# CHAPTER 3
# AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

## Introduction

This chapter provides information concerning the existing environment of Analysis Unit 22 and potential consequences to that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2. Each resource potentially affected by the "Proposed Action" or the alternatives is described by its current condition and uses.

Following each resource description is a discussion of the potential effects (environmental consequences) to the resource associated with the implementation of each alternative. All significant or potentially significant effects, including direct, indirect, and cumulative effects, are disclosed. Effects are quantified where possible, and qualitative discussions are also included. The means by which potential adverse effects will be reduced or mitigated are described.

## Soil Productivity (Issues 1 and 2)

### Affected Environment

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. The Homochitto National Forest lies in the thick loess and thin loess Major Land Resource Area of the Southern Mississippi Valley Silty Uplands.

Analysis Unit 22 is composed of one broad soil association, the Smithdale-Susquehanna association. It is described as rolling to hilly, well-drained soils that have a loamy subsoil and somewhat poorly drained soils that have a clayey subsoil; on uplands. This association is general. The more specific soil series that occur within Analysis Unit 22 have been described through an extensive soil resource inventory for the Homochitto National Forest, completed in 1984 (Soil Resource Inventory Report 1984). This survey identified the different soil types and associated map units along with their locations. Important characteristics of these soil types with the implications for management were also presented as part of this report. The interpretation of the map units provides the limitations and capabilities of these soils to anticipated impacts related to management. 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.

There are eight different soil types associated with Analysis Unit 22. These series include: Ariel silt loam; Gillsburg silt loam; Lorman silt loam; Providence silt loam, eroded; Saffell gravelly

fine sandy loam; Smithdale sandy loam, 8-20% slope; Smithdale sandy loam, 20-45% slope; and Trebloc silt loam, frequently flooded.

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 available water holding capacity is moderate.

The sideslopes and upper slopes (20-45% slopes) consist mainly of the well drained Providence, Lorman, Saffell, and Smithdale fine sandy loam soils. The loamy, skeletal Providence soil has greater than 35% gravels mixed with the soil and for this reason has a medium available water holding capacity. The Lorman silt loam is moderately well drained with a high water holding capacity. The Saffell gravelly fine sandy soils are well-drained soils with a medium water holding capacity and severe erosion hazard. The loamy Smithdale soils are well drained with a medium to high available water holding capacity.

Soils on sideslopes with 8-20% slopes consist of the Smithdale sandy loam series. These are well-drained soils that have formed in thick beds of loamy sediments of marine deposits on the gentle upper sideslopes and drain head position. The available water holding capacity is moderate.

Nearly level soils associated with broad floodplains, old stream terraces, and drainage ways are represented mainly by the silty-loam soils of the Ariel, and Gillsburg soil series. These soils are subject to occasional flooding. Ariel soils are well drained and have a very high available water holding capacity. Gillsburg soils are somewhat poorly drained but have a high available water holding capacity.

The floodplains along the Homochitto River and its tributaries and depressional flats on old stream terraces consist of the frequently flooded Trebloc soil series. Trebloc soils are poorly drained with a high available water capacity. No management activities would occur in this area.

Topography within Analysis Unit 22 is composed of rugged hills with moderately steep hillsides of varying 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.

For Analysis Unit 22, a list of the soil types and their occurrence by compartment and stand has been completed and is included in the project file. This list was complied by using the soil maps included in the Soil Survey of Amite County, Mississippi. A summary of the soils potentially affected by proposed treatments in the "Proposed Action" and its alternatives is provided. A map of the soil types occurring in Analysis Unit 22 is provided in Appendix B of this document.

## Existing Soils by Treatment and Alternative (Table 3.1)

| Activity | Proposed Action | No Action | Proposed Action w/o Herbicides | Thinning Only | Forest Plan |
|---|---|---|---|---|---|
| **Regeneration** | Ariel<br>Saffell<br>Smithdale | N/A | Ariel<br>Saffell<br>Smithdale | N/A | Ariel<br>Saffell<br>Gillsburg<br>Saffell<br>Smithdale |
| **Sawtimber Thinning** | Ariel<br>Lorman<br>Smithdale | N/A | Ariel<br>Lorman<br>Smithdale | Ariel<br>Lorman<br>Smithdale | Ariel<br>Lorman<br>Smithdale |
| **First Thinning** | Ariel<br>Lorman<br>Saffell<br>Smithdale | N/A | Ariel<br>Lorman<br>Saffell<br>Smithdale | Ariel<br>Lorman<br>Saffell<br>Smithdale | Ariel<br>Lorman<br>Saffell<br>Smithdale |

Source: Soil Resource Inventory Report, Homochitto National Forest (USDA 1984) and Soil Survey of Amite County, MS (USDA 1976)

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 upon 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 is confined to skid trails, roads, and landings. For Analysis Unit 22, the soil map units and their bare ground surface erosion hazard ratings are listed as follows:

## Soil Erosion Hazard Rating by Soil Series (Table 3.2)

| Soil Series | Slope (%) | Surface Erosion Hazard Rating |
|---|---|---|
| **Ariel silt loam** | 0-2% | Slight |
| **Gillsburg silt loam** | 0-2% | Slight |
| **Lorman silt loam** | 8-20% | Moderate |
| **Providence silt loam** | 0-8% | Moderate |
| **Saffell gravelly fine sandy loam** | 8-20% | Severe |
| **Smithdale sandy loam** | 8-20% | Moderate |
| **Smithdale sandy loam** | 20-45% | Severe |
| **Trebloc silt loam** | 0-1% | Slight |

Source: Soil Resource Inventory Report, Homochitto National Forest (USDA 1984) and Soil Survey of Amite County, MS (USDA 1976)

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.

## Compaction Hazard Rating by Soil Series (Table 3.3)

| Soil Series | Slope (%) | Compaction Hazard Rating |
|---|---|---|
| **Ariel silt loam** | 0-2% | Severe |
| **Gillsburg silt loam** | 0-2% | Severe |
| **Lorman silt loam** | 8-20% | Severe |
| **Providence silt loam** | 0-8% | Severe |
| **Saffell gravelly fine sandy loam** | 8-20% | Moderate |
| **Smithdale sandy loam** | 8-20% | Moderate |
| **Smithdale sandy loam** | 20-45% | Severe |
| **Trebloc silt loam** | 0-1% | Severe |

Source: Soil Resource Inventory Report, Homochitto National Forest (USDA 1984) and Soil Survey of Amite County, MS (USDA 1976)

## No Action

The "No Action" alternative 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. Any headcutting that is ongoing within the project area will not receive treatment.

## Proposed Action and Action Alternatives

Although the thinning and, in some cases, regeneration of timber stands in the action alternatives could have some adverse impacts, routine mitigation measures would control these impacts to an acceptable level under normal circumstances. Silvicultural Best Management Practices of Mississippi, 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 statewide 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 22.

The soil, air and water specialist for the Homochitto, T. Rivers, 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 were properly functioning. The forest floor litter layer had trapped soil movement adjacent to skid trails.

Observed soil movement occurred primarily on logging roads and skid trails located on moderately steep slopes (8-12%). Most of this movement was associated with the lead-out ditches that drain water from the road and not the road itself. 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 trails/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 sediment. 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" which was released to the public on July 7, 1997. 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, and 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 clearcut 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 clearcut 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% 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. The calculations supporting this finding can be found in the project record.

The following table 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 "Proposed Action", the "No Action" alternative, and action alternatives, 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 22 regardless of the alternative chosen.

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

## Tons of Soil Movement per Alternative During a Three-Year Recovery Period (Table 3.4)

| Activity | No Action | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
|---|---|---|---|---|---|
| **Natural erosion (per rotation)** | 28,831 tons | 28,831 tons | 28,831 tons | 28,831 tons | 28,831 tons |
| **Increase over Natural erosion (during recovery period)** | 0 tons | 892 tons | 683 tons | 474 tons | 683 tons |
| **Total erosion (per rotation)** | 28,831 tons | 29,723 tons | 29,514 tons | 29,305 tons | 29,514 tons |
| **Allowable Erosion (per rotation)** | 207,360 tons | 207,360 tons | 207,360 tons | 207,360 tons | 207,360 tons |

Source: Dissmeyer and Stump 1978 and USDA-FS Monitoring Surveys.

As shown in the table above, none of the alternatives proposed for Analysis Unit 22 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% increase in soil movement or result in more than 15% of the soil movement allowable. At these activity levels, these actions, with mitigation, are extremely unlikely to result in the loss of site productivity or stream health due to soil movement.

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 this watershed, despite 30 years of continuous forest management activity similar to those proposed, also indicates the validity of this analysis.

According to research conducted by Keim and Schoenholtz, net deposition/erosion within the riparian zone was not significantly affected by the type of silvicultural treatment. Overall, there was net deposition of 0.12 to 0.34 cm at all locations within the riparian zones, the rate of which apparently did not decrease after the first year. The processes of erosion or deposition did not dramatically slow with time after logging as was expected. This result indicates that net deposition is an ongoing process within riparian areas of the Loess Bluffs regardless of treatments.

The “Proposed Action” and the other action alternatives include temporary roads, skid trails, road reconstruction and spot reconstruction, and road maintenance. 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, disking 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 the closure of roads to vehicle use once the sale is completed.

The "Proposed Action" and the other action alternatives include regeneration, which 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 that 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 within approximately one year after harvest.

Because the "Thinning Only" alternative 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 intricated skidding system with increased soil compaction.

Mitigation measures applied to the "Proposed Action" and the other 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 the "Proposed Action" and other action alternatives, all harvesting operations would be accomplished in a manner to protect streams, inclusions, and/or streamside management zones. Streamside management zones are designated adjacent to all lakes, perennial or intermittent springs and streams, wetlands, or water-source seeps.

A streamside management zone has a minimum width of 33 feet. Streamside management zone protection measures include: 1) no felling of trees into stream channels; 2) no presence of mechanical equipment in any defined stream channel except to cross at designated points (designated by the Forest Service); 3) minimal rutting and no more than 10 percent of the mineral soil may be exposed; and 4) retention of woody understory vegetation 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.

Implementation of the "Proposed Action" or the other 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, which 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, reconstruction, 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. In addition, monitoring of each stand in the proposed action and other action alternatives include locating and repairing present and potential stream head cutting site.

# 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. The "Proposed Action" and alt. 2, provide the highest level of activity being considered for Analysis Unit 22. The "Proposed Action" and Alt. 2 will be used for the purpose of cumulative effects analysis.

When compared to past harvesting intensity for Analysis Unit 22 or the Homochitto National Forest, neither the "Proposed Action" nor the "Forest Plan" alternative represent an increase of harvest activity or road use and the associated soil and water impacts, as shown in Table 3.5.

