide" (Alternative 3)

This alternative proposes regeneration without the use of herbicide. This absence of herbicide may reduce the ability of longleaf seedlings to out-compete hardwoods species for establishment.

Other affects on game species should be similar to those discussed for the "Proposed Actions".

"Thin Only" (Alternative 4)

This alternative does not reestablish the historic forest but mast-producing trees are emphasized as discussed for the "Proposed Actions". This alternative would also provide less early seral habitat for short-term browse opportunities than the "Proposed Actions" or "No Herbicide" alternatives.

Hardwood and hardwood-pine stands in the analysis area are not being converted to pine types under any of the alternatives considered.

These decisions about hard mast producers are based solely on the burning regime. Smaller hardwoods in burn areas tend to be very under-productive and their potential for loss is great. Therefore in harvesting and thinning within the burn block, we will retain a large number of the best mast producers as specific mitigation.

Outside of the burn block, the intention of the regeneration ("Proposed Actions" and Alternative 2) is to create pine-hardwood stands for the long term. The intention of thinning in this area is to reduce the pine basal area to below that level maintained in the burn areas specifically to release hardwoods to take a dominant position in stands for the long term. These areas are being moved to a higher level of hardwoods to offset losses of hardwoods in the burn area.

CUMULATIVE EFFECTS

By maintaining the bulk of hardwoods in the regeneration and thinning areas, increasing the quality of those hardwoods through release, incorporation of clumps and single trees within

regeneration areas, increased widths of streamside management zones, and other mitigations discussed, there should be no net loss of hardwood mast producers in Analysis Unit 24. Management focuses on benefits to the games species involved, not on the concept of hardwood itself. Regeneration of mature loblolly pine stands and thinning of such stands may in fact be partial mitigation for deer, turkey, and quail since each of these species benefits from at least some exposure to early seral stages at some point in their life history. The whitetail deer is a habitat generalist and browser who do not care where the young, tender woody vegetation comes from to browse. Browse is essential to its survival, but acorns are nice to have ("ice-cream plants"). The wild turkey needs accessibility to early seral habitat for nesting and brood habitat even though the turkey will utilize acorns if available; acorns are not essential to its survival. The bobwhite quail essentially disappears from unthinned late seral stands that are not burned and will utilize regeneration areas for nesting and brooding until the rough becomes too difficult to move through.

Reported annual harvest data for whitetail deer on are available for both the Caston Creek Wildlife Management Area and Sandy Creek Wildlife Management Area for the period 1982 to present. The results of the Caston Creek area are the most relevant because of proximity and habitat type and would be discussed here. Reported annual deer harvest ranged from a high of 304 during the 1992-1993 hunting season to a reported low of 127 in the 1995-1996 hunting season. Interestingly, the harvest of deer per man/day of hunter effort were almost equal (61 deer per hundred man days in 1991-1992 to 60 deer per hundred man days in 1995-1996), indicating that there was probably little change in population size but rather a change in the number of hunters using Caston Creek Wildlife Management Area (and Homochitto NF).

The reported annual harvest data for wild turkey on the Caston Creek Wildlife Management Area was at a peak during the 1982-83 season with 90 gobblers being killed. Increasing hunter effort and a regionally declining turkey population bottomed out in 1994-95 when 17 gobblers were reported killed. This reflects a turkey population, which is in the process of rebuilding (39 gobblers were killed in 1996-97).

Caston Creek Wildlife Management Area harvest data for squirrel and quail do not differ significantly from that for the statewide results. Statewide results of harvest data for deer, turkey, squirrel, and quail are reported in (Mississippi Department of Wildlife, Fisheries & Parks Wildlife Management Areas Harvest Summary Report). This data is aimed at checking the effectiveness of overall management programs at maintaining stable populations of high demand game species (some of which are also Management Indicator Species). The most telling numbers are the number of game harvested per unit of effort since this lessens the swing in harvest numbers seen due to more or less hunters in any given year due to weather, changes in hunting regulations, and availability of other lands to hunt.

Both deer harvest and deer hunting show increasing trends, resulting in a relatively stable trend in harvest per hunter-day. These figures suggest that deer populations are robust and able to absorb increasing hunting pressure. In contrast, turkey harvest has declined in the face of increasing hunting demand resulting in declining trends in harvest per hunter-day. The Statewide decline in the wild turkey population began at a period of record high turkey numbers. Diseases such as fowl pox are believed to have been the active agent in the decline. Coupled

with this precipitous decline came a change in land use management practices on private land and expanding predator populations (primarily raccoons) which is believed due to a region-wide decline in fur trapping.

These figures reflect a declining turkey population. Both quail harvest and hunting activity are generally low, showing a stable trend, suggesting low but stable populations. Total squirrel harvest (fox and gray squirrel combined) has increased slightly despite decreasing hunting pressure resulting in increasing success by squirrel hunters. These figure suggest squirrel populations on national forests are stable or increasing.

Desired conditions described in the Forest Plan include an increase in habitat capability for species dependent on early-seral conditions such as deer, and a decrease in habitat capability for late seral species such as turkey (page 4-82, Forest Plan). Harvest data for deer and turkey support the conclusion that Forest Plan goals related to habitat capability are being met. In contrast however, quail, another early-seral indicator, appear to exhibit stable populations, while squirrels, indicators of late-seral habitat, appear to exhibit increasing populations. These variable results reflect the variety of species-specific factors other than habitat that affects wildlife populations. For turkeys, such factors include disease, nest predation, weather pattern fluctuations, and hunting pressure. For quail, researchers have proposed weather, fire ants, land use changes, and predation as some of the potential factors causing region-wide declines in quail populations. The complexity of such specific ecological interactions associated with each species limits the usefulness of indicator species as representatives of other species or communities.

There is, however, direct interest in populations of these high-demand game species. Results presented here mirror conclusions made by game managers with the Mississippi Department of Wildlife, Fisheries and Parks and wildlife researchers about game populations statewide. Deer and squirrel populations are large and stable or increasing, turkey populations have shown some regional declines within Mississippi, and quail populations have shown general declines in recent years.

Although surrounding private lands do contribute habitat for Management Indicator Species, these lands are in no way legally bound to provide such habitat, as are national forest lands. Therefore, they cannot be counted on to provide such habitat in the future. The analysis in Table 3.10 takes a conservative approach by considering primarily national forest lands, for which viable population requirements apply. In general lands in and surrounding the Homochitto National Forest are primarily managed and unmanaged forest lands, crop and pasture lands, and scattered residential housing.]

It has been Forest Service Policy to look at the most appropriate management in the most natural manner. In many cases this involves the restoration of the historical forest. In the case of large parts of the Homochitto National Forest, this historical forest was a mosaic involving a longleaf pine-shortleaf pine dominated ridge community with loblolly pine occurring more frequently on lower slopes and within drainages. Hardwoods species were found in mesic ravines, river and creek bottoms where the microhabitat conditions prevented frequent occurrence of fire. One of the best surviving descriptions of the native forest indicates that 50 to 70 percent of the ridge

forest was composed of longleaf pine with shortleaf pine and loblolly combining for up to 30 percent of the forest with hardwoods making up about 10 percent of the stand (Holmes, J.S. and J.H. Foster, 1908). There is a concern that removal of hardwoods through intensified management intended to recreate this historical forest is creating a forest that is less valuable to game species. Present management is aimed at restoring this historic fire-dependent community on those portions of the Homochitto National Forest where fire management is possible. In Analysis Unit 24, approximately 3,016 acres are managed with prescribed fire.

The hardwood of most perceived value to game species is the oak because of the acorn crop that falls during the fall hunting season and may, in good mast years, help to fatten game animals against the winter. In most cases, the actual dominant species of hardwood present in today's pine stands are generally not oak but rather sweetgum, black gum, and red maple, which became established due to exclusion of fire. In the historical upland mixed pine forest, hardwoods were a relatively minor component of the forest (approximately 10 percent according to Holmes and Foster, cited above) because the frequent burning precluded their establishment. Hardwoods, including oaks, were restricted to streamsides, and lower slopes wherever moisture or topography protected the trees from any but the most severe fire events.

Fragmentation

AFFECTED ENVIRONMENT

The value of mature forest communities are determined by local habitat factors as well as landscape composition. At a landscape level, the single most important consideration is to maintain large areas in breeding and wintering forest habitats to provide for species needing large unbroken tracts of forest for population viability. This includes some species of Neotropical migrant birds. At the habitat level, the most basic management step is to maintain native ecosystems and promote rare ecosystems required by threatened, endangered and regional species of high management concern. On the Homochitto National Forest, large forested tracts are maintained as breeding areas for Neotropical species requiring forested ecosystems. While at any given time some of the forest may be younger than others, it is still forest. The recent discussions about habitat fragmentation effecting Neotropical migrant comes mainly from research done in the Midwest where the forest was truly fragmented, i.e., trees surrounded by corn fields. Recent research in the southeast concerning the effects of regeneration areas within forested blocks has not confirmed the midwestern data (L.W. Burger, Mississippi State University, personal communication).

A high priority in the south is to restore and maintain natural ecosystems that have been substantially reduced or altered such as the longleaf pine system. (Dickson, Franzerb, Thompson and Conner 1992). Failure to accomplish maintenance and restoration of scarce habitat types is more likely to impact population trends than the short-term disturbance created by logging activities. In Analysis Unit 24 between 385 to 479 acres of this habitat would be created this entry, depending on alternative selected.

ENVIRONMENTAL CONSEQUENCES

Under the proposed alternative, no more than 26% of the late succession habitat would be converted, and this only for the species utilizing late succession pine habitat. Species such as the wild turkey and Pileated woodpecker that utilize pine, pine/hardwood, and hardwood forests, would see only an 11% decline in overall habitat. The species utilizing forest with the most hardwood component, gray squirrel, screech owl, and hooded warbler would see small increases in habitat size.