## Regeneration within A.U. 22 from the 1970 to 2002 (Table 3.5)

| | Year | | | | |
|---|---|---|---|---|---|
| | **1972-1981** | **1982-1991** | **1992-2002** | **Proposed Action** | **Alt. 2** |
| **Acres** | 210 | 753 | 406 | 292 | 421 |

Recent administrative boundary changes have combined recently entered compartments with compartments that have not had management activities conducted in them for several years. Analysis Unit 22 is a prime example. Compartment 278 has within the last three years had management activities conducted within its boundaries. However, the majority of the planned management activities would occur in areas that have not been harvested since 1988 to 1992. If no activities are implemented this entry, it could possibly be another ten years before this project area is entered again. Forest health that is already stressed could only be expected to decline until Analysis Unit 22 is scheduled for entry again.

Prior to the commencement of harvesting, a prework 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 hazard.

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 ameliorate 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 reblocked 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 and revegetate the site, 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.The potential cumulative effect on soil over time is loss of productivity. 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. The areas regenerated in the past decade have all healed and are not additive in the Analysis Unit 22 Project Area.

Monitoring of similar activities on similar sites on this Forest 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. Most roads are in place and require only maintenance or spot reconstruction. Local roads and skid trails tend to occupy ridge tops without direct runoff 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 it is 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 the natural factors noted above.

The amount of soil displaced by timber hauling activities on connector and arterial roads is also comparatively small. These are the roads that provide access to public and interspersed private ownerships and recreational facilities. 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 runoff is at its highest.

When the effects related to the interaction of the Analysis Unit 22 Project with other projects occurring on the District are considered (cumulative effects over area), no cumulative effects can be identified. Cumulative effects over time are focused on the Homochitto River drainage.

Approximately 10% of the District is inventoried annually. Habitat and vegetative management needs identified through these inventories typically result in thinning, regeneration, and road usage. Because soil impacts are relatively localized, only activities in the five adjacent analysis units, Analysis Unit 18, Analysis Unit 21, Analysis Unit 23, Analysis Unit 24, and Analysis Unit 35 are considered in this analysis. The Cumulative Effects Map for Projected Activities (Appendix B) displays these analysis units.

Soil movement into 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 the habitat for biological components associated with small clear-running streams. For these rivers, outputs from Analysis Unit 22, along with other activities projected in the 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-source sediment from adjacent private lands resulting from agriculture, timber harvesting, and building of home sites are unavailable at this time.

# Minerals

## Introduction

Oil and gas exploration and production have been common on the Homochitto National forest. Gravel pits on National Forest lands support both Forest Service and local government projects and maintenance activities.

## Oil and Gas

Until recently there were two producing wells in this block. Section 24, T4N, R2E (Rocky Branch Oil Field) wells were operated by Energen Resources Corp. Wells are currently being plugged in preparation to abandon this oil field. Work should be completed by this summer.

Leasing has been very active in block 22 due to speculation around this oil field. There has been approximately 15 wells drilled in this block since the mid 1960's and I would expect some drilling to occur in the future (one well every 3-5 years). Probable exploration could occur in the vicinity of the current production. As you can see from the attached map, there is very little federal minterals in the area. Most of the National Forest Land has Private mineral rights under it.

## Gravel

There are two gravel pits in this block. Royal Chapel pit is one acres in size. There are no current permits for this pit and its is undecided presently if this pit will be used in the future. We currently have a decision to perform rehab work in this pit this year. Crosby Airport pit is also approximately one acre. There is no permit for this pit either and no plans for use in the future.

## Special Uses

Special uses within Analysis Unit 22 include oil and water pipelines, electric and telephone lines, and the Crosby airport glide path.

## Potential Cumulative Effects from Minerals

Any use of mineral resources within Analysis Unit 22 would be currently out of the scope of this project. Under the National Environmental Policy Act, documentation would be required for future minerals activities. Cumulative effects, if appropriate, would be considered at that time.

# Water Quality (Issues 2 and 11)

Specific concerns relating to water quality include sedimentation; herbicide; wetlands, floodplains, and riparian areas; cumulative impacts, and aquatic habitats. These concerns, as well as other general water quality concerns, are discussed in this section.

## Affected Environment

Analysis Unit 22 resides within eight watersheds of which Foster and Brushy creek are the largest. Major perennial and intermittent streams that make up these watersheds are Foster creek, Red Prong creek, and Brushy creek. Other unnamed perennial and intermittent streams within Analysis Unit 22 eventually flow into the Homochitto River.

The lower portion of the Homochitto River was channelized in the 1930's. This lowered the normal water level and increased its rate of flow, which, in turn, lowered the water level in its tributaries, and increased their rate of flow. Such increased flow caused stream-bank cutting, which left 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 1984).

The Homochitto River watershed is considered a headwater basin including streams ranging from perennial and intermittent to ephemeral. Although the Homochitto River is a perennial stream, many of the smaller streams 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 vast majority of the watershed is composed of first and second order streams.

Water quality on the Homochitto National Forest and AU-22 is generally good, although some local problems do exist. Local problems may be the result of erosion and sedimentation from Loess soils, headcutting of streams, or infrequently from oil and gas operations. In addition, some streams may be locally impaired from fecal coliform associated with the lack of private on-site septic treatment 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, which may increase the fecal coliform count. Much of the watershed drainage originates on Forest Service Lands, the primary negative impacts on water quality come from uses on neighboring private lands. These uses are generally agricultural (farming and cattle), commercial (small woodlots), and residential. Erosion and sediment are impacts from these activities that may have a direct negative impact on water quality.

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, 1984). 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.

Downstream beneficial uses for the Homochitto River include non-contact recreational uses (i.e. bank fishing), warm water aquatic habitat, wildlife use, livestock watering, and riparian values. Land use practices within the Analysis Unit 22 project area of the Homochitto River watershed include the following: clear-cut harvest, thinning, midstory removal, chemical release, prescribed burning, road building, grazing, farming, and private residences.

Analysis Unit 22 is disjoint, containing private ownerships of varying sizes within its boundary. As a result, some of the lands down-slope are not on the forest digital mapping database. However, these lands are within the Homochitto River watershed. A digital analysis estimates that there are 12,239 acres designated as private. Approximately 93 acres are in home or farm building sites. Approximately 631 acres are in cropland or pasture land and the remainder is in forest. The area contains approximately 26 miles of paved, open public road. Farm activities include both pasturing and row crops. Some of the farmland incorporates woodlots and forested streamside zones too wet to farm. Many of these are visible from the roads and appear to be fenced and grazed.

Under the "Proposed Action", thinning is proposed on 552 acres (combination of first thinning, sawtimber thinning) that drains directly into the Homochitto River through the farm and forestland to the east. Most of the potentially affected ownerships are in forest or pasture and hay production. Row crop activity does not appear to be a prevalent use on the private ownerships in that area. There is no other known or planned harvest and no expectation of cumulative effects.

Due to existing influences (private land uses, past harvest practices, roads), effects will occur to the water resources in Analysis Unit 22 regardless of the proposed alternative. 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".

Because most of the potential effects would be confined to the analyzed watershed boundaries, the geographic boundary of Analysis Unit 22 is considered to be the same as the watershed boundaries. 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 the Analysis Unit 22 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 Analysis Unit 22 three years before the proposed project and three years after implementation.

Since the mitigation used to maintain the integrity of the Analysis Unit 22 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.

## No Action

With the "No Action" alternative, 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, which are responsible for creating openings in the forest canopy. No significant changes to water quality would be expected from implementation of the "No Action" alternative.

## Proposed Action and Action Alternatives

For the "Proposed Action" and the other action alternatives, 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 the "Proposed Action" and the other action alternatives would potentially affect water quality, water quantity, channel morphology, and downstream beneficial uses.

Studies sited in the Vegetation Management Environmental Impact Statement include Red Prong Creek on this District. Soil types and terrain in the Red Prong area are similar to those in all areas of the analyzed watersheds. As a whole, these studies predicted that under maximum activities, stormflow increases would be expected to be 2% to 7%. Activities in Analysis Unit 22 are well below maximum levels, and storm flow would be expected to be lower. At minimum activity levels, the Environmental Impact Statement indicated that variations in water yields would be expected to be below normal seasonal and annual variations (Vegetation Management in the Coastal Plain/Piedmont, IV-101-102). Therefore, they would not be detectable from annual variations.

An additional study conducted by the Homochitto National Forest (Preliminary Report: Impacts of the Caston Creek Management Project on Aquatic Habitat give further evidence that current projects are doing little to negatively affect state and federal water quality standards. Caston Creek watershed is a baseline reference watershed, to be used for comparative analysis with other watersheds with similar features. It is not meant to be a standard. Current analysis of the data from DEQ, Alcorn University, and the Homochitto Ranger district for Caston Creek from 1997 through September of 2002 does not appear to indicate any excessive negative impact on soil productivity or water quality of Caston Creek as a result of mitigation efforts of forest treatment activities

Water yields return to normal levels rapidly as sites revegetate. As with soil movement and sediment loads, previously discussed under "Soil Productivity", other activities planned within the Homochitto National Forest would disperse the water yield and absorption over a wider area. Activities would remain within maximum levels allowable for the analyzed watershed and not increase yields over 2%. This would not be discernible over annual variation and would increase rapidly. Therefore, cumulative effects associated with water yield would not occur.

Regeneration methods 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 (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 (Brown and Binkley 1994).

Temporary increases in sediment yields would also occur in response to road building. 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.

All harvest and regeneration operations would be accomplished in a manner that would not damage protected streams, inclusions, or streamside management zones. Prohibited activities in these areas include:

- Felling of trees to be harvested into streams;
- Crossing of streams by equipment, except when designated by the Forest Service;
- Excessive disturbance of soil;
- Placement or leaving of timber slash from harvested trees in streams;
- Exposure of more than ten percent of mineral soil within the filter strip.

Mitigation measures applied to the "Proposed Actions" would hold all impacts within the Forest Plan soil loss and water quality guidelines. Implementation of this alternative would lead to very minor, short-term soil movement from the removal of vegetation and use of existing roads and skid trails that are currently closed. Those impacts have been successfully mitigated in the past as described in "Soil Productivity" section above and have not led to known decreases in population of either plants or animals in the watersheds across the forest.

The "Proposed Action" and the other action alternatives include road reconstruction and spot reconstruction, temporary roads, and skid trails, which can potentially contribute to the amount of sediment accumulated in the Analysis Unit 22 Project Area streams. Typical road reconstruction activities are completed in the same year and usually during the same season as the logging activities. By employing road ditches, leadoff ditches, culverts, and seeding of exposed road cuts and fills to disperse runoff, potential long-term effects of sedimentation on waterways can be minimized. In addition, monitoring of each stand in the proposed action and other action alternatives include locating and repairing present and potential stream head cutting site.

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 Analysis Unit 22, the roads would not contribute to long-term effects, which could be cumulative.

Regeneration methods 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. The same study indicated that any increase in sediment stabilized after the first-year past treatment. Thinning should create negligible direct or indirect effects.

Herbicides would be used in the "Proposed Action" and alternative 2. Only Class "A" chemical/method combinations as defined in the Final Environmental Impact Statement for Vegetation Management in the Coastal Plain/Piedmont (pp. II-41,42) would be used. Actual estimated application rates are listed in Appendices C and G.

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 is not effective in the dormant season or late growing season. Therefore, more than one herbicide treatment is analyzed. Herbaceous weed control with backpack sprayers will use Oust and Velpar L 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 Garlon 3a and Arsenal at rates not to exceed 1.3 lb./acre and 0.75 lb./acre respectively. Soil spot application with backpack spotguns would apply Velpar L 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 Garlon 4 with the streamline technique at rates not to exceed 4.0 lb./acre.

Site preparation and release with herbicides would introduce slightly toxic chemicals to the site. These herbicides may accumulate to a slight degree within the soil for 6 days to 2 months and translocate to non-targeted vegetation. The half-life of all of the above herbicides is less than six weeks, and they do not bio-accumulate. Since they are generally fixed on site, there is no known potential for cumulative impacts. Velpar, Oust, and Arsenal are ground active; however, application rates and methods for Oust and Arsenal limit would not result in movement off site. Velpar could move up to one chain in very low concentrations.

Streams would be protected from herbicide translocation by limiting herbicide application to no closer than 100 feet adjacent to streams or springs. As noted above, streamside management zones would absorb this movement without noticeable effect on land or aquatic vegetation. Placement of an untreated streamside management zone beside the channel greatly reduces the potential for direct contamination of a water resource. No reports have been documented showing injury to stream biota in conjunction to regulated herbicide use. Based on the low stream concentrations measured in previous studies, chemical contamination of water quality should be short term (Brown and Binkley 1994).

Soils in Analysis Unit 22 are sufficiently dense to hold herbicides on site and are within the range of the analysis done for the Final Environmental Impact Statement for Vegetation Management in the Coastal Plain/Piedmont. Therefore, this analysis determines that any of the mixes identified above and in Appendices B and E are appropriate for the site. Detailed risk assessments, including surface and subsurface off-site movements, may be found in Appendix A, Section 4, of the Final Environmental Impact Statement for Vegetation Management in the Coastal Plain/Piedmont. Analysis of these risk assessments reveals little, if any, negative effect

on soil productivity or water quality from the use of these pesticides and methods. Animal and human health risks for these products are very low, also.

In the absence of chemical treatment for site preparation (the "Proposed Action Without the Use of Herbicides"), manual vegetative removal is required. Manual vegetative removal is not anticipated to create any observable erosion or sediment. Ground cover conditions should improve since the cut vegetation will add to the ground litter. Increases in stream nutrient concentrations should be negligible. Any increases in water yield should not persist since the current vegetation will quickly resprout and restore vegetative uptake processes.

For the "Proposed Action" and other action alternatives, State "Best Management Plans" and guidelines in the Forest Plan would be implemented. Implementation of mitigation measures (see 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 an herbicide treatment revealed that 75% or more of the ground cover remained intact after a moderate burn. In another study, sites with slopes as steep as 30% experienced low sediment production after a prescribed burn. 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.

Streams within the Analysis Unit 22 watersheds 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.

# Cumulative Effects

Considering potential cumulative effects, the proposed regeneration methods 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 analyzed watersheds, and these risks would continue indefinitely.

For Analysis Unit 22, 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 upon cited literature, professional judgement, 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 2000 and that mitigative benefits from "Best Management Practices" would be included in the potential risk.

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 plan 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 the "Proposed Action" and Alt. 2, 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, which would degrade to common, non-active elements before they could build up. These herbicides do not bioaccumulate.

## Potential Risk of Impairment to the Water Resources from Proposed Land-Use Activities in Analysis Unit 22 (Table 3.6)

Downstream Beneficial Uses*

| Land-Use Activity | Recovery Period§ | NR | WW | WI | RI | LW | Water Qual. | Water Yield | Aquatic Organisms |
|---|---|---|---|---|---|---|---|---|---|
| **Regen. Method** | 3 | None | Slight | None | None | None | Slight | Slight | None |
| **Thinning** | 1 | None | None | None | None | None | Slight | Slight | Slight |
| **Site-prep w/fire & Chemicals** | 1 | None | None | None | None | None | Sight | None | Slight |
| **Chemical Release** | 1 | Slight | Slight | Slight | Slight | Slight | Slight | None | None |
| **Prescribed Burn** | 1 | None | None | None | None | None | None | None | None |
| **Existing Roads** | -- | None | None | None | None | None | Slight | Slight | Slight |
| **Temp. Roads** | 2 | None | None | None | None | None | Mod-erate | Slight | Moderate |

* Downstream beneficial uses include NR = non-contact recreational use, WW = warm water fisheries, WI = wildlife use, RI = riparian values, LW = livestock watering. Skid trails and landings are included in the risk potential.
§ Recovery period denotes recovery years to reach near baseline.

# Air Quality (Issue 3)

## Affected Environment

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

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 state-issued permits are 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, carbon dioxide, and water vapor. Smaller amounts of other by-products are produced. 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, which form the foundation of the food chain. Other by-products of prescribed 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 the "Proposed Action" and the other action alternatives would be a minute part of that equilibrium but not accumulative due to the equilibrium relationships as forests re-grow. From a historic perspective, current wood burning levels are far below those in pre-history and settlement times.

## No Action

Implementing the "No Action" alternative in Analysis Unit 22 would not, by itself, impact air quality. Cumulatively, selection of the "No Action" alternative on a national or global basis could lead to the substitution of 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" indicated that when compared to steel, wood produced ⅓ 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 the "No Action" alternative and lowest for Alt. 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 offset any reductions associated with not operating logging and manufacturing equipment. The "No Action" alternative is likely to result in a cumulative national adverse impact on air quality. Based upon the size or the national economy and the over-all use of fossil fuels, this would be a minute but real impact.

## Proposed Action and Action Alternatives

The Proposed Action and the other action alternatives 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 Analysis Unit 22 project would result in small additional contribution of air pollutants. However, no part of Analysis Unit 22 is having problems in meeting air quality standards (National Ambient Air Quality Standards), 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 National Ambient Air Quality Standards.

The Homochitto National Forest has produced from 45 million board feet (MMBF) to 60 million board feet (MMBF) 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). The "Proposed Action" and action alternatives would not increase the harvesting level that 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. It would provide for forest products that have substantially lower sulfur content than most fossil fuels, and have a lower lifetime output of greenhouse gasses than substitute products. 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.

# Cumulative Effects

Depending upon economic demands, future activities using fossil fuels on neighboring lands may increase or decrease beyond the present level of agriculture and timber harvesting. However, given 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, an increase in air pollutants and deterioration of air quality would increase as well. If the usage decreases, a decrease or stabilization of pollutants would occur dependent upon the consumption of fuels nationally and internationally. 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. However this output would likely be lower than produced if individuals from the local communities traveled further to find jobs.

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 if the "Proposed Action" or other action alternatives are not implemented. Accumulations of highly concentrated particulates and gases are not expected since the activities are not above previous harvesting levels.

# Vegetation (Issue 4)

Specific concerns relating to vegetation include the effects of vegetation changes on threatened, endangered, or sensitive species; age class diversity; old growth; forest health; pine monoculture and hardwood reduction; understory diversity; maintenance of natural forest types and trees; and cumulative effects of timber harvest. There were also concerns expressed that vegetation changes would result in substantial cumulative effects over time and area. These concerns, as well as other general vegetation concerns, are discussed in this section. Fauna in the forest and streams are dependent on the vegetation component of the forest for food and cover. Many of the issues concerning management indicator species (MIS) and proposed, threatened, endangered, and sensitive species (PETS) relate directly to vegetation management issues. Relationships addressed in this section are referenced directly to other relevant sections when the concern was expressed as separate issues.

## 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.

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. These forests 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 the absence 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.

One of the intents of this project is 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 below in Table 3.7.

## Table 3.7 – Acres by forest type and general age class (2002)

| Forest Working Group | Early Seral | Intermediate | >60 Years | Totals | Percent |
|---|---|---|---|---|---|
| **Yellow Pine** | 238 | 1,112 | 1,414 | 2,764 | 84% |
| **Yellow Pine w/ Longleaf** | 36 | 0 | 322 | 358 | 10.9% |
| **Pine/Hardwood** | 17 | 33 | 91 | 141 | 4.2% |
| **Hardwood** | 0 | 8 | 19 | 27 | .9% |
| **Totals** | 291 | 1,153 | 1,846 | 3,290 | |
| **Percent** | 8.8% | 35% | 56.2% | | |

The forest types within Analysis Unit 22 and the acres they occupy include mixed pine (approximately 3,122 acres), pine-hardwood (approximately 141 acres), and hardwood (approximately 27 acres). The forested acres in early succession (0 to 10 years) are approximately 291 acres, and the forested acres in late succession (>60 years) are approximately 1,846 acres. A table of the current conditions for stands proposed for action can be found in Chapter 1.

Age relationships are displayed in a manner consistent with scoping responses. 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 is probable. Frequent fires on the ridges favor longleaf pine, and shortleaf pine to a lesser extent. 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 the Forest in 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.

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. Due to the ownership patterns and natural firebreaks, prescribed burning is limited to approximately 1,553 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 rather than 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.