In Analysis Unit 24, at the present time, the largest block of unfragmented forest habitat of age >40 years is approximately 2,360 acres. Under the proposed action and alternative 3, this would reduce to 1,611 acres, still a large tract of unbroken forest. In alternative 2, this would be reduced to 1,507 acres. In the current proposal, all regeneration areas are located as close to other young forest as is possible while complying with regulations in the Forest Plan. This not only preserves the largest block of late seral forest and helps to prevent fragmentation of this habitat, the cluster of early seral stands would become the late seral stands of the future and they would likewise be close to each other, insuring forest fragmentation would be minimized into the future.
All alternatives will use the standard mitigation and monitoring guidelines found in appendix C.

CUMULATIVE EFFECTS

Total late seral habitat on the Homochitto National Forest has declined from approximately 133,291 acres in 1980 to approximately 109,534 acres in 2003. The majority of this conversion was due to the wholesale loss of older loblolly pine stands to the southern pine beetle and increased harvest of the aging loblolly pine stands to convert them to longleaf/mixed pine stands. Since the forest is not static, stands currently less than 30 years of age would mature during this entry period, eventually replacing those stands that were regenerated. Since there is this continual growing back in of older forest, no cumulative effects would occur.

In Analysis Unit 24, thinning and regeneration activities during the last decade (1990-present) have been limited in size and distribution. Compartments are normally entered on a 10-year basis; however, entry of some compartments was delayed by the 1994-1996 southern pine beetle epidemic suppression activities. Additional scheduling changes resulted from forming groups of compartments into "Analysis Units". These areas consolidate segments of watersheds and improve the effects analysis. This analysis represents the vegetative management and habitat planning for this 10-year period.

Activity levels of the previous two decades regenerated approximately 1,491 acres of Analysis Unit 24. This is about 8% of the total analysis area and about 20% of the US Forest Service lands. Proposed regeneration levels are based on forest health and diversifying forest age classes to ensure long-term habitat for all forest species.

Thinning, along with prescribe burning will result in increased levels of grasses and herbaceous vegetation on the forest floor. This represents a return to the historic conditions prior to early 1900's harvest, rather than a cumulative effect. The long-term cumulative effect has been the loss of this type of forest condition and habitat.

Based on this, the proposed harvesting does not contribute to other unconnected actions within the project area to create unacceptable levels of negative cumulative impacts.

On the other hand, deferment of wildlife habitat improvements (Alternative 1 – "No Action") will contribute to lost opportunities for maximizing wildlife populations' within the Homochitto National Forest. Additionally, failure to regenerate pine during this entry will contribute to the current imbalance of age classes throughout the district.

Neotropical Migrants

AFFECTED ENVIRONMENT

To address growing concerns about viability of bird populations, Neotropical migrants in particular, the Forest Service developed in 1996 a Migratory and Resident Landbird Conservation Strategy for implementation on southern National Forests. This strategy identifies priority species based on population trend data compiled from a variety of sources by Partners In Flight, a network of agencies, organizations, and individuals dedicated to conservation of Neotropical migrants. The strategy also sets in motion a plan for monitoring long-term trends of bird populations on southern National Forests. National Forests in Mississippi contain over 1000 monitoring points in a full range of habitats: monitoring of these points began in 1994 with a three year pilot project on the Homochitto National Forest. Monitoring for all on the National Forests in Mississippi began in 1998 and expanded in earnest in 1999 and is continuing into the present.

This intensive effort documents trends of songbirds associated with a wide range of habitats. With the information provided by using this level of monitoring, it is not necessary to obtain stand specific data on songbird populations in order to insure viability. In a few years, monitoring points will give us much better data on trends by National Forest. Currently we rely on regional summaries of bird survey data to indicate potential viability problems. These sources have been used in our regional strategy to identify 47 regional priority bird species. This list serves as a starting point for assessing effects of management activities on bird population viability.

A study of Neotropical migrants on the Homochitto National Forest started in 1994 and is continuing indefinitely. This breeding bird survey includes approximately 230 monitoring points on the Forest. By 2001, 86 species of birds have been documented on these monitoring points for the Homochitto National Forest. Of these 19 are listed as regional priority bird species.

Fragmentation of habitat is always a concern when managing the National Forest lands. Frequency of Occurrence data for the brown-headed cowbird obtained from the Breeding Bird Survey indicates that present management activities have not resulted in large brown-headed cowbird populations. Average Frequency of Occurrence for the brown-headed cowbird for the Homochitto National forest for six years (1994-96, 1999-2001) was 1.66%. This frequency of occurrence can be contrasted with that of the federally endangered red-cockaded woodpecker (3.80%). It appears that fragmentation is not being created by current management practices.

Breeding bird survey data from 1994 to 1996 were utilized to compare areas intensively managed for red-cockaded woodpecker to the rest of the forest (Burger, L.W., et. al., 1998). They found that stands under RCW prescriptions (including hardwood midstory removal) exhibit greater total breeding bird abundance (12.9 birds per point versus 10.6 birds per point, P=0.005) and marginally greater species richness (9.8 versus 8.9 species per point, P=0.08) than forest stands under traditional management. Nine species (white-eyed vireo, common yellowthroat, yellow-breasted chat, rufous-sided towhee, prairie warbler, indigo bunting, red-cockaded woodpecker, brown-headed nuthatch, and eastern wood pewee) were more abundant in stands under RCW prescription, versus four species (tufted titmouse, acadian flycatcher, blue-gray gnatcatcher, and red-eyed vireo) more abundant in stands under traditional management. Those species favored under RCW prescriptions tended to be early successional or mature pine-grassland species that are declining regionally or nationally (7 of 9), whereas those species favored under traditional management were relatively common forest interior species exhibiting stable or increasing trends (4 of 4 species). They concluded that prescribed fire regimes (and by inference hardwood midstory removal) that maintain open pine-grassland forest structure likely enhance both alpha and beta diversity by promoting regionally scarce habitats to which numerous southeastern bird species are adapted. According to Dr. Wes Burger of Mississippi State University, this type of management actually constitutes "ecosystem management" or "restoration" from which many early successional, fire adapted species such as the Bachman's sparrow, prairie warbler, and northern bobwhite likely benefit (Lucas 1993, Wilson et al. 1995).

This direction is consistent with the direction provided by Dickson, Franzerb, Thompson and Conner (1992). According to their management recommendations, Neotropical bird communities are determined by local habitat factors as well as landscape composition. At a landscape level, the single most important consideration is to maintain large areas in breeding and wintering forest habitats to provide for large Neotropical populations. At the habitat level, the most basic management step is to maintain native ecosystems and promote rare ecosystems required by threatened, endangered and regional species of high management concern.

A high priority in the south is to restore and maintain natural ecosystems that have been substantially reduced or altered such as the longleaf pine system (Dickson, Franzerb, Thompson and Conner 1992). Failure to accomplish maintenance and restoration of scarce habitat types is more likely to impact population trends than the short-term disturbance created by logging activities.

Logging during nesting season physically disturbs nests and alters behavior of nesting adult birds, impacting reproductive failure. Although hard data are not available, we assume that in most cases this failure will be nearly complete within affected areas for the period of logging. This assumption is based on observations of researchers studying nesting productivity of forest birds (Dr. Keith Ouchley, Louisiana State Univ., personal communication).

ENVIRONMENTAL CONSEQUENCES

"Proposed Actions"

Under the Analysis Unit 24 proposal, the total acres which will be either thinned or regenerated represents less than 1% of the total Homochitto National Forest area. Based on the typical timber-harvesting program for the Homochitto National Forest, approximately 4% of the total Forest area is disturbed annually. However, only 20% of the total logging season typically occurs between April 15 and June 15. This represents less than 1% of the total Homochitto National Forest that is disturbed annually during the peak nesting season.

With logging activities disturbing less than 1% of the total area from April 15 - June 15, this translates into a similar proportion of breeding productivity lost due to the cumulative effects of logging on the Homochitto National Forest. Based on this, population effects from this action (both individually and cumulatively) will be small and viable populations of all native birds can be maintained without eliminating logging during the nesting season.

Selective application of Class A herbicide would be used in the "Proposed Actions" only. Herbicide application rates and treatments are specific to plants treated. Type A herbicides typically have low toxicity and short persistence. With a half-life of 6 days to 6 months, Class A herbicide are generally not measurable a year after application. Application of recommended rates of Class A Herbicide have not been shown to cause cancer, mutations or birth defects or to accumulate in the food chain or in the bodies of humans or animals (VMCP/P).

The "Proposed Actions" will help restore and maintain natural ecosystems that have been substantially reduced or altered such as the longleaf pine system (Dickson, Franzerb, Thompson and Conner 1992). Failure to accomplish maintenance and restoration of scarce habitat types is more likely to impact population trends than the short-term disturbance created by logging activities.

"No Action" (Alternative 1)

Because there would be no timber harvesting activities with this alternative, no birds would be disturbed during the nesting season. However, restoration and/or maintenance of natural ecosystems that have been substantially reduced or altered such as the longleaf pines system would not occur. This could potentially impact bird species that require this type of habitat.

"No Herbicide" (Alternative2) and "Thin Only" (Alternative3)

Under either of these alternatives, the total acres which will be either thinned or regenerated represents less than 1% of the total Homochitto National Forest area. Based on the typical timber-harvesting program for the Homochitto National Forest, approximately 4% of the total Forest area is disturbed annually. However, only 20% of the total logging season typically occurs between April 15 and June 15. This represents less than 1% of the total Homochitto National Forest that is disturbed annually during the peak nesting season.

With logging activities disturbing less than 1% of the total area from April 15 - June 15, this translates into a similar proportion of breeding productivity lost due to the cumulative effects of logging on the Homochitto National Forest. Based on this, population effects from this action

(both individually and cumulatively) will be small and viable populations of all native birds can be maintained without eliminating logging during the nesting season.