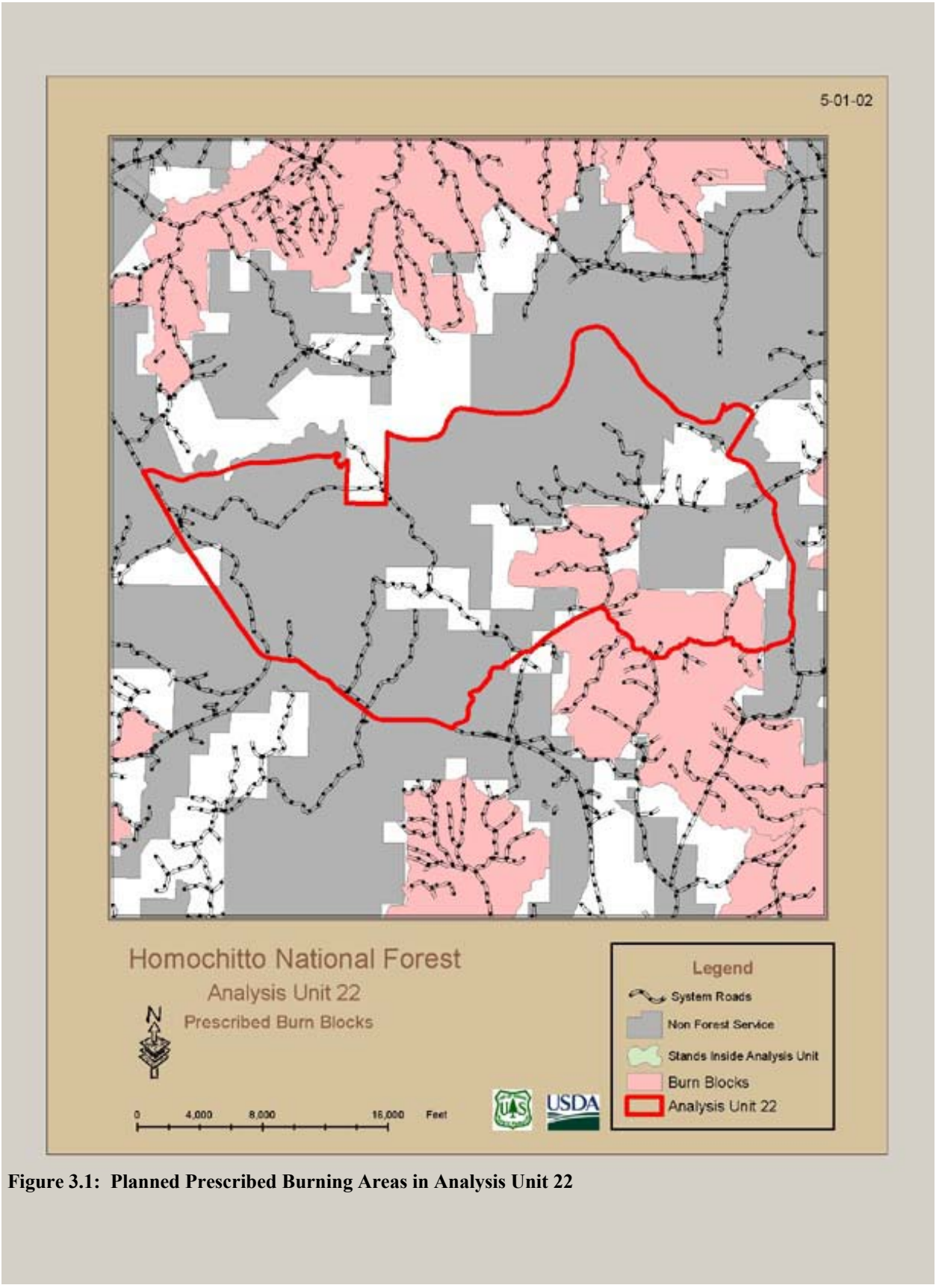



**Figure 3.1: Planned Prescribed Burning Areas in Analysis Unit 22**

Southern Pine Beetles: Southern pine beetles and ips bark beetles (commonly referred to cumulatively 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 22 occurred this year. Fortunately, the outbreak was spotted and contained to a small size. 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).

Dense pine stands and slow tree growth were frequently associated with outbreaks of SPB in the Gulf Coastal Plain. 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 22 include overstocked stands of mixed-pine, which include loblolly pine, shortleaf pine, and longleaf pine. (Comp 277, stand 5)

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 22 has not experienced any substantial wind losses in recent years.

**Other Current Condition Factors:**

Late Seral: Late Seral stands have been identified (see Maps, Appendix C) for Analysis Unit 22. 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.

Management using regeneration methods creates habitat conditions favorable for several plant and animal species. When compared to past harvesting intensity for Analysis Unit 22 or the Homochitto National Forest, the "Proposed Action" does not represent an increase in harvest activity or road use and the associated soil and water impacts. Thinning has been an ongoing management activity since the 1960's and tends to be very low impact. Regeneration does not take forestland out of production, so fragmentation should be minimal and short-term.

**Threatened, Endangered, and Sensitive plant species:**
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 Unit (Appendix D). The conclusions reached in this document are summarized here.

There are no Threatened or Endangered plant species confirmed to occur within the project area or on the Homochitto National Forest. The fetid trillium (*Trillium foetidissimum*) and the bay starvine (*Schisandra glabra*) are the only Sensitive plant species confirmed to occur in the project area. The trillium has a wide range of reported habitat preferences: ravines, floodplains, low ground, in rich woods, 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 trillium also occurs in floodplains in mixed hardwood forests. The bay starvine is associated with deep, moist drainages near seeps, perennial and large intermittent streams.

The following Sensitive plant species are either considered confirmed residents or potential residents of the Homochitto National Forest. None, however, have been found within the project area. The cypress-knee sedge (*Carex decomposita*), a moss (*Hookeriopsis heteroica*) and Small's wood fern (*Dryopterus X australis*) have been found on the Homochitto National Forest, but not within the project area. Dixie grapefern (*Botychium jenmanii*) and loose watermilfoil (*Myriophyllum laxum*) are potential residents on the Homochitto National Forest, but have not been found despite botanical surveys of the forest dating back to 1991.

State Species of Local Concern confirmed to occur in the project area include the silky camellia (*Stewartia malacodendron*), painted sedge (*Carex picta*) and Virginia bunchflower (*Melanthium virginicum*). On the Homochitto National Forest, the only known occurrence of the painted sedge and the Virginia bunchflower are located within one area of Analysis Unit 22. Other State Species of Local Concern that have the potential for occurring in the project area include: single-headed pussytoes (*Antennaria solitaria*), Florida Keys hempweed (*Mikania cordifolia*), swamp hickory (*Carya leiodermis*), Appendaged lobelia (*Lobelia appendiculata*), Allegheny spurge (*Pachysandra procumbens*), Ginseng (*Panax quinuefolium*) and crested fringed orchid (*Platanthera cristata*).

The silky camellia can most commonly be found on north facing bluffs and in deep ravines where it is nearly always associated with small trees of witch hazel. It seldom grows in areas that have repeated or frequent fires. Silky camellia does not often form large stands but typically occurs as 3-10 plants. It seldom grows in areas that have repeated, frequent fires and it is doubtful if these small trees are fire tolerant. All known occurrences are forested. The trees 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 forest cover, avoid surface disturbance that may enhance the spread of aggressive shrubs and vines and limit any controlled burns to when humidity is high and resulting fires are cool. Associated plants can include shortleaf pine, loblolly pine, longleaf pine, spruce pine, American beech, white oak, tulip poplar, bigleaf magnolia, pyramid magnolia, sourwood, flowering dogwood, witch hazel, American holly, red maple, Florida anise, Elliotts blueberry, wild azalea, partridge-berry, long-leaf spikegrass, and yellow jessamine.

The painted sedge occurs on wooded slopes or bluffs, with either hardwood or mixed pine-hardwood or mixed pine-hardwood canopy. The slopes are mesic and often north facing. It is usually associated with beech and the deciduous magnolias. The colonies are somewhat local and scattered in Mississippi. The painted sedge typically forms circular clumps, which are hollow in the middle ("wagon-wheel" shaped clump). On the Homochitto, painted sedge has been found in areas of deep ravines supporting beech and magnolia. The painted sedge is one of the earliest flowering sedges on the Homochitto (blooming in January in some years) but should be found more reliably in late February. Associated plants can include American beech, white oak, tulip poplar, black gum, spruce pine, shortleaf pine, loblolly pine, sourwood, bigleaf magnolia, pyramid Magnolia, American holly, Florida anise, dwarf iris, wild ginger, partridge-berry, striate sedge, woodland sedge, red buckeye, Ovate-leaved Indian plantain, braod beech fern, Christmas fern, melic grass, horse-balm, sweet azalea, witch hazel, silky camellia, flowering dogwood, muscadine, poison ivy, yellow jassamine, Southern arrow-wood.

The Virginia bunchflower is a rare member of the lily family, which has only recently been collected from this area. This species inhabits wooded spring seeps, which have abundant mucky soil. Associates include: swamp black gum, sweetbay, red maple, tulip poplar, Virginia willow, possum haw, poison sumac, climbing hydrangea, bogmoss, green rein orchid, poison sumac, marsh St. Johns-wort, cinnamon fern, royal fern, and netted chain fern.

The single-headed pussytoe seems to be more restricted to rich mesic woods habitat than does the common pussy toes. The habitat for this species, on the Homochitto, seems to be disturbed patches of bare soil where the topsoil has eroded or slipped in rich mesic woods (well drained with good organic and mineral content) and wooded slopes (usually on upper to mid slope). It is not typically associated with grassy conditions found in open pine understory with frequent prescribed burning. 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. 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. There is a wetland in this analysis area, therefore these species could occur. However, they were not found during a plant survey conducted in 1998 and in the fall of 2001 and in the winter of 2002. Appendaged lobelia is associated with grasslands. Grass dominated understory can be found in openings and in pine stands that have been thinned and prescribed burned. While not specifically documented on the Homochitto NF, the likelihood exists that further survey efforts will locate the species in open, burned, thinned, pine stands.

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.

# Environmental Consequences

**Age Class Distribution and Mature Habitats:**

Issues were identified related to age class distribution and mature habitats. Comments ranged from requesting increased regeneration to improve over-all forest health and reduce attrition losses in over-mature stands, to the opinion that harvest was inappropriate and early seral habitats were over-emphasized. These issues were addressed through the formulation of alternatives.

**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. Table 3.7 summarizes the vegetation effects expected from implementation of either of these two alternatives. 292 acres of mature yellow pine dominated by loblolly pine would be regenerated and established as early seral habitat this entry. Reforestation would include planting 95 acres of longleaf pine for mixed pine management, planting 118 acres of loblolly pine for pine/hardwood management, and seedtree regeneration of 79 acres of yellow pine (primarily loblolly pine). 56.2% 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.