Herbicide would not be used in either of these alternatives, and therefore would not affect bird populations.

These alternatives will help restore and maintain natural ecosystems that have been substantially reduced or altered such as the longleaf pine system (Dickson, Franzerb, Thompson, and Conner 1992). Failure to accomplish maintenance and restoration of scarce habitat types is more likely to impact population trends than the short-term disturbance created by logging activities.

Based on this, the prescribed thinning combined with prescribed burning described in the Proposed Action and Alternatives 2, 3, and 4, are likely to restore important habitat for a host of Neotropical migrants associated with a regionally scarce forest type. According to Dr. Wes Burger of Mississippi State University, this type of management actually constitutes "ecosystem management" or "restoration" from which many early successional, fire adapted species such as the Bachman's sparrow, prairie warbler, and northern bobwhite likely benefit (Brennan 1991, Lucas 1993, Wilson et al. 1995).

This direction is consistent with the direction provided by Dickson, Franzerb, Thompson and Conner (1992). According to their management recommendations, Neotropical bird communities are determined by local habitat factors as well as landscape composition. At a landscape level, the single most important consideration is to maintain large areas in breeding and wintering forest habitats to provide for large Neotropical populations. At the habitat level, the most basic management step is to maintain native ecosystems and promote rare ecosystems required by threatened, endangered and regional species of high management concern. On the Homochitto National Forest, large forested tracts are maintained as breeding areas for Neotropical species requiring forested ecosystems. While at any given time some of the forest may be younger than others, it is still forest. The recent discussions about habitat fragmentation effecting Neotropical migrant comes mainly from research done in the Midwest where the forest was truly fragmented, i.e., trees surrounded by corn fields. Recent research in the southeast concerning the effects of regeneration areas within forested blocks has not confirmed the midwestern data (L.W. Burger, Mississippi State University, personal communication).

CUMULATIVE EFFECTS

Logging during nesting season physically disturbs nests and alters behavior of nesting adult Neotropical birds, impacting reproductive success. Although hard data is not available, we assume that in most cases this failure would be nearly complete within affected areas. This assumption is based on observations of researchers studying nesting productivity of forest birds (Dr. Keith Ouchley, Louisiana State Univ., personal communication). However, this represents one years lost reproduction for several pairs of each species, none of which are high priority species as determined by the Partners in Flight Program. The adult birds would survive and may attempt renesting later in the season or may survive to nest the following season.

Under Analysis Unit 24, the total acres which would be either thinned or regenerated represents less than 1% of the total Homochitto National Forest area. Based on the typical timber

harvesting program for the Homochitto National Forest, approximately 4% of the total Forest area is disturbed annually. However, only 20% of the total logging season typically occurs between April 15 - June 15. This represents less than 1% of the total Homochitto National Forest that is disturbed annually during the peak nesting season.

With logging activities disturbing less than 1% of the total area from April 15 - June 15, this translates into a similar proportion of breeding productivity lost due to the cumulative effects of logging on the Homochitto National Forest. Based on this, population effects from this action (both individually and cumulatively) would be small and viable populations of all native birds can be maintained without eliminating logging during the nesting season.

Social and Economic Factors

ECONOMICS (ISSUE 8)

Affected Environment

Mississippi's primary source of revenue is based on agricultural production, which includes timber. The Mississippi Extension Publication *Harvest of Forest Products Report* identifies 2001 as the ninth straight year Mississippi's timber production value was over $1 billion. At $1.07 billion, timber was second only to poultry and eggs $1.66 billion as the most valuable agricultural commodity in 2001 (Daniels, 2002). Timber harvesting on Forest Service lands provides a 25% return to the counties directly related to the value of the timber sold. This money is distributed to the counties for support of local schools and roads. In 1996, the 25% return to counties within the Homochitto National Forest totaled $2,888,026.50 (Franklin Advocate 12/26/96). Wilkinson County relies heavily on timber harvesting to provide jobs and revenue to its inhabitants.

Timber on the Homochitto National Forest represents an investment value for the public, which provides tax support during the long period of stand establishment and growth. Recently, pine sawtimber has brought nearly $171 per CCF, and pine pulpwood prices are currently about $6 per CCF.

There are also indirect social/economic impacts, including effects on future jobs and income associated with processing wood products. Habitat changes may adversely impact species of special public interest. Examples of these species of special public interest are popular hunting species, which generate jobs and incomes in the local and national private sector, and endangered species, which represent a source of genetic diversity that may cumulatively be important in maintaining a healthy ecosystem on the earth.

The project Area contains approximately 2,194 acres of National Forest land and approximately 2,880 acres of privately owned land. Private land use within close proximity to the project area is predominately timberland. There are some scattered parcels of private land currently utilized as cropland or pasture but the predominate use is timberland.

Within the proclamation boundary of the Homochitto National Forest, only 191,571 of the 373,497 acres (51%) are in federal ownership. The remainder is privately owned farms scattered along the Homochitto River, larger drains, and broader ridges, or interspersed forested tracts of industrial and private ownership. The ownership pattern becomes more broken north of U.S. Highway 84 in Franklin, Copiah, Jefferson and Lincoln counties.

The seven counties in southwest Mississippi contained within the Homochitto National Forest are Adams, Amite, Copiah, Franklin, Jefferson, Lincoln and Wilkinson. With the exception of Brookhaven and Natchez, these counties are rural in nature and are dominated by small towns. The seven counties are almost entirely dependent upon the timber, oil and gas industries. Much of the area is forested and the farms tend to be small family and part-time operations. Agricultural practices on interspersed private land within the Forest are primarily cattle production, dairy operations, minor grain and cotton operations and subsistence farming.

In southwest Mississippi, approximately 70% of the land is timberland and more than 22% of the forestland in the seven county area is owned by forest industry. Therefore forestry plays an important role in the economics of the region. Much of the forestland in the seven county area is under active forest management by industry and consulting foresters.

In the last ten years, the average unemployment was 10.6% in the seven counties, ranging from a low of 8.4% in Amite County to a high of 20.9% in Jefferson County. The region is one of chronic unemployment with double-digit rates being the norm. The U.S. average unemployment over the last ten years was 6.7%. All the counties, except Adams and Lincoln, have an out-migration of workers from the rural areas to more urban counties.

Timber production is an important base of the local economy. Local communities benefit from the taxes generated by timber activities. These benefits include social services such as law enforcement activities, safe drinking water, road maintenance, construction and reconstruction of roads and public school systems. These services contribute to an enhanced standard of living to the public living within the area.

Stumpage value alone misrepresents the true value of timber to the economy. Basic economic theory recognizes that the source of all world and national wealth can be attributed to the two basic resource industries, Agriculture and Mining. All incomes are derived from multiplication of raw materials values through the economic process. Accepted contributions are that 4% of the Gross National Product is derived from harvesting forest products. Manufacturing of finished products into various wood products represents added value and stimulates additional income to communities. Even though direct manufacturing jobs are decreasing in the US economy (15% in 1988), more than 60 million service jobs are directly dependent upon manufacturing. Typical examples for the Forest industry would be home builders and home building supply stores. Each of these 60 million jobs in turn generates the demand for additional manufacturing and service jobs.

When the National Summary Timber Sale Program Annual Fiscal Year 1994 reported the relationship between jobs created by logging on National Forests and recreation on National Forests, the recreation data was value added data that looked at the full multiplier effect of

recreation on the National Forests. The logging figures did not encompass the same relationships, and are therefore not comparable. The production of raw materials from agriculture and mining, and the value additions from this process are the source of the disposable income is used for recreation. Even though the value of timber in the analysis unit is small when viewed on a national scale, it does provide a substantial local benefit and an incremental benefit to the national income and quality of life.

In the ten-year period from 1990 through 1999, the average unemployment was 10.6% in the seven counties of the Homochitto National Forest, ranging from a low of 8.4% in Amite County to a high of 20.9% in Jefferson County. The region is one of chronic unemployment with double-digit rates being the norm. The U.S. average unemployment over the last ten years was 6.7%. All these counties except Adams and Lincoln have an out-migration of workers from the rural areas to more urban counties.

Counties surrounding the Homochitto National Forest have elected stabilized payments under the Secure Rural Schools and Community Self Determination Act of 2000 (Public Law #106-393). Payments under this act are taken from National Forest Receipts to the extent available.

Environmental Consequences

The level of 25% returns available to the counties have been stabilized through the selection of stabilized payments. This represents a commitment of approximately 2.5 million dollars for the Homochitto National Forest. To place this in national perspective, the total cost of stabilization payments is estimated to be approximately $3,861,662,000 annually. This is nearly $15.00 for every man, woman and child in the United States. In the absence of National Forest Receipts from projects like the proposed action, this will represent a tax burden to individual taxpayers and to businesses that pass tax costs on to their consumers through the price of their goods.

Depending on sale packaging and market conditions, the forest product value of the proposed action and its alternatives may be somewhat higher or lower than estimated. Estimated value generated and equivalent pro-rated share that would be subsidized to the county through stabilization payments are recorded in Table 3.28:

Table 3.28: Estimated Value Generated and Estimated Prorated share

Alternative	Estimated Value Generated	Estimated Prorated Share	Benefit/Cost Ratio
Alt. 1	0	0	N/A
Alt. 2	$1,345,022	$336,255	1.86
Alt. 3	$1,079,730	$269,932	1.66
Alt. 4	$686,108	$171,527	2.13
Alt. 5	$1,079,730	$269,932	1.82

Stabilized Returns Generated per County for 2002 (Table 3.29)

County		Full County Return	Average Payment per Acre
Adams		$182,369.00	$2.74
Amite		$455,719.00	$1.16
Copiah		$93,431.00	$2.79
Franklin		$1,213,888.00	$.79
Jefferson		$100,987.00	$2.62
Lincoln		$100,987.00	$2.73
Wilkinson		$286,011.00	$2.54

The above table does not imply that there is no value to the resources of Analysis Unit 24, but that no monies would be returned to the treasury to offset county stabilization payments. Equally, there is no basis for considering that these returns are a trade-off with other multiple-use values. Maintaining "demand" game species and the associated recreation values is actually enhanced by this project (Issue 9). The un-quantified values of habitat, including endangered species habitat, is enhanced for all alternatives except "No Action". Generating stumpage values is not mutually exclusive of most other benefits.

Without the income produced from this proposed project, Alternative 1 ("No Action") would create a potential cost expenditure for road maintenance and schools in the form of tax collections. While under the umbrella of federal tax collections, and more widely distributed, they still represent real costs. Other programs such as minerals and recreation contribute to the Forest Service Fund account, but these sources are small when compared to historic stumpage receipts. Differences represent a direct public cost.

The "action" alternatives provide for variable levels of returns. Each level of return represents the value of raw products and not the dollar-added value. Manufacturing of finished products into various wood products represents added value and stimulates additional income to communities. The benefit to cost ratios are listed in the table above.

The effects of producing a timber sale will maintain or enhance the present level of employment depending on market conditions and private timber producing entities. Implementation of Alternative 1 (No Action) would not produce tangible economic benefits and may impact those that use federal timber to supplement timber production from private forestlands. This in turn could have a negative impact on employees whose jobs are related to the timber industry. Reduced production of timber products would reduce the need for employees and could result in layoffs. Layoffs could affect the social and financial structure of many of the communities around the Forest. Such a situation would create an additional burden to social services such as unemployment and job retraining programs.

One facet of the economics issue that is readily misunderstood is the effect of National Forest Sales on the value of private timber. In recent years, the Homochitto National Forest has produced forest products equivalent to the production of one large, local mill with about 100 employees. If no National Forest timber is sold, the short-run effect is increasing private timber prices as more efficient mills outbid less efficient mills. However, forest product markets are international in nature and, in the long term, companies can pay no more for raw materials than

the "market can bear". Less efficient operators are forced out of the market place. As the number of production facilities drop, demand drops and prices return to the level supported by the supply/demand market place. While this is basic economic theory available in any economics text, the scenario has been tested in the western United States where reduced production from the National Forests has resulted in a large number of mill closures. In the long-term, many landowners experienced lower stumpage values because of reduced demand and their distance from the few remaining mills. This sub-issue is not supported by basic economics theory or recent experience.

Choosing to implement Alternative 1 would not relieve the requirement for maintenance of the forest or compliance with the other federal mandates. Analysis of this area for management needs, completed as required by law, is valued at approximately $27,000. Other costs are based on an analysis of the non-connected activities.

A national average of 16.5 jobs were generated for every 1 MMBF (million board feet) of timber cut on National Forest lands (USDA-FS Dec. 1997, page 25.) An estimate of the number jobs that could be created as a result of activities proposed in Analysis Unit 24 is found in Table 3.29.

Table 3.30: Number of Jobs Created by Activities Proposed in the Analysis Area

Alternative	Jobs Created In MS	Jobs Created Outside MS	Total Jobs Created
Alt. 1	0	0	0
Alt. 2	261	128	389
Alt. 3	227	112	339
Alt. 4	183	89	272
Alt. 5	227	112	339

"PROPOSED ACTIONS" AND ALTERNATIVE 2 AND 3

The "Proposed Actions" and Alternative 2 and 3 provide the highest returns to the county. If the county is to maintain the same level of services, differences between the Alternatives 1 and 4 and the "Proposed Actions" or Alternative 2 and 3 represent the funding from other sources that would be required. Typically, property taxes are used to provide this difference.

"NO ACTION" (ALTERNATIVE 1)

There would be no investment recovery or jobs supported through the processing timber with the implementation of this alternative. These activities represent the largest local industry and employment opportunity for minorities and non-minorities. No payments would be made to the counties, either, representing a relative loss of funds when compared to the action alternatives. To maintain the same level of education and service, local taxpayers would have to offset this loss. Indirect costs would also be higher. Without the income produced from a timber sale, Alternative 1 (No Action) would also create a potential cost expenditure for road maintenance.

"THIN ONLY" (ALTERNATIVE 4)

The "Thin Only" alternative would provide more economic support to the counties than the "No Action" alternative, but less than the other action alternatives.

Cumulative Impacts

There would be no cumulative economic impacts as a result of the "Proposed Actions" or other action alternatives for this project alone. Forests would be replaced, maintaining long-term growth and timber outputs. Present and future jobs and manufacturing facilities would be maintained at approximately current levels, and community income from the annual influx of hunters and sportsmen should remain about the same. However, if applied over a period of time to a large number of areas on the Homochitto National Forest and other National Forests, the "No Action" alternative would have an adverse cumulative impact on the timber value of the forest. It would also adversely impact the most local industry incomes, local employment opportunities, and the ecosystems that have dominated since the prehistory period.

RECREATION (ISSUE 9)

Dispersed Recreation

AFFECTED ENVIRONMENT

Hunting is the largest single dispersed recreational use of Analysis Unit 24, and driving for pleasure is secondary in dispersed recreation use. Hiking, bird watching, canoeing are approximately equal (FEIS-Forest Plan 1985, page 3-15). In general, recreation use during the summer declines because of the associated heat and humidity. Recreation use is high during the fall, winter, and spring when hunting seasons and weather conditions promote outdoor activities.

Forest Management Goals (Forest Plan, pages 4-1 and 4-2):

- "Manage the land in a manner that recognizes the values of all resources, both renewable and nonrenewable".
- "Provide for safe public use and enjoyment of forest resources".
- "Provide a spectrum of dispersed and developed recreational opportunities reflective of the demands of the public. The spectrum of dispersed recreation represents such activities as hunting, hiking, fishing, canoeing, horseback riding, etc., and developed recreation is represented by such activities as swimming, camping, picnicking, etc."

As defined in the Forest Plan, the desired future condition for recreation in the analysis area includes an increasing supply of dispersed recreation opportunities, which would be provided primarily through increased access due to logging activities (Forest Plan, page 4-79). Also, dispersed recreation use would be increased through expansion of the trail system (Forest Plan, page 4-2).

Recreation Opportunity Spectrum (ROS) identifies Analysis Unit 24 as a Roaded Natural setting (Forest Plan, page 4-41). According to the Forest Plan, the National Forests in Mississippi are open to camping except where restricted because of resource damage or user conflicts are expected to occur (Forest Plan, page 4-41).

Hunting

The Homochitto has historically attracted large numbers of hunters from two of the most heavily populated cities in Louisiana (the metropolitan areas of Baton Rouge and New Orleans). In the 1995 State- wide hunting regulations, Mississippi prohibited harvest of does on public lands by non-resident hunters. At the same time, harvest of does was liberalized on private land for both residents and non-residents. In 1996, harvest was further restricted to protect "spike" bucks throughout the state. There is an observed, but undocumented trend towards out-of-state hunters to move to private hunting leases to increase opportunities for success. Game laws and bag limits are controlled by the State, and outside the scope of this project. Only habitat management is within the scope of the Forest Service's authority.

Data from the Forest Plan indicated that in 1992 there were 490.9 thousand wildlife and fishery user days in Mississippi, and 648 thousand user days for all other dispersed recreational activities. Unlike driving for pleasure, hunters tend to stay in the forest for extended periods of time and make extensive use of lower standard roads. Therefore, under the action alternatives proposed for Analysis Unit 24, the dispersed recreation that would most be affected would be hunting. Less than 0.2% of the hunting capacity on the Homochitto National Forest would be affected by these possible actions. The regenerated stands would affect hunting until they are thinned at approximately 15 years of age. The effects on hunting in stands 3-15 years of age are reduced sight distances and restricted travel routes in dense stands.

Hunting and fishing demand on public land is heavier than on private lands. The National Forests in Mississippi represent 7% of the forestland base in the state, but supply an estimated 16.2% of the wildlife user days (FEIS-Forest Plan 1985, page 3-23).

The Homochitto National Forest contains two State administered Wildlife Management Areas. These are operated on National Forest lands under a cooperative agreement between the Forest Service and the Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP). The wildlife is managed by the State and the Forest Service manages the habitat.

ENVIRONMENTAL CONSEQUENCES

Under Alternative 1, pulpwood stands would not receive first thinning. Over time in these unthinned stands, the visual variety would decrease, sight distances would be restricted, and travel routes would be blocked. These conditions would contribute to an area considered poor for dispersed recreation and hunting. Under the No Action alternative, there would be a reduction in area available to hunters. Indirectly, hunter related expenditures could potentially be forfeited during the hunting season because these stands are not thinned.

Under the Proposed Action and Alternatives 2-4, thinning of pulpwood stands would increase dispersed recreation and hunting opportunities as follows:

- Remaining mast-producing hardwoods would be allowed to develop.
- The increased herbaceous plants and mid-story brush providing forage, browse, nesting and bedding for wildlife.
- The increased sight distances within the thinned stands.

- The cleared travel-ways within the stands and the maintained and spot reconstructed Forest Service system roads.

The harvesting of pine-hardwood and/or hardwood stands often generates concern among local sportsmen. This concern is due to the perceived association of the abundance of hard mast producing hardwoods with game animal populations. The Proposed Action and Alternatives 2, 3, and 4 would not harvest any pure hardwood stands, but would impact some hardwood trees; however this reduced number of hardwoods would not adversely affect hunting opportunity.

Prescribed burning provides better habitat for deer, turkey, and quail by providing increases in the yield and quality of herbaceous vegetation, legumes, and browse. It also provides conditions under which fire dependent plants would survive and prosper (Forest Plan, pages 3-10).

Mitigation

With the standard safety precautions taken along haul routes and within the harvesting areas, forest visitors would have warning of the activity and be able to make alternate plans or take safety precautions as needed.