# Table 3.8: Distribution of Forest Working Groups by Age for Each of the Alternatives in Five Years

**AGCL at 2007** **Proposed Action and Proposed Action without Herbicides**

| Forest Working Group | Early Seral | Intermediate | >60 Years | Totals | Percent |
|---|---|---|---|---|---|
| **Yellow Pine** | 0 | 1,350 | 1,122 | **2,472** | **75.1%** |
| **Yellow Pine w/ Longleaf** | 157 | 36 | 322 | **515** | **15.6%** |
| **Pine/Hardwood** | 135 | 50 | 91 | **276** | **8.3%** |
| **Hardwood** | 0 | 8 | 19 | **27** | **1.0%** |
| **Totals** | **292** | **1,444** | **1,554** | **3,290** | |
| **Percent** | **8.8%** | **43.9%** | **47.3%** | | |

**AGCL at 2007** **No Action and Thin Only Alternatives**

| Forest Working Group | Early Seral | Intermediate | >60 Years | Totals | Percent |
|---|---|---|---|---|---|
| **Yellow Pine** | 0 | 1,350 | 1,414 | **2,764** | **84%** |
| **Yellow Pine w/ Longleaf** | 0 | 36 | 322 | **358** | **11%** |
| **Pine/Hardwood** | 0 | 50 | 91 | **141** | **4.2%** |
| **Hardwood** | 0 | 8 | 19 | **27** | **0.8%** |
| **Totals** | **0** | **1,444** | **1,846** | **3,290** | |
| **Percent** | **0.0%** | **43.9%** | **56.1%** | | |

**AGCL at 2007** **Alternative 2**

| Forest Working Group | Early Seral | Intermediate | >60 Years | Totals | Percent |
|---|---|---|---|---|---|
| **Yellow Pine** | 0 | 1,350 | 993 | **2,343** | **71.2%** |
| **Yellow Pine w/ Longleaf** | 90 | 36 | 322 | **448** | **13.6%** |
| **Pine/Hardwood** | 331 | 50 | 91 | **472** | **14.3%** |
| **Hardwood** | 0 | 8 | 19 | **27** | **0.8%** |
| **Totals** | **421** | **1,444** | **1,425** | **3,290** | |
| **Percent** | **12.7%** | **43.9%** | **43.4%** | | |

**Acres and percentages are approximate.**

If harvest were to take place immediately, about 18% 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, 291 acres currently in early seral habitat will move into intermediate age classes, leaving no early seral habitat in the Analysis Unit until acres are harvested (See Table 3.8).

Regeneration under these alternatives falls well below the Forest Plan maximum of 823 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 between 524 and 831 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 the "Proposed Actions Without Herbicides" alternatives 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.

**Thin Only alternative**: 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 the Thin Only alternative, 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 percentage of the Analysis Unit in the 60+ age classes will remain unchanged. No additional acres will be added to this age class within 10 years of this project. 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.

**No Action**: The "No Action" alternative retains 56% of the forest in these compartments that is currently in older (>60years)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 22. Therefore, there is no guarantee that choosing this alternative would address the concerns for increased older age classes and reduced 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.

**Alternative 2: Maximum Regeneration**: This alternative would have the same effects as the Proposed Actions with regard to forest health and southern pine beetle hazard reduction. Approximately 421 acres of regeneration would be harvested. There would be a decline of approximately 27 acres in the amount of thinning under this altnerative.

Alternative 2 creates the greatest amount of early succession vegetation. Hardwoods will be reduced as in other alternates but will remain in SMZ's where historically found. Hard mast-producing hardwoods 16" dbh or larger located in the drain bottoms or the extreme lower slopes will be retained in regeneration stands. In thinning stands, hardwoods greater than 10" dbh will generally not be marked for removal unless they are of poor quality, overtopped by a higher-quality tree slated for retention, or if cutting the tree will release the crown of a more desirable stem. Hard mast-producing species that are greater than 12" dbh will be retained except where removal is necessary at log landings and for road clearing. See appendix B for site-specific areas for each alternative.

Planting longleaf pine is an accepted management practice as described by three Forest Plan amendments. These are Amendments #2, 13, 14. As identified by the Soil Survey of Franklin and Jefferson Counties, longleaf pine is most productive in the Smithdale and Providence Soil series. Table 3.9 identifies the percent suitable soils for regeneration stands in the proposed action. Areas that are unsuitable are generally not on ridgetops or upper slopes. Unsuitable soils, on which longleaf pine will not be planted, are frequently 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 microsites located inside unit boundaries. 11% of the soils in the regenerated stands will contain unsuitable soils. This is not expected to cause a significant cumulative impact when only those soils located on ridges or upperslopes will be planted to longleaf pine. See soil map in Appendix B.

Longleaf pine would be planted on this suited Saffel soil series for the following reasons:

- Field identification of a soil boundary before or during planting would be inefficient and costly.
- Our purpose and need of promoting forest stand diversity would be met by including longleaf pine in fringe areas.
- The creation of a patchwork of loblolly pine and longleaf pine stands would be inefficient and, in some cases, unmanageable. This is not expected to cause a significant cumulative impact as only the ridges or upper slopes would be planted to longleaf pine. The following table identifies the stands and the percent of soils in Analysis 22 suitable for regeneration to longleaf pine under the action alternatives.

## % of Soils Suitable for Longleaf Pine Regeneration (Table 3.9)

| | Comp/ Stand | Total Acres* | Forest Type | Year | Soil Series | % of Each Soil Series | % Soil Suitable for Longleaf |
|---|---|---|---|---|---|---|---|
| | 277/7 | 46 | 25 | 1925 | Smithdale | 100% | 100% |
| | 277/28 | 52 | 31 | 1933 | Smithdale | 100% | 100% |
| | 278/22 | 42 | 25 | 1905 | Smithdale<br>Lorman<br>Gillsburg | 63%<br>27%<br>10% | 63% |
| | 279/38 | 62 | 31 | 1901 | Smithdale | 100% | 100% |

All alternatives meet Forest Plan standards for late seral habitats. Regeneration removes some mature hardwood. Much to the quality hardwood in regeneration units will be retained in streamside zones and leave clumps. Within all first thinning stands, reserve hardwoods would be marked within drains and riparian zones for retention as well as protection from harvest operations.

### Forest Health and Southern Pine Beetles:

**No Action:** The "No Action" alternative defers opportunities for regeneration and thinning. Analysis Unit 22 would 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, 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 were prescribed for Analysis Unit 22 during a period of endemic southern pine beetle populations. The project was put on hold after initial scoping comments due to a lawsuit settlement agreement. In the interim, pine beetle activity is increasing. This gives a unique opportunity to view the validity of the forest health purpose and need and the information gathered during the field inventory that was used to identify stands as having a high hazard of southern pine beetle infestation.

Without regeneration, opportunities for creating edge habitat are reduced. Edge habitat would result from the small opening created by individual trees as they die. Creation of larger openings would result from events such as fire, insects, disease, and wind damage. Understory vegetation would continue to be scarce in those stands with closed canopies. As a result, the number of wildlife species inhabiting the stands would be reduced.

Leaving pole stands unthinned reduces tree growth and vigor. Additionally, a closed canopy resulting in an understory with reduced vegetative diversity would characterize these unthinned pole stands. Similarly, unthinned stands of mature pine would be characterized by closed canopies and reduced vegetative diversity of the understory. 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 ten years after the treatment. Without thinning, this opportunity for accelerated growth and increased or sustained productivity would be lost.

During the years 1991 through 1997, annual harvesting activity on the Homochitto National Forest has included approximately 6,825 acres of clearcutting and thinning. Annually, clearcutting represents approximately 3,000 of these 6,825 acres (USDA-Forest Service Data Base). Under the "No Action" alternative, habitat normally created by annual harvesting and thinning would not occur at the rate historically and currently managed for on the Homochitto National Forest. Previously treated stands would move to later successional age classes or revert to younger age classes as the result of natural events.

The "No Action" alternative would continue to produce an imbalance in age classes. The effect on plant species diversity would be a reduction in replacement habitat created from regeneration (early seral) and thinning activities being implemented currently and in the past on the Homochitto National Forest. Replacement habitat normally created by annual harvesting and thinning would not occur at a rate managed for previously or presently. Previously treated stands would move to later successional age classes or revert to younger successional age classes as a result of natural events. Canopy structure would remain closed for a period of 10 to 20 years longer.

Without the usual level of disturbance, various types of habitat from early successional to late successional stages would not be created across the Forest. Disturbance provides a diverse habitat structure on the Forest that is inclusive to individual successional structures across the entire forest. Retention of high-density pine stands, which would be the end product of the "No Action" alternative, creates an environment that favors southern pine beetle attack. Intermediate cuttings in heavily stocked plantations and natural stands would reduce the probability of southern pine beetle attack. Over time, non-treatment of timber stands would lead to southern pine beetle epidemics worse than those in the years 1985-1986 and 1994-1995.

The direct impact of the "No Action" alternative would result in a reduction of treated acres across the Homochitto National Forest. Over time, this could reduce habitat for various plant species that utilize habitat created by disturbances from harvesting activities. 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 but would be dependent on the ownership objectives of the landowners. Management of private lands is not reliable due to ownership changes and the changing management objectives of those owners over time.

**Proposed Action and Action Alternatives**

The "Proposed Action," and alternatives 2-4 include thinning and regeneration methods. Depending on the action-alternative selected, existing mature pine stands would be reduced by approximately 292 acres to 421 acres, respectively. Alternative 2 creates the greatest amount of early successional vegetation.

Regeneration would reduce pine bark beetle hazard for most of the next 20 years on 292-421 acres. The 524-831 acres of 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.