Visual Quality

AFFECTED ENVIRONMENT

Access to Analysis Unit 24 is by Forest Development Roads (FDR), County Roads and State Highway. Gating or blocking with earthen mounds has closed some Forest Development Roads

The travel-way (Open roads within the project area) is broken by openings from previous harvesting. By providing views into the dense forest structure, these openings break the continuity of dense forested stands. Views along travel-ways in the project area include evidence of road building, cuts into slopes, and various stages of tree growth including trees, shrubs and herbaceous species from seedlings to large trees up to 120 feet high.

On the Forest, vegetation generally ranges from pine ridge tops to hardwood bottoms, with a pine-hardwood mix in the middle slopes. The understory is dense over much of the area (FEIS-Forest Plan 1985, page 3-3). Permanent openings in Analysis Unit 24 are the result of roads, utility rights-of-way, and high water tables. Temporary openings occur from timber harvesting, windstorms, wildfires, insects and disease.

Visual quality objectives for the project area are considered from view sheds of roads highways, and the Homochitto River. Consideration is given for retaining visually pleasing mitigations for harvesting activities that include slash visibility and depth, location of landings to process and remove timber from the site and retention of visually pleasing flowering or colorful vegetation.

According to the Forest Plan, the Forest Management Goals (Forest Plan 1985, page 4-1 and 4-2) are to provide a visually acceptable landscape by maintaining or upgrading the existing visual condition. The Forest-wide Standards and Guidelines state that the Visual Resource Management relationship to visual quality include the systematic recognition that such values

exist to varying degrees and can be protected and managed in conjunction with other National Forest resources (Forest Plan 1985, page 4-2).

For the desired future condition of the visual resource, the Forest Plan provides the following direction: "The most obvious change in the Forest would be in timber management. As timber production is increased, more activities would be evident and, consequently more effects would be viewed. The Forest may take on a more "managed" look. This condition would be enforced as management intensity and utilization are increased," (Forest Plan, page 4-79). The likely visual results of intensive, even-aged timber management over the planning horizon is a visible distribution of age classes. More stands of varying size would become evident. This distribution has the positive aspect of providing visual variety to the landscape (Forest Plan, page 4-80). Projections of future visual conditions are based on visual variety, comparisons of total acres harvested, visual absorption capacity of the land and comparisons between estimated volumes of harvest and growth (Forest Plan, page 4-80).

The forest is dynamic and changing, very slowly progressing from birth to death. In nature, forests are renewed by natural catastrophes. Harvest cutting through responsible management renews forests. In nature, one successional stage would usually cover a large area as a result of fires, disease, etc. In a managed forest, all stages of succession would be present from stands of seedlings and grasses through immature and mature pine stands, to the hardwood type, which is considered to be the climax stage. This would provide continuing habitat for plants and animals that may do well during one stage of succession but poorly during another (Forest Plan, pages 3-10).

ENVIRONMENTAL CONSEQUENCES

With Alternative 1 (No Action), there would be no thinnings or regeneration implemented. This defers opportunities to create openings and viewing opportunities along the roadways. The visual quality would remain subject to the natural influences already in place, including openings created by wind damage, fire, or beetles. This would provide limited viewing opportunities from the roadways into the Forest. As individual trees die, they would create small openings and stands with a mixture of both live trees and snags.

Alternatives 2-5 would all result in changes to the current visual quality. The proposed thinnings would create more open stands with longer sight distance than existed prior to thinning. Alternatives 2, 3, and 5 include seed tree cuts that create pronounced long distance viewing opportunities. Leaving seed trees or clumps of reserve trees further reduces visual impacts associated with regeneration cuts. Feathering trees along edges would also help to mitigate visual impacts.

The planned harvesting in the Proposed Action and Alternatives 2, 3, and 4 would create stumps and logging slash visible to the public. Naturally occurring vegetation and planted trees would offset these effects in approximately three to five years. Other measures to minimize visual impacts would include restrictions on slash depth, distance of slash from roadways, placement of loading areas from roadways, irregularly shaped cutting areas, and limiting road openings to less than 1/4 mile.

Immediately after harvesting operations under the Proposed Action and Alternatives 2, 3, and 4, logged areas would be visually displeasing due to remaining debris, damaged understory vegetation, and road scars (FEIS-Forest Plan 1985, page 4-22). Road construction and reconstruction would result in removing vegetation. (FEIS-Forest Plan 1985, page 4-10). Road construction or reconstruction would be visually displeasing while in progress (FEIS page 4-23). Vegetation deadened during site preparation or release activities would be unsightly until it is screened from view by new vegetation. (FEIS page 4-23)

Removal of timber and establishing new stands occur on the Forest annually and each year portions of the Forest receives intermediate cuts. When timber is harvested there would be adverse effects on aesthetics. Overstory trees are removed, understory vegetation is damaged, slash remains, and road scars are obvious. All of these are temporary conditions. Adverse effects would be the greatest where timber cutting contrasts the most with the surrounding landscape. (FEIS-Forest Plan 1985, page 4-29)

At the same time, timber harvesting activities can be effectively utilized to achieve visually acceptable variety along travel-ways. This would create changing and more interesting landscapes along the roads (FEIS page 4-22 to 4-23). In the Proposed Action and Alternatives 2,3, and 4, the thinning would contribute to visual variety, and increase visual distances into the forest (FEIS page 4-23). Properly shaped and placed clearcuts enhance the visual variety; thinning increases and enhances the visual absorption (FEIS-Forest Plan 1985, page 4-7). Visual disruption from thinning treatments should be negligible after 3 to 4 months (USDA--FS 1989, page IV-139).

After timber has been harvested, vegetation competitive with the reforestation would be removed. Site preparation through control of competing vegetation would provide for accelerated growth of young trees reforesting the area (FEIS-Forest Plan 1985, page 4-10).

Mitigation measures would protect the visual quality for future use. Being a renewable resource because it is based on vegetation, there would be no long-term loss (FEIS-Forest Plan 1985). In all cases, mitigation is applied in excess of Forest Plan standards. The areas along County Roads are modification zones. Mitigations include the following:

Seed tree - Modification:

- Establish irregular stand shape avoiding straight lines or geometric forms except as necessary along land lines (follow natural features).
- Reduce openings along road to as narrow as possible (1/4 mile preferred maximum).
- No opening exceeding 75 acres (preferred maximum) would be viewed from any location on a travelway or lake.
- Lop and scatter slash to within 2' of ground within 50' zone beyond R-O-W edge (in seen area).
- Direct felling cuts away from travelway or lake within lop and scatter zone and adjacent trees that may fall into lop and scatter zone.
- Log landings no closer than 200" from edge of travelway except where terrain or other resources dictate.

Commercial Thin - Modification:

- Lop and scatter slash to within 2' of ground within 50' zone beyond R-O-W edge (in seen area).
- Direct felling cuts away from travelway or lake within lop and scatter zone and adjacent trees that may fall into lop and scatter zone.

The rest of the area is a Maximum Modification zone.

If Clear-cut

- Establish irregular stand shape avoiding straight lines or geometric forms except as necessary along land lines (follow natural features).
- Reduce openings along road to as narrow as possible (1/4 mile preferred maximum).

Transportation System

AFFECTED ENVIRONMENT

Access to Analysis Unit 24 is achieved by means of Forest Development Roads and County Roads. County Roads include C127, C126, and C164. Forest Service roads include 154C, 154D, 154A, 154B, 164I, 164D, 164G, 164B, 164H, 164J, 164C, and 154. These Forest Development Roads are open or seasonally open to provide basic public access for recreation and private ownerships. Additional non-motorized, dispersed access to the area is by intermittent roads and temporary roads, which have been either gated or blocked by earthen mounds.

Based upon current or anticipated use, Forest Development Roads are classified into three of the five possible maintenance levels with associated traffic service levels (Forest Plan, Appendix A). There are no maintenance level four or five roads in the Analysis Unit 24. Should one of the action alternatives be selected, maintenance levels would increase for the duration of the entry. After entry, the maintenance levels would be returned to basic public access on the open roads. Closed roads would be returned to maintenance level one or obliterated after use.

In the early 1990's the District evaluated transportation and public access needs and blocked or seasonally closed appropriate roads to address wildlife habitat and soil and watershed protection needs. Forest Development Roads are open or seasonally open to provide basic public access for recreation and private ownerships. Many roads have deteriorated from their planned use and safety classification standards. Deterioration of the roadways is a result of public use under a combination of natural occurrences such as rains, and associated runoff, inappropriate use, maintenance limitations, and neglected closures. All roads from graveled forest roads to paved interstate require periodic maintenance to restore safety and stability.

ENVIRONMENTAL CONSEQUENCES

No Action

Under the "No Action" alternative, no construction of new roads would occur in Analysis Unit 24. Therefore, the presence and density of roads is the same for all alternatives except for the "No action" alternative, which would result in the highest long-term road density. The selection of this alternative, however, would not preclude the District from pursuing road closure as a separate decision for public comment.

Traditional funding for road maintenance has been accomplished through timber sales. If the "No Action" alternative were implemented, opportunities to implement road reconstruction, maintenance, and improvements would be deferred until other funds became available. Delay of road reconstruction, maintenance, and improvements can lead to a situation where road conditions will continue to deteriorate, increasing erosion or public safety hazards.

Proposed Action And Other Action Alternatives

See Table 2.6 for miles associated with each action alternative. In addition, there are an estimated 4 right of ways planned. Road construction will take place in areas where Right of Way issues prevent use of existing roads. Roads, which have been gated or blocked by earthen mounds, would also require reconstruction and maintenance.