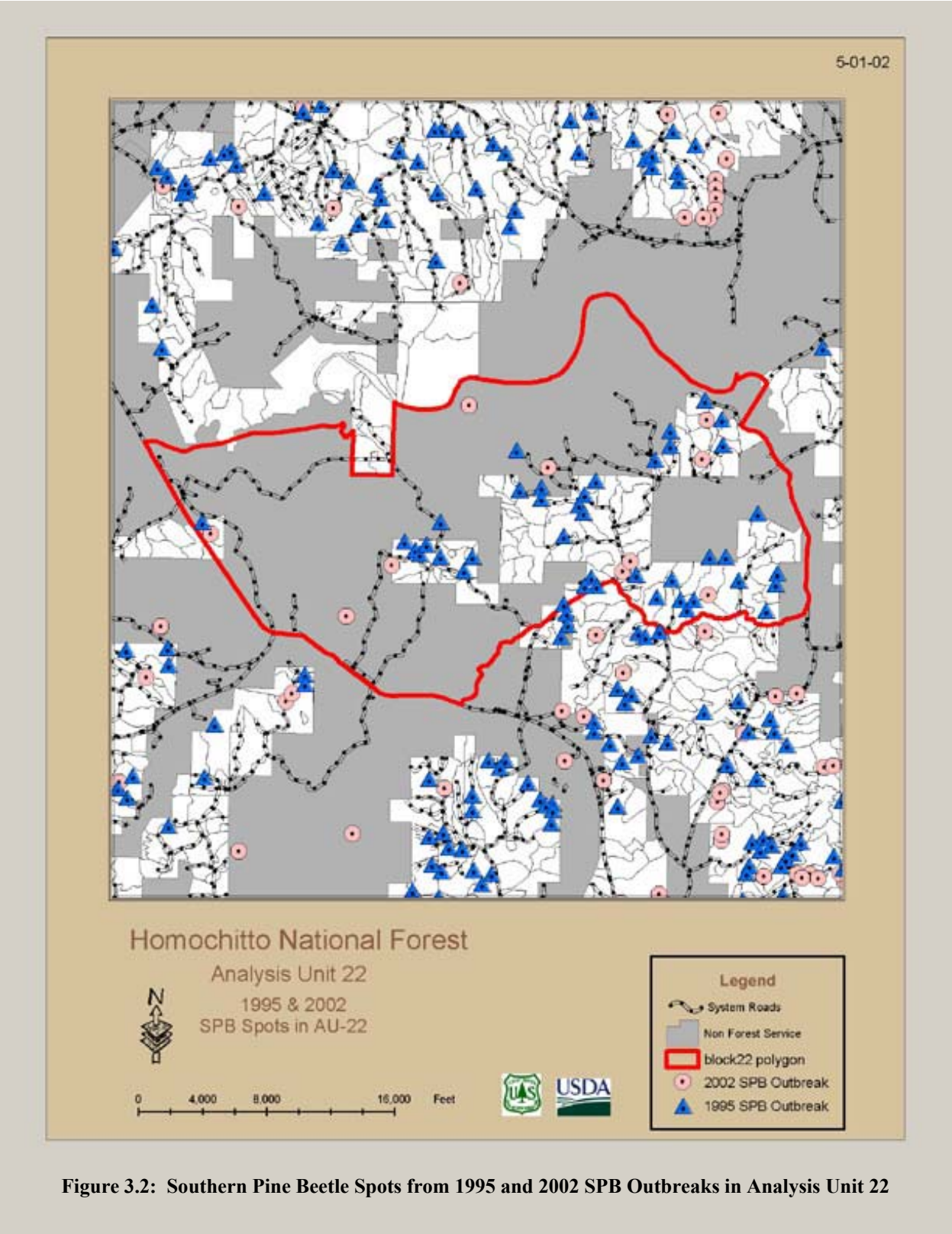



**Figure 3.2: Southern Pine Beetle Spots from 1995 and 2002 SPB Outbreaks in Analysis Unit 22**

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 22 area. However, the Forest Plan specifies standards and guidelines that could not be met at higher regeneration levels (Chapter 2, Alternatives Not Developed in Detail). Within constraints, all alternatives address forest health issues.
A secondary forest health benefit of these alternatives is that 157-214 acres of longleaf-dominated yellow pine stands will be established, depending on the alternative chosen. 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.

By using the "clearcut with reserve groups" regeneration method, stands can be managed for a mixed pine forest type, and in areas not designated for prescribed burning, stands can be managed for a pine-hardwood forest type. The seed-tree method gives an opportunity to utilize existing species for natural regeneration, release of desirable hardwoods, and regeneration of hardwood rootstock. All 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 Analysis Unit 22.

The "Proposed Action without Herbicides" proposes regeneration without the use of herbicides. In the absence of herbicides, seedlings must compete with non-target vegetation. These may reduce the ability of pine seedlings to regenerate successfully. Additionally, the large amounts of competing shrubs and non-woody vegetation would give the regenerating sites an unmanaged

appearance. Without herbicides, more intensive hand control of the competing vegetation would be required.

Because the "Proposed Action" and the other action alternatives include some level of thinning that would result in the opening of the canopy, more sunlight would reach the forest floor, and understory vegetation would be influenced. 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 reduce the digestibility of forage by causing a high cellulose content. This reduced digestibility can more than negate the nutritional advantage. Increasing sunlight from 8% to 45% would result in more leaf biomass produced and increased levels of soluble carbohydrates, digestible energy, and digestible dry matter. (Hunter 1990)

The "Proposed Action," and alternatives 2-4 would reduce the amount of unfragmented forest within Analysis Unit 22. The "Proposed Action" and alternative 3 would reduce the amount of unfragmented forest to approximately 698 acres. Alternative 2 would reduce the amount of unfragmented forest to approximately 547 acres.

Alternative 4 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 on 831 acres by thinning low vigor trees and high-density areas where infestations normally start. As with the "Proposed Action" and other action alternatives, 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.

## Threatened, Endangered, and Sensitive species:

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 Unit (Appendix D). The conclusions reached in this document are summarized here.

Only plant species are addressed under Issue 4, Vegetation. There are no Threatened or Endangered plant species confirmed to occur within the project area (or on the Homochitto NF).

The Action Alternatives are anticipated to result in no change of habitat suitability for the trillium. In general, excessive removal of the overstory or conversion of sites from mesic to xeric conditions may damage or destroy populations. Logging activities may result in the loss of individual plants. Implementation of streamside management zones should minimize potential impacts to the trillium. Streamside zones are applied similarly for all action alternatives; there is no anticipated difference in the potential impacts to habitat for the trillium. There should be no impact to the bay starvine with the implementation of streamside management zones. The cypress-knee sedge, the moss, and Small's wood-fern have not been found in the project area but should also be protected by implementation of streamside management zones. Loose watermilfoil has not been found on the Homochitto National Forest, but should be protected by the streamside management zones as well if they should be found. The Dixie grapefern and Blue Ridge catchfly are potential residents on the Homochitto NF and could potentially have habitat

within the project area. As with the trillium, logging activities may result in the loss of individual plants, but there is no anticipated result in change of habitat suitability in the long-term for either of these plants.

State Species of Local Concern confirmed to occur within the project area include silky camellia, and Virginia bunchflower. The streamside management zones should protect both these species. Individuals or small groups of other plants that could potentially occur in this analysis unit, such as Florida keys hempweed or single-headed pussytoes, could potentially be impacted by logging activities, but species would also be somewhat protected by the streamside management zones. Impacts from logging activities would be ephemeral in nature. The appendaged lobelia would in the long-term benefit from the logging activities. This species prefers grass-dominated understory in pine stands that are fire maintained. Swamp hickory and crested fringed orchid would be protected by implementation of streamside management zones. 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.

# Cumulative Effects

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. It was thought that, together, these projects presented 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 22, along with proposed or estimated vegetative management activities on other Homochitto National Forest lands within three years of anticipated implementation, is summarized in Table 3.10. These areas are graphically represented on the Cumulative Effects map in Appendix B. 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. Additional projects are under consideration and are identified in the District's quarterly "Schedule of Proposed Actions". These projects, however, are not expected to be implemented within the 3-year period and are therefore not included in Table 3.10.

## Table 3.10: Harvest Activities within 3 years of Analysis Unit 22

| Analysis Name | Year Actions Planned / Implemented | Regeneration Acres | Thinning Acres | Total Analysis Unit Acres (FS only) |
|---|---|---|---|---|
| **AU-1 ψ** | 2002 μ | 605 λ | 720 | 5,697 |
| **AU-4 ψ** | 2003 μ | 131 | 1,111 | 4,609 |
| **AU-5 ψ** | 2003 μ | 295 | 850 | 3,800 |
| **AU-7 ψ** | 2002 μ | 502 | 915 | 7,290 |
| **AU-12 ψ** | 2002 μ | 273 | 1,140 | 3,760 |
| **AU-14** | 2000 | 172 | 3,151 | 5,569 |
| **AU-17** | 2001 | 719 λ | 2,594 | 6,028 |
| **AU-20 ψ** | 2002 μ | 351 | 1,645 | 5,097 |
| **AU-22 ψ** | 2004 μ | 294 | 518 | 3,300 |
| **AU-27 ξ** | 2004 μ | 294 | 1,174 | 5,872 |
| **AU-36 ξ** | 2004 μ | 226 | 905 | 4,526 |
| **AU-38 ψ** | 2003 μ | 233 | 782 | 3,973 |
| **AU-39 ψ** | 2003 μ | 278 | 856 | 5,874 |
| **First Thinning 1** | 1999 | 0 | 5,675 | 5,675 |
| **First Thinning 2 ψ** | 2002 μ | 0 | 2,578 | 2,578 |
| **TOTALS:** | | **4,373** | **24,614** | **73,648** |

ψ - Acres projected based on stand review.
μ - Projected implementation date.
λ - Includes only regeneration openings in uneven-age management areas. Acres between these small openings are included with "thinning acres".
ξ - Acres projected based on long-term averages.

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 3.10 estimates 4,373 acres of regeneration applied over 73,648 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 7% over a ten-year period, or just over ½% of the available acres per year for the "Proposed Action". In general, most analysis units, at entry, have more than 60% of the forests in age classes of 60 years old or older, and 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 in C-262, Stand 2.** This stand, while not in Analysis Unit 22, is representative of critical interior pine forest habitats and is an example of natural losses in high risk and older stands. In the absence of planned regeneration, the forest will not be stable, but will be replaced by insect, disease, wind, and fire events.

This site has received scheduled burns. The stand was prescribed for thinning to manage SPB hazard, but delays have resulted in unmanaged risks and this pine beetle infestation.

Advanced regeneration is minimal, and residual vegetation consists of scattered soft-mast hardwoods and water oak, with low shrubs and grass. Burned upland sites such as this can be restored to interior pine forest communities with site preparation and planting as needed.

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. Table 3.8 demonstrates age relationships in five years with and without regeneration. There is little change in early seral habitat over time for the regeneration alternatives. 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.

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.

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.

**Photo 3.4: Southern pine beetle spot in C-263, Stand 8.**

This stand, while not in Analysis Unit 22, is representative of an unplanned loss in an unburned pine forest habitat.

This stand has a well-developed midstory less than half the height of the dominant pine overstory. The bum, beech, hornbeam, and water oak understory is off-site on this well-drained upland. There is no advanced pine regeneration, and without site preparation or additional disturbance, the midstory hardwoods will occupy this site resulting in a forest type conversion. The new community would have little benefit to the red-cockaded woodpecker, numerous neotropical migrant birds which are declining regionally (Issue 7), wild turkey, white-tailed deer, and other species of interest.

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 *Draft 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 *Draft 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.

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 *Draft 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 292 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 alternatives 2 and 3 would provide for 95-152 acres of longleaf pine component restoration. This 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 because of there much shorter lifespan. On a large time scale, longleaf pine (overmature at approximately 120 but can remain healthy to approximately 200 years) will be able to provide habitat for RCW for a much longer time period than loblolly pine(overmature at approximately 80 years). The re-establishment of longleaf pine in its historic niches is also supported by amendment 14 of the Forest Plan. This amendment states…..Clearcutting method (even-aged) will be allowed to restore longleaf, shortleaf, or other desirable native pine spcies to appropriate sites currently occupied by trees less suitable for the RCW. Further, the "Proposed Action", combined with past activities and proposed actions in other Analysis Units, 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.