Intermittent and short-term roads would be restored to Maintenance Level 2 with a Traffic Service Level of D for the duration of harvest activities. Upon completion of harvesting activities, these intermittent and short-term roads would be closed with either a gate or earthen mound. Intermittent roads would then revert to a Maintenance Level 1 and short-term roads would revert to resource production. Seeding bare surfaces associated with short-term roads would provide a filter strip zone to reduce the amount of sediment potentially entering streams.

Road maintenance and road construction and reconstruction associated with the action alternatives would improve the present transportation system within the project, offset short term impacts, and provide a direct benefit to the investment previously made in road development in the project area.

Photo 3.5: Temporary road undergoing conversion back to resource production of forage and trees. A large percentage of roads within the Homochitto National forest appear in this condition.

Photo 3.6: Road maintenance improves safety and stability of the road for the public and Forest Service. A road in AU-24 which will undergo spot reconstruction. (FS154)

Cumulative Impacts

To have an impact on recreation, this project would have to change the use rates or activities on the Analysis Unit or the surrounding lands. This is not likely to occur with the implementation of any of the alternatives considered in detail. Hunting is the primary use, and many of the activities sustain current populations of game species. This would not result in increased hunter

success but would sustain current success levels. Alternative 1, No Action, is likely to result in lower success rates. With respect to hunting, standing forests are likely to reduce the value of this recreational activity.

Many plantations from previous entries have reached a point where thinning is indicated. Thinning opens up an unthinned plantation that has the appearance of a green barrier to provide extended visual distances into the forest. This is considered a visual improvement. Additional harvests are planned along travel ways but these are offset by stands growing into intermittent age classes and taking on the appearance of sawtimber forests. The over-all visual environment is not expected to change to a great extent. Selection of the No Action, Alternative 1, would result in improved visual environment because regeneration would not occur. However, over time, implementation of Alternative 4, "Thin Only" would likely provide the best visuals. Regeneration would not be implemented but the benefits of thinning and increased within forest site distances would be realized. Bird watching opportunities increase if some early seral habitat is present and current studies show that populations of a number of Neotropical migrant and sensitive birds increase in thinned and prescribe burned pine stands. Inquiries related to pleasure travel routs and bird watching opportunities are extremely rare on the Homochitto Ranger District. Increases or reductions in non-consumptive uses are not expected for any alternative.

There are no cumulative effects associated with the transportation system for this project. The analysis unit has a large network of system roads and woods roads and trails already established. All roads are in place and there will be minimal road construction as a result of alternative routes for right of way. Transportation would open up an alternative route of travel for many recreationist that could not previously visit parts of AU-24. Many of these roads are currently open to the public and in use. Over time, public use results in deterioration that is not always offset by maintenance funding. Reconstruction on these roads would return them to their design standard or in some cases improve alignment. Roads closed or seasonally closed prior to the project would be closed after the project. Reconstruction and maintenance of roads currently closed would vary from brushing to short realignments and improved drainage to facilitate safety and use. These would be permanent improvements that would be visible for an extended period after management activities. However, closed roads would be revegetated returning surface erosion to base levels. After several years, vegetation would encroach and they would take on much of their current appearance. However, since the density or use patterns of the transportation system would not change, habitat seclusion or other management concerns associated with wildlife would not change. These areas do not have a "roadless character" and most hunters and hikers observed on the District prefer walking old roads rather than through normal woods brush and briars. As these travel ways return to their vegetative character between entries, they should enhance or maintain the current recreation uses of the area. This project will not elevate the standard of any existing road over its existing, historic standard. Roads closed or seasonally closed prior to the project would be closed after the project. Closed roads would be revegetated returning surface erosion to base levels. Cumulative effects from soil movement, including that from roads, were addressed earlier in this chapter under "Soils".

The conclusion of an analysis of unquantified benefits currently offered within, and surrounding this Analysis Unit, is that use levels will be sustained or will increase. The No Action alternative is the least favorable for hunting, which is the most intensive recreational activity.

Table 3.31 Transportation System Summary

Road Type	Road Number	R-O-W	Length (mi)
Maintenance			0.85
Maintenance	154B		0.11
Maintenance	154C		0.5
Maintenance	154D		0.25
Maintenance	154A		0.75
Maintenance	154		0.13
Maintenance	Salem Ln		0.35
Maintenance	164G		0.34
Maintenance	164I	Yes	0.10
Maintenance	164D	Yes	0.75
Maintenance			0.67
Maintenance			0.3
Maintenance	164H		0.25
Maintenance			0.28
Maintenance	164J		0.42
Maintenance	126L		0.82
Maintenance	164		2.77
Reconstruction	164B1		0.43
Reconstruction	164B		0.7
Reconstruction			0.25
Reconstruction	154		0.85
Reconstruction		Yes	0.65
ROW-Alt. 1	-----		0.18
ROW- Alt. 2	-----		0.30

HERITAGE RESOURCES – (ISSUE 10)

Affected Environment

Lands in this analysis area and across the Forest have been harvested for timber one or more times, and some sites were in row crops prior to Forest Service acquisition. Most stands have been thinned, selectively harvested, or entered for suppression of southern pine beetle between acquisition and 1970. Portions of the historic record (the actual cultural resource sites) may have been affected by that activity.

The District Archaeologist and technicians in consultation with the Mississippi State Historic Preservation Office conducted a heritage resource inventory and survey of Analysis Unit 24. This survey was conducted in accordance with the National Historic Preservation Act, associated statutes and regulations, and the signed Memorandum of Understanding among the USDA Forest Service, the Mississippi Department of Archives and History (Mississippi State Historic

Preservation Office), and the Advisory Council on Historic Preservation Concerning the Management of Heritage Resources in the National Forest in Mississippi

Many sites were located, as a result of a cultural resource survey completed in the project area. Of these, 3 isolated finds were newly recorded. Three sites are unknown and they should be further evaluated. The remainder of the sites is ineligible. Location and distribution information collected for these sites meets historical record needs. In accordance with our Memorandum of Understanding, the sites with potential eligibility and unknown eligibility would be protected until further testing can be completed and their status confirmed. The 3 sites would be protected and monitored according to Class I and Class II Property Avoidance Procedures outlined in Appendix E of that Memorandum of Understanding.

Environmental Consequences

No National Register sites were identified. There are seven sites that were listed as "unknown" were located and recorded by the District Archaeologist. These sites are to be protected as potentially eligible for listing in the National Register of Historic Places, as noted above. A survey report and description of all sites including all ineligible sites was submitted to the State Historic Preservation Officer (SHPO), with recommendations for protection of appropriate sites. The State Historic Preservation Officer concurred with the findings and proposed protection coordination (Appendix E). To avoid potential impacts, the 3 protected sites identified during pre-project survey would be marked and excluded from harvesting activities.

In accordance with the signed Memorandum of Understanding, if any additional heritage resources are encountered during any project related activities, the District Archaeologist would be notified and activity at that location would be suspended until an evaluation of the resource is made.

Harvesting and subsequent reforestation activities that are proposed in the Proposed Action and Alternatives 2, 3, and 4 would have the small potential that undiscovered cultural resources on federal lands could be damaged. Based upon the intensity of the surveys, the State Historic Preservation Officer defines this potential as "very remote" (Appendix E). Cultural resources on private lands are not surveyed or protected. However, cultural resource inventory measures would serve to minimize the possibility of lost information from federal lands.

Cumulative Impacts

There is no reasonable expectation of cumulative effects on the archaeological record from this project. To have a cumulative effect, sufficient information would have to be lost over time and/or over the Forest, such that understanding of pre-history and settlement activities would be influenced. Based upon the intensity of surveys conducted and the mitigation applied, information remaining after acquisition by the Forest Service is being captured. Activities on or loss of resources on private land is independent of this project. Historic information is completely site specific and additional surveys within the project area would not provide information from adjacent ownerships.

PUBLIC HEALTH AND SAFETY (ISSUE 11)

AFFECTED ENVIRONMENT

The Final Environmental Impact Statement for Vegetation Management in the Coastal Plain/Piedmont addressed the effect of herbicide use on human health as a significant issue and identified that many people feel herbicides may have serious effects on human health (Vegetation Management in the Coastal Plain/Piedmont, Volume 1, Page V). For this reason, the use of herbicides has been identified as an issue for the Analysis Unit 4 Environmental Assessment.

ENVIRONMENTAL CONSEQUENCES

No site-prep herbicide application is proposed under the "No Action" alternative or alternative the thin only alternative. There would be no effect to human health from herbicide use under any of these alternatives. As a consequence of not using herbicides for site preparation, regenerated sites would require more intensive suppression efforts with the use of hand tools. Additionally, these sites may experience increased levels of competition from undesired species and reduced success of desired species.

There are trade-off risks associated with hand treatments. Woods workers experience one of the highest industrial accident rates, and hand tools, such as axes, machetes, and chainsaws, are very dangerous. While herbicide treatments produce low human health and safety risks under all applicable alternatives, Alternative E, the no herbicide alternative for the Environmental Impact Statement, projected: "Increased hand-tool work results in a high rate of accidental lacerations from chainsaws and cutting tools" (Final Environmental Impact Statement for Vegetation Management in the Coastal Plain/Piedmont, IV-130). Annually, deaths occur from chainsaw injuries and from falling cut vegetation. Heat and related injury and health concerns increase for hand-cutting methods.

The "Proposed Action" and alternatives 2 and 6 propose the use of herbicides for release and site preparation. The chemicals proposed for use are: sulfometuron-methyl, triclopyr-amine, triclopyr-ester, hexazinone, and imazapyr. Hand-tool application is proposed as the only application method.

Spot herbaceous spraying, tree injection, and directed foliar spraying, or soil spot application would accomplish Hand/chemical site preparation for mixed pine reforestation areas. For site preparation, soil spot application is the most effective treatment. However, Velpar is season sensitive and isn't effective in the dormant season or late growing season. Therefore, more than one herbicide treatment is analyzed. Herbaceous weed control with backpack sprayers would use sulfometuron-methyl and hexazinone at rates not to exceed 0.06 lb./acre and 4.0 lb./acre, respectively. Tree injection would be done by the hack and squirt method using triclopyr-amine and imazapyr at rates not to exceed 1.3 lb./acre and 0.75 lb./acre respectively. Soil spot application with backpack spot guns would apply hexazinone at rates not to exceed 4.0 lb./acre.

Hand chemical site preparation for pine/hardwood reforestation would be accomplished using spot herbaceous spraying and tree injection at the same maximum rates as those listed for mixed pine reforestation. Release work on both reforestation treatments, when needed, would utilize backpack sprayers applying triclopyr-ester with the streamline technique at rates not to exceed 4.0 lb./acre.

If label directions are not followed properly, all of these chemicals can cause eye and skin irritations to workers. For a typical application, the use of these chemicals poses a low risk to safety. Under the conditions of typical public exposure to any herbicide being proposed for use, no member of the public would be affected (Final Environmental Impact Statement for Vegetation Management in the Coastal Plain/Piedmont, Volume 1, page IV-14).

The herbicides discussed above are all soluble and do not accumulate in human or animal tissue. Human and animal exposure and risk studies conducted for, or sited in the VMCP/P indicate that cumulative buildup effects on human health do not occur when used at prescribed rates with appropriate application methods.

Table 3.32: Toxicity Data for Herbicides Proposed for Use*

Herbicide Ingredient	Formulation	Oral LD-50 (rat)	Dermal LD-50 (rabbit)
Triclopyr-amine	3lb/gal	2000-3000 mg/kg	> 4000 mg/kg
Triclopyr-ester	4lb/gal	2000-2500 mg/kg	> 4000 mg/kg
Imazapyr	2lb/gal	> 5000 mg/kg	> 2148 mg/kg
Hexazinone	25%, 2lb/gal	> 4495 mg/kg	> 2000 mg/kg
Sulfometuron methyl	75%	> 5000 mg/kg	> 2000 mg/kg

* From the Herbicide Handbook of the Weed Science Society of America, 6th edition, 1989; and Agriculture Handbook #633, Pesticide Background Statements, USDA-FS, 1984

The term "LD-50" is used to describe the toxicity of a chemical. Simply put, the LD-50 is the dose of a substance that would be lethal to 50% of the organisms in a specific test situation when ingested (oral) or absorbed through the skin (dermal). It is expressed in weight of the chemical (mg) per unit of body weight (kg). As an example of the minimal toxicity of these chemicals when used in a manner consistent with their labeling, a 160-pound herbicide applicator would have to ingest more than 3 pints of triclopyr-ester straight from the bottle in order to reach the minimum oral LD-50 for triclopyr-ester. Once the herbicide is mixed and ready for application, that worker would have to ingest nearly 10 gallons of the mixture to reach the 2000 mg/kg minimum LD-50. When compared to ingesting common food and household goods such as table salt or borax, the herbicides proposed for use in the Analysis Unit 24 area are very low in toxicity. They are not identified as carcinogenic or mutagenic, and degrade rapidly in the

environment. Due to the speed at which they degrade and the typical time period between treatments, these herbicides would have no cumulative effects on the human environment.

A risk assessment was done for the pesticides purposed in this project. A risk assessment is required under the National Environmental Policy Act (40 CFR Part 1502.22). Syracuse Environmental Research Associates (SERA) recently created new models for the Forest Service to better predict the effects of purposed pesticide use. Older versions of risk assessments used margin of safety to determine the potential affects of pesticides to humans and the environment. In the newest version the hazard quotient is used to determine the relative hazard of using a proposed pesticide. Hazard quotients are determined by using the dose, no observed adverse effect level, accepted by the EPA , and an uncertainty factor established by the EPA. If the hazard quotient is less than one the use of the purposed pesticide is deemed not to have adverse affects to human or wildlife, if the hazard quotient is greater than one further mitigations are needed.

The represented in the tables below are a worst case scenario for any of the given herbicides used. For example, 1.84 pounds active ingredient (AI) per acre was used for triclopyr, this represents two separate treatments, cut stump and streamline release. The other rates used in this model can be found in Appendix E. The high hazard quotients for hexazinone are due to insufficient data in the model. A few of the hazard quotients concerned with contaminated water are above 1, but buffers of 228 feet for perennial and 162 feet for intermittent streams are used to mitigate any effects of the herbicides. Some of the hazard quotients for terrestrial animals are above 1 due the effects of contaminated vegetation or insects. All of the herbicides purposed are ground applied and use target specific application methods such as directed foliar spray, streamline basal spray, and spot treatments. The purposed treatments are not broadcast treatments, thus the amount of contamination to vegetation or insects would be very limited, and with proper mitigations and personal protective equipment no adverse effects would be expected.

Table 3.33 Summary of Risk Characterization for the General Public

		Hazard Quotients				
Scenario		Imazapyr	Triclopyr-amine	Triclopyr-ester	Hexazinone	Sulfometuron-methyl
		Acute/Accidental Exposures				
Direct spray, entire body	Child	0.0057	0.003	0.9	0.365	.0002
Direct spray, lower legs	Woman	0.0006	0.7	1.8	0.036	.00002
Dermal, contaminated vegetation	Woman	0.0001	0.9	1.7	0.023	.00002
Contaminated fruit	Child	0.0007	0.09	0.08	0.047	.0014
Contaminated water, spill	Child	0.0818	0.4	0.3	2.727	.0398
Contaminated water, steam	Child	0.0019	0.01	0.003	.0902	.0024
Consumption of fish, General public	Man	0.0025	0.0007	.0006	0.409	.0012
Subsistence populations	Man	0.0120	0.003	.003	1.995	.0058
		Chronic/Longer-term Exposures				
Contaminated fruit	Woman	0.0003	0.04	.04	0.0197	0.0005
Consumption of water	Man	0.0001	0.02	.02	.0022	.000001
Consumption of fish, General public	Man	0.0000	.00007	.000007	.00006	.000001
Subsistence populations	Man	0.0000	.00006	.00005	0.0005	.000001

Table 3.34 Summary of Risk Characterization for Terrestrial Animals

	Hazard Quotient				
Scenario	Imazapyr	Triclopyr-amine	Triclopyr-ester	Hexazinone	Sulfometuron-methyl
	Acute/Accidental Exposures				
Direct Spray					
Small mammal	0.0004	0.1	0.2	.048	.0001
Small animal	0.0145	0.3	0.3	.97	.0334
Bee	0.0240	0.2	0.2	.6	.0208
Contaminated vegetation					
Small mammal	0.0008	0.005	0.003	.05	.0018
Large mammal	0.0103	0.2	0.2	.69	.024
Large bird	0.0161	0.07	0.09	1.1	.037
Contaminated water					
Small mammal	0.0016	0.008	0.007	.053	.0009
Contaminated insects					
Small bird	0.0225	0.1	0.1	1.5	0.052
Contaminated fish					
Predatory bird	0.0010	0.0008	0.001	.18	.0006
Contaminated vegetation					
Small mammal	.00003	0.005	.004	.042	.0001
Large mammal	.0012	0.7	0.6	1.7	.003
Large bird	.0018	0.6	0.5	2.7	.004
Contaminated water					
Small mammal	.00001	0.003	.001	.0023	0.000
Contaminated fish					
Predatory bird	.00001	.0004	.0003	.008	0.000

The only chemicals proposed for use in the Analysis Unit 24 Area that have been shown to have a significant effect on human health are hexazinone and triclopyr-amine, which cause severe eye irritation. Dow Chemical Company states that, "goggles are recommended during handling or use of triclopyr-amine before dilution." (Ag. Handbook 633, pg. T-15). This safety measure is incorporated into the Pesticide Safety Plan (Appendix E), and would be used when mixing hexazinone as well as triclopyr-amine.

Mixed with the pesticide chemical to produce the marketed product such as triclopyr or imazapyr are other chemicals known as inert ingredients. The herbicide producer for various reasons adds these to the active herbicide chemical. Several of the LD-50 toxicity tests cited above were performed with the registered product as well as with the herbicide itself. These numbers, therefore, take into account any inert ingredients in the formulation. In addition to previously

cited research, risk assessments were performed for the VMCP/P EIS that analyzed forest workers using these herbicides. No human health effect was found for the inert ingredients in the herbicide formulations proposed for use in the Analysis Unit 4 Area.

Selective application of Class A herbicides would be used in Alternative 2, 3, 5, and 6. Herbicide application rates and treatments are specific to plants treated. Type A herbicides typically have low toxicity and short persistence. With a half-life of 6 days to 6 months, Class A herbicides are generally not measurable a year after application. Application of recommended rates of Class A Herbicides have not been shown to cause cancer, mutations or birth defects or to accumulate in the food chain or the bodies of humans or animals (Record of Decision FEIS Vegetation Management in The Coastal Plain Piedmont Page 10).

Cumulative Impacts

The herbicides discussed above are all soluble and do not accumulate in human or animal tissue, so no significant negative cumulative impacts occur. Human and animal exposure and risk studies conducted for or sited in the Final Environmental Impact Statement for Vegetation Management in the Coastal Plain/Piedmont indicate that cumulative of buildup effects on human health do not occur when used at prescribed rates with appropriate application methods.