The potential for cumulative effects associated with restoring 157-214 acres longleaf pine component must also be considered within the perspective of time. This project does not propose to create pure longleaf stands but to re-establish the natural longleaf pine component that historically existed in combination with shortleaf and loblolly pines and hardwoods. Surveys in the early 1900s indicated that longleaf pine represented a substantial component of the Homochitto's pine forests. Longleaf pine/fire ecosystems represented the most common forest

community type across the southern region. On the Homochitto National Forest, longleaf had a continuous presence as a component of a mixed pine/fire ecosystem for thousands of years, interrupted only by unrestricted cutting on the then private lands in the Homochitto River basin, beginning around 1920. For this reason, the absence of a substantial longleaf pine component is only a short-term alteration of a historic condition, which has occurred only within the last 70 – 80 years. The continued and long-term loss of the longleaf component is the potentially cumulative effect. Therefore, no action or regeneration without longleaf component restoration would represent the cumulative relationship. Conversely, restoring the component after a short, man-caused intervention is inherently non-cumulative when viewed in the perspective of time.

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 concern over time. 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 Draft 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 historically pine forests in the southern coastal plain is consistent with the regional trends. 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 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 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 2.2% of the forest is projected to be regenerated within 3 years of Analysis Unit 22. 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 biologic and botanical 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)

Specific concerns relating to forest health include southern pine beetle, prescribed burning, and wind firmness. These concerns, as well as other general forest health concerns, are discussed in this section. Southern pine beetle and prescribed burning were also discussed under Issue 4, Vegetation.

## Southern Pine Beetle

## Affected Environment

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. Droughts, lightning, floods, wind and ice storms, or slow growing, unthinned/aging pine stands are the factors some entomologists have 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 will be successfully attacked. (Final Environmental Impact Statement for the Suppression of the Southern Pine Beetle, Southern Region)

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 beetles. Stands having these high hazard characteristics are more likely to suffer heavier losses over time than are those classified as low hazard. (Forester's Handbook for Reducing Bark Beetle and Disease-Caused Losses in Southern Pines 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 the development of future outbreaks. (Forester's Handbook for Reducing Bark Beetle and Disease-Caused Losses in Southern Pines 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 beetles 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. (Final Environmental Impact Statement for the Suppression of the Southern Pine Beetle, Southern Region)

# Environmental Consequences

## "Proposed Actions", and action alternatives

The thinning proposed in the "Proposed Actions", 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.

## "No Action" (Alternative 1)

Under the "No Action" alternative, the retention of high-density pine stands would perpetuate an environment that favors southern pine beetle attack. Stands with a moderate to high risk of southern pine beetle infestation would, over time, become more vulnerable to southern pine beetle infestations. Over time, non-treatment of timber stands would lead to southern pine beetle epidemics potentially equal to or worse than those experienced in the years 1985-1986 and 1994-1995.

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 epidemic nearly 3,000 spots were recorded. Sizes ranged from just a few trees to approximately 90 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.

# Fire
# Affected Environment

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. Recent management of National Forest lands has included prescribed burning as an important tool to restore and maintain pyric (fire dependant) communities. In recent years, the Homochitto National Forest has increased its prescribed burning program from approximately 6,000 acres to 25,000-30,000 acres annually over the past 10 years.

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 annually.

# Environmental Effects

### No Action

Selecting No Action does not preclude prescribe burning in this management unit, but indirectly limits the potential for burning on a frequency that would maintain historic fire dependent community relationships that have existed on the ridges and upper slopes of the area. Resource managers generally consider periodic burning to be a maintenance activity in fire dependent, biological communities, which this project is intending to foster. Reduced burning would likely result in a continuation of the cumulative effect that fire has had since the Homochitto was harvested prior to acquisition. During that period, fire dependent communities have declined on the district and across the south. Many of the listed and sensitive species in this region 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.

### "Proposed Actions" and Other Action Alternatives

Prescribed burning may result in some minor soil exposure. On the Talladega National Forest, monitoring of prescribed burns following an 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. It is expected the Homochitto soils will react the same as these monitored soils. 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 Actions" and action alternatives 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.

## 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, a closed canopy, resulting in understory conditions of reduced vegetative diversity, characterizes unthinned stands.

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 22. "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, and Sensitive Species (Issue 6)

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 in detail for each species. This section describes the environment and effects to TES animals: the environment and effects to TES plants are discussed in Issue 4, Vegetation.

## Affected Environment

**Threatened or Endangered species:** Within Analysis Unit 22, the **red-cockaded woodpecker** is the only threatened or endangered species known to occur. There is one active red-cockaded woodpecker cluster known and monitored in Analysis Unit 22. There are also three recruitment stands (areas being managed for the possible future inhabitance by new woodpecker clusters) located within the analysis unit with another 5 planned for this project. There are also 8 active clusters just east and south of the Analysis Unit 22 boundary.

Analysis Unit 22 is completely within the boundaries of the proposed red-cockaded woodpecker habitat management area. All sites of pine and pine-hardwood greater than 30 years of age within the Analysis Unit 22 Project Area were surveyed in 1999 to determine if any new clusters had become established. No evidence of the establishment of a new cluster was found.

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. 30 miles to the 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**: A detailed discussion of potential project impacts on Forest Service Sensitive species is found within the Biological Evaluation (BE) prepared for this Analysis Unit (Appendix D). The conclusions reached in this document are summarized here. Forest Service Sensitive species that have been found within the project area include: Natchez and chukcho stoneflies, Pearl blackwater crayfish, bay starvine, and fetid trillium. Sensitive species that occur on the Homochitto National Forest but have not been found within the project area include: Webster's salamander, Bachman's sparrow, Rafinesque's big-eared bat, trachyxiphium moss, cypress-knee sedge, and Small's woodfern. Forest Service sensitive species not likely to occur

in the project area include the Alabama shad, crystal darter, broadstripe topminnow, 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 none are currently believed to occur in the Homochitto River drainage.

**State Species of Local Concern (animals):** The only State Species of Local Concern that has potential for occurring 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 density of insects that can be found around bodies of water (streams and ponds) makes this very important foraging habitat. Surveys for this bat have not been conducted in the Analysis Unit. The Analysis Unit is known to contain habitat preferred by this species.

## Table 3.11: Environmental Consequences To TES

| Species | Occurrence on the Homochitto NF | "Proposed Actions" | No Action Alt 1 | Thin Only Alt 2 | No Herbicides Alt 3 | Uneven Age Emphasis Alt 4 |
|---|---|---|---|---|---|---|
| Red-cockaded woodpecker | Confirmed | NLAA | NLAA | NLAA | NLAA | NLAA |
| Louisiana black bear | Confirmed | NLAA | NLAA | NLAA | NLAA | NLAA |
| Bald eagle | Confirmed | NE | NE | NLAA | NLAA | NLAA |

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

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

Management to restore the longleaf pine/bluestem grass pyric ecosystem to sites where it was historically present would increase the long-term availability of habitat for species dependant on that ecosystem, such as the red-cockaded woodpecker and other priority species such as brown-headed nuthatch. The photo below shows an example of this community, which is the desired future condition of longleaf restoration.

**Photo 3.5—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. There is a "no impact" determination for all species with Alternative 1 (No Action) with the exception of 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 all alternatives. For Webster's salamander, Pearl blackwater crayfish, Rafinesque's big-eared bat, trachyxiphium moss, cypress-knee sedge, bay starvine, Natchez and chukcho stoneflies will have "no impact" for the No Action alternative. Impacts to their habitats are minimized in all action alternatives the determination is "may impact individuals but no likely to cause a trend to federal listing or a loss of viability". The Alabama shad, crystal darter, broadstripe topminnow, rayed creekshell, and Arogos skipper were determined to be "no impact" for all alternatives because the known ranges and habitat characteristics indicated that they do not occur in Analysis Unit 22.

## Table 3.12: Sensitive Species Summary of Conclusions of Effects

| Species | Occurrence on the Homochitto NF | "Proposed Actions" | No Action Alt 1 | Maximum Regen Alt 2 | No Herbicides Alt 3 | Thin Only Alt 4 |
|---|---|---|---|---|---|---|
| Webster's salamander | Possible | MII | NI | MII | MII | MII |
| Bachman's sparrow | Confirmed | MII | MII | MII | MII | MII |
| Pearl blackwater crayfish | Confirmed | MII | NI | 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 | NI | NI | NI | NI |
| Chukcho stonefly | Confirmed | NI | NI | NI | NI | NI |
| Rayed creekshell | Unlikely | NI | NI | NI | NI | NI |
| Rafinesque's big-eared bat | Confirmed | MII | NI | MII | MII | MII |
| Arogos skipper | Possible | NI | NI | NI | NI | NI |
| A moss | Confirmed | MII | MII | MII | MII | MII |
| Dixie grapefern | Possible | MII | MII | MII | MII | MII |
| Cypress-knee sedge | Confirmed | MII | NI | MII | MII | MII |
| Small's woodfern | Confirmed | NI | NI | NI | NI | NI |
| Bay starvine | Confirmed | MII | NI | MII | MII | MII |
| Fetid trillium | Confirmed | MII | MII | MII | MII | MII |

NI = "no impact"
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 = "beneficial impact"

**State Species of Local Concern (animals):**

**"Proposed Actions", Alternatives 2 and 3**

A majority of the bats foraging habitat (bodies of water) should remain undisturbed by the management activities in Analysis Unit 22 through the maintenance of streamside management zones (SMZs). There is a greater potential for disturbing roosting habitat, if it is located within trees. 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.

**"No Action," Alternative 1**
No management activities would take place with this alternative. Therefore, there would be no adverse effects to these State Species of Local Concern.

**"Thin Only," (Alternative 4)**
A majority of the bats foraging habitat (bodies of water) should remain undisturbed by the management activities in Analysis Unit 22 (maintenance of SMZ). There is a greater potential for disturbing roosting habitat, if it is located within trees. Because no regeneration is planned in this alternative, more of the larger trees will remain uncut, providing potential roosting habitat. Hardwoods left in areas targeted for burning will slowly drop out of the stand, but in these areas hardwood inclusions and SMZ should remain intact. In areas to be thinned, most 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

## Herbicides

Risk of toxic effects to both plants and animals from herbicide use is present. These risks are strictly limited by the types and amounts of herbicides allowed under Forest Service policy as described in the Final Environmental Impact Statement for Vegetation Management in the Coastal Plain/Piedmont. Risk assessments in this document indicate an insignificant risk to vertebrates from the selective application of the herbicides allowed for use. Selective applications, such as injection and directed foliar spray of soil inactive herbicides, should protect sensitive plant species as well.