CIVIL RIGHTS AND ENVIRONMENTAL JUSTICE (ISSUE 12)

Affected Environment

Based on information available in 1997, statistics for counties within the proclamation boundary of the Homochitto National Forest are as follows:

Table 3.35: County Statistics

County	Total NF Acres	% Pop below Poverty Level	Per Capita Income	% of National Average PCI	10-year Average Unemployment
Adams	14,310	30.5%	15,791	73%	9.98%
Amite	35,642	30.9%	11,281	52%	8.39%
Copiah	7,305	32%	12,490	58%	10.47%
Franklin	95,572	33.3%	11,911	55%	9.5%
Jefferson	8,003	46.9%	9,767	45%	20.97%
Lincoln	4,936	23.6%	14,069	64%	9.77%
Wilkinson	22,803	42.2%	11,701	54%	12.43%

Table 3.36: County Population and Minority Status

County	1998 est. Population	1996 Minority %
Adams	34,225	50.5%
Amite	13,644	46.9%
Copiah	28,883	52.2%
Franklin	8,319	38.1%
Jefferson	8,427	86.7%
Lincoln	31,771	31.6%
Wilkinson	9,223	68.8%

All documents and notices related to this proposed project were readily accessible to all segments of the public. See Appendix A for a list of people contacted. Also, notices were placed in the Clarion Ledger, the paper of record detailing proposed activities.

The United States Department of Agriculture (USDA) Forest Service in a diverse organization committed to equal opportunity in employment and program delivery. USDA prohibits discrimination on the basis of race, color, national origin, sex, religion, age, disability, political affiliation and familial status.

Environmental Consequences

A Civil Rights Impact Analysis is not needed as a separate document in an environmental analysis. This analysis is a component of the EA process and is discussed in length in our ID team meetings. Through these meetings and other information sources, it is determined that this project does not have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. This project is most likely to improve economic and health conditions for the surrounding populations. During our public comment period no issues or impacts were identified. During this time, we scoped a wide range of people including businesses, governments, and landowners through paper mailings as well as the general public through legal advertisements in the Clarion Ledger, our paper of record. No civil rights issues associated with this project have come to our attention.

Cumulative Impacts

It is determined that this project does not have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. This project is most likely to improve economic and health conditions for the surrounding populations.

Ten year 25 % average county returns for the Homochitto National Forest and the counties within its administrative boundary averaged $1.8 million annually as of 1992 with the greatest return for Franklin County ($907,581) and the least return going to Jefferson County ($74,119).

Table 3.37: Estimate of Uses and Activities - Past and Future 10 Years By Alternative

Activities	Unit of Measure	Past 10 Years	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Regeneration	Acres	1048	0	548	279	0	279
	% of Area	4	0	2	1	0	1
Thinning	Acres	1974	0	730	947	1,226	947
	% of Area	7	0	3	4	5	4
Prescribed Burning*	Acres	805	805	805	805	805	805
	% of Area	3	37	37	37	37	37
Pasture/Haying	Acres	73	73	73	73	73	73
	% of Area	<1	<1	<1	<1	<1	<1
Crop Farming	Acres	304	304	304	304	304	304
	% of Area	1	1	1	1	1	1

* Prescribed burning acres are projected under a separate decision not associated with this document

Continued harvesting and subsequent reforestation activities in the planning area would continue to expose undiscovered cultural resources on federal lands and virtually all cultural resources on private lands to potential damage. The increase of thinning activities on federal lands in Alternatives 2-5 would increase the likelihood of this damage, however, cultural resource inventory measures, as already discussed, would serve to minimize this possibility.

Ongoing regeneration of private and federal lands in the planning area would continue to convert larger and more mature stands of trees to areas that contain smaller stems and a denser structure. Many people find these stands less visually appealing, however, they do tend to add diversity to the landscape. As shown above, this activity is expected to continue at slightly less than its current rate over the next ten years under all Alternatives except No Action.

From another perspective, expanded thinning of mature stands on federal lands under the Proposed Action and the action alternatives would serve to open stands and provide expanded view sheds that are uncommon to forested landscapes in this area. Public response to such visual changes in other project areas after this type of thinning has been completed has been overwhelmingly positive. It is anticipated that the effects of these two harvest and timber management practices on visual resources in the planning area would be essentially neutral, as one would tend to offset the other.

Irreversible and Irretrievable Commitment of Resources

An irreversible commitment of resources refers to resources that are renewable only after a long period of time (such as soil productivity) or non-renewable resources (such as heritage (cultural) resources and minerals). An irretrievable commitment of resources refers to losses of the productivity or use of renewable resources. This represents opportunities foregone for a period of time that the resource cannot be used.

Alternative 1 (No Action) would delay the harvest of timber and result in higher mortality rates from disease and beetles. This pine-dominated habitat is disturbance dependent for regeneration. Natural succession typically replaces this cover type with off site hardwoods and brush species unless frequent low intensity woods burning maintains favorable regeneration conditions or a significant disturbance such as a severe fire "resets" the site to conditions favorable to pine regeneration.

The historic and pre-history records indicate that fire was a frequent component of about 70% of local ecosystems. The need to protect private and public property, and a complex system of roads ranging from 4-lane highways to gravel forest roads has altered natural relationships. Under current social and economic environments, the primary means of recovering pine forest communities is harvest followed by site preparation treatments. This historic disturbance pattern has been disrupted. Under "No Action" species diversity would degrade without effective replacement. This would represent an irretrievable commitment of resources. Salvaged timber has lower market values and unsalvaged tree mortality produces no revenue. Additionally, Alternative 1 would not generate a 25% return to the counties or stimulate the local economy. Even if resources were produced at a later date, inflation and salvage losses would result in reduced future values. Also, jobs and related personal income and life style not currently available could not be recovered in the future. As a consequence, Alternative 1 would result in irretrievable economic and social losses.

Alternatives 2-5 would result in some on-site erosion, above the normal base level movement, as a result of timber harvesting and road use. Most of this would be recaptured on site. Soil displaced from the site represents an irretrievable commitment of resources. However, since all losses are computed (Table 3.3) to be well within the Tolerable Erosion Losses where productivity and water quality can be maintained, (Forest Plan, Appendix I), this does not represent an irreversible commitment of resources. Loblolly pine, which currently occupies the site is a relatively short lived tree and on typical Homochitto sites, requires replacement on a 70 year to 90 year rotation to maintain healthy, well stocked stands. Unlike "No Action", which does not plan orderly replacement, the period is planned an of shorter duration, and quality habitat is returned. Harvesting with replacement of suitable habitat is considered normal rotation of habitat age classes rather than an irretrievable loss. Because these alternatives to reduce potential tree mortality, there is a reduction in the potential economic loss associated with salvage.

Cumulative Impacts

Cumulative effects are evaluated by considering two types of impacts: impacts cumulative over time, and impacts cumulative over area. An evaluation of cumulative impacts is based on changes from the current or historical condition. Discussions for cumulative impacts are provided for each resource area. Cumulative impacts are based on these baseline values and represent real, measurable impacts that have a bearing on the decision. No cumulative impacts other than those discuss under specific resource areas have been identified or identified as an issue.

TIMBER HARVEST

On the Homochitto, all lands were acquired from willing sellers after 1930 in a "cut over" condition or as immature forests regenerated during the settlement era. With the exception of scattered relic trees that were un-merchantable at the time of harvest, there are no remnants of the original forest that existed before prior to settlement. Many of the acres had natural seedlings in place. Confirmation of this condition is provided by Forest Plan 1981 data, which indicated that only 11% of the forest had a stand birth date prior to 1910. The forest developed through the mid 1960s went from seedlings and saplings to intermediate and large sawtimber. Thinning was the primary treatment during this period and regeneration was generally limited to replacement of natural losses such as pine beetles or tornados, or reforestation of non-forested acquisitions. Forest Plan data indicates that only about 2% of the forest has a birth falling between 1940 and 1960. These age relationships were appropriate because the forest was immature and developing. Both past and current laws governing timber harvests on National Forest lands set maturity as one of the primary considerations in planning for regeneration. However, the entire forest was maturing as a single unit. In 1960, more than 95% of the forest was mature or rapidly approaching maturity. Historically, the majority of the pine component had been longleaf. Because of the unique regeneration characteristics this component had been lost and replaced with the shorter-lived loblolly and shortleaf pines. The need to regenerate was an important consideration.

Because large tracts of land were harvested at the same time, much of the forest moved into a high hazard condition for southern pine beetle, at the same time. The Homochitto consisted of approximately 170,000 acres of maturing forest, increasingly susceptible to natural losses. This situation was not unique to the Homochitto. Most of the forests in the East had been harvested since the turn of the century and were maturing together. Loblolly had replaced longleaf on nearly seventy million acres across the region, limiting the time available to replace this ageing, short-lived species on an orderly basis. The initial laws dealing with harvest from National Forests limited harvest to mature single trees. However, since forests were even-aged and all trees were maturing together, new legal and procedural directives were legislated (the National Forest Management Act) to deal with these new challenges on USFS land.

Even-aged harvests began in the late 1960s, and less than 4000 acres were initiated on the Homochitto during that decade. Beginning in the 1970s, regeneration has taken place at a relatively uniform pace: 1970-1979 = 21,877 ac.; 1980-1989 = 24910 ac.; and 1990-1998 = 24,877 ac. Thinning records are not readily available for the forest. Until recently updated, the Region 8 stand database was designed to maintain only current conditions and needs. On the ground observations of professionals during field inventory indicated that many stands were thinned in the 1960s, prior to initiating a sizable regeneration program. By the mid-1980s these stands had grown and required thinning again, and regeneration areas began to reach merchantable size. Thinning treatments have grown steadily since that time to meet the silvicultural needs.

The cumulative effects of the alternatives evaluated in this assessment on soil, water, air, visual, and cultural resources in Analysis Unit 24 are expected to be very similar to the effects of actions that have occurred over the past ten years with only one exception, commercial thinning. For the

Project Area, Alternatives 2-5 would significantly increase the amount of commercial thinning in comparison to the amount that had occurred over the past ten years.

Negative effects of federal and most private activities on soil, water, and air in the planning area from disturbances that occurred over five years ago have essentially ceased. Harvesting and reforestation activities in the action alternatives would be expected to maintain the current level of watershed and air quality in the planning area even if thinning was increased due to the use of the many mitigating measures that would be applied as described in Appendix C.