## 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:**

A Biological Evaluation (BE) has been prepared and documents the determination of effects for Threatened or Endangered species. The US Fish and Wildlife Service have provided concurrence for the Biological Evaluation. The Biological Evaluation will be included in the project file for Analysis Area 22, 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 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 endangered 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**:

## Red-cockaded Woodpeckers

The "Proposed Action" could impact the red-cockaded woodpecker in several ways. The harvesting of mature pines can impact foraging and roosting habitat. Timber harvest can also reduce the number of potential cavity trees, thereby, limiting cluster expansion and formation of new clusters (Conner and Rudolph 1991). Disturbance from logging and road construction may have negative effects, especially during breeding season, when it may cause decreased reproductive success, reproductive failure, or even cluster abandonment.

On a positive side, timber harvesting that results in an adequate numbers of trees retained for foraging and nesting can benefit red-cockaded woodpeckers. While simultaneously reducing susceptibility to habitat loss from pine beetle infestation, thinnings would provide the open habitat favored by the woodpeckers. First thinnings can increase the growth of residual trees, thereby, progressing the stand towards more suitable habitat in a quicker time period. Also, the existing loblolly pine habitat is mature and has a limited life span on the well-drained sites where it occurs. Regeneration insures orderly replacement of ageing habitat and the restoration of a longleaf pine component extends the stability of future habitat.

According to the implementation guide for red-cockaded woodpecker management during the interim period, thinning is encouraged if the following foraging habitat equivalents are met for the ½-mile foraging area:

1. A pine basal area of 70 or greater is maintained where it is currently present.
2. At least 6,350 pine stems 10 inches in DBH or larger are retained within the ½-mile foraging area.
3. At least 8,490 square feet of total pine basal area is maintained within the ½-mile foraging area.

4. Suitable foraging habitat is within ½ mile of the geometric center of the cluster site.
5. Suitable foraging habitat is continuous and contiguous with the cluster site.

Under the interim guidelines, regeneration is allowed in the ¼-to ¾-mile zone surrounding a cluster or replacement/recruitment stand if the following conditions are met:

1. Regeneration is not planned in the oldest ⅓ of the stands in this zone.
2. Sufficient foraging habitat is available after harvest for each cluster or recruitment stand.
3. Foraging habitat is not fragmented by the proposed cutting but is continuous and contiguous within the cluster or recruitment stand.
4. Recruitment/replacement stands are not isolated from each other by the proposed timber harvest.
5. The distribution of age classes should ensure that an even flow of habitat is available through time. Cutting should occur in the predominant age classes, and no more than 25% of the pine and pine-hardwood acres should be less than 30 years of age. No more than 8.5% should be less than 10 years old after the proposed timber harvest.

Because of their positions relative to the proposed harvest areas, foraging habitat for some of the existing clusters and the proposed thinning and regeneration may affect proposed recruitment stands. However, based upon the foraging analysis data conducted for Analysis Unit 22, no timber harvesting activity would result in numbers falling below the minimum guidelines for foraging habitat for all existing and proposed recruitment stands in the project area.

Although the proposed action would result in conditions outside the regeneration standards of the interim guidelines for three of six involved clusters, it is believed that long-term benefits to current and potential red-cockaded woodpecker habitat would result and that these long-term benefits outweigh the short-term costs associated with these currently inactive and un-used stands. The project addresses both short-term and long-term habitat needs and recognizes the dynamic nature of the forest. It provides for pro-active management to benefit red-cockaded woodpecker habitat and stand health. Anticipated benefits related to the proposed project follow:

1. Southern pine beetle infestations have been documented within the project area. The mature pine stands within Analysis Unit 22 are considered to have a southern pine beetle risk rating of medium to high. The thinning proposed in this project would lessen the risk rating and increase the likelihood of maintaining the older pine types.
2. Tree distribution within the stands to be thinned is not uniform. Thinning would reduce the dense clumps, which serve as reservoirs for southern pine beetle outbreaks. Some locations within stands are below desired basal area because of past losses. Thinning high-risk areas would not even distribution where trees are already lost.
3. There are 150 acres of pole stands planned for thinning during this entry. Thinning of these pole stands (stands < 30 years of age) would allow these stands to achieve foraging and future nesting requirements as quickly as possible. Without thinning, these stands would remain overstocked and slow growing. Thinning would hasten the development of the open park-like conditions preferred by the red-cockaded woodpecker.

4. Thinning of 402 acres of mature stands would increase the vigor and prolong the life of these stands. This would allow for the retention of these stands during the time that it would take for the younger stands to attain suitable foraging and nesting characteristics.
5. Thinning in these mature stands would enhance the open, park-like conditions preferred for red-cockaded woodpecker foraging and nesting. These thinning would be enhanced by 320 acres of hardwood mid-story reductions and prescribed burning to create and maintain the habitat characteristics preferred by the red-cockaded woodpecker.
6. The 292 acres of regeneration proposed within and adjacent to the red-cockaded woodpecker clusters and recruitment stands would be by the clearcut with reserves method in which clumps of trees from 0.5 acres to 2 acres are retained. These reserves would total 15 to 20 percent of the stands (or approximately 37 to 50 acres). Selection of retention trees would emphasize longleaf pine or shortleaf pine relicts and pine trees with the greatest potential for cavity use. In addition, all available longleaf trees would be released and retained as future cavity trees. 79 of these acres would be regenerated by the irregular seedtree method.
7. Longleaf pine would be restored on all regenerated sites within the prescribed burn area. Without prescribed burning, longleaf pine cannot be reliably regenerated on the Homochitto National Forest since natural seeding from adjacent loblolly pine stands would out-compete the longleaf pine seedlings.
8. The present age distribution of the red-cockaded woodpecker clusters and recruitment stands does not represent an even flow of habitat through time. The "No Action" alternative would perpetuate the present condition in which 60 to 70 percent of the stands are older, off-site loblolly pine which are approaching the end of their natural life expectancy. Without active intervention, the "No Action" alternative would lead inexorably to wholesale loss of a major portion of present red-cockaded woodpecker habitat within the next 30 to 40 years. The purpose of the project is to meet present and short-term future red-cockaded woodpecker habitat needs while providing for long-term survival as well. The proposed actions address both.

Consistencies with the interim guidelines include the following:

1. Stands less than 30 years old and within ½ mile of the cluster would be thinned.
2. To reduce the potential for infestation by southern pine beetles, older stands would be thinned.
3. Off site pine would be converted back to longleaf pine.
4. Sufficient foraging habitat is available for all clusters and recruitment stands within Analysis Unit 22.
5. Midstory removal and artificial cavities (inserts) would be utilized to accomplish recruitment stand objectives.
6. Prescribed burning would be implemented for control of hardwood midstory.

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 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, this habitat 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, thinning for habitat improvements and 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 tracks 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 is in the proposed habitat management area for the red-cockaded woodpecker, and has extensive suitable habitat. Active clusters are located throughout and adjacent to Analysis Unit 22. Based on this time frame comparison, all aspects of the "proposed action" and alternatives 2-3 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. However, limitations on regeneration are discussed in Chapter 2 under "Alternatives not Developed in Detail".

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 use 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 or shade tolerant species, mixed hardwoods would likely dominate the returning stands 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 Draft Southern Forest Resource Assessment (November 26, 2001) (http://www.srs.fs.fed.us/sustain/) 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". 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". This alternative has 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 that there is no expectation of resident populations of bear in the foreseeable future. The Vegetation 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 Unit 22. 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. A survey of likely locations was conducted and any populations located are being protected, even though a few individuals may suffer mechanical damage. 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.

During the last ten years (1992-2002), approximately 406 acres in the Analysis Unit have been regenerated. By mid-project (year 2007), 0 acres would remain in the 0-10 age class

(alternatives 1 and 4), 292 acres (alternatives 3 and 5), or 421 acres (alternative 2). Consequently, within the analysis area, cumulative impacts of the proposed action are limited since the acreage in the 0-10 age class is less under any alternative than the present condition. Although National Forest ownership within the planning area is only 40% of the total area, it is fairly well consolidated with just few in-holdings of private land.

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).

# Management Indicator Species (Issue 7)

This section includes discussion of Management Indicator Species (MIS) as well as other wildlife issues not covered under Issue 6, TES species. Specific concerns discussed here include the effects of management activities on wildlife species utilizing early seral forest habitat, wildlife species requiring mature forest, game species, habitat fragmentation, general wildlife concerns, neotropical migrants, and aquatic species.

## 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 3.13 Management Indicator Species for Analysis Unit 22 of the National Forests in Mississippi as presented in the Forest Plan**

| MIS | Habitats Represented In Analysis Unit 22 | |
|---|---|---|
| White-tailed deer | 0-10 years, all forest types | X |
| Bachman's sparrow | 0-10 years, longleaf/mod. yield slash pine | X* |
| Bobwhite quail | 0-10 years, longleaf/yellow pine | X* |
| Eastern meadowlark | 0-10 years, yellow pine | X |
| American kestrel | 0-10 years, pine/hardwood | X |
| Rufous-sided towhee | 0-10 years, hardwood | |
| Eastern wild turkey | 40+ years, all forest types | X |
| Pileated woodpecker | 40+ years, all forest types | X |
| Red-cockaded woodpecker | 40+ years, all pine forests except slash | X* |
| Fox squirrel | 40+ years, longleaf pine | X* |
| Pine warbler | 40+ years, yellow pine | X |
| Eastern gray squirrel | 40+ years, pine/hardwood and hardwood | X |
| Screech owl | 40+ years, pine/hardwood | X |
| Hooded warbler | 40+ years, hardwood | |
| Southwest stream fish (8 species listed) | Streams south of Interstate-20 and west of Highway 49 | X |
| Lake and pond fish (8 species listed) | Lakes and ponds | X |

* 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 3.13).

## 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 3.14 lists the fish MIS associated with the Homochitto National Forest.

**Table 3.14: 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 22 flow into the Homochitto River.

Ebert sampled the district during the period between 1981-1983 and collected seven of eight aquatic MIS from the watershed. As a part of the established aquatic MIS monitoring protocol, various areas of the forest were 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, seven (possibly all eight, but lamprey were not identified to species) of the eight MIS fish were present in the samples.

**Summary of Surveys**
Wildlife surveys conducted include the following: quail point counts (ongoing Mississippi State University), Neotropical bird point counts (ongoing Forest Service), 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 of local concern were conducted in 1999 and 2002.

## 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 2002 and another for the year 2007. This gave the present acreage and the acreage for the No Action alternative (year 2007). 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 22 for all alternatives. Current condition acres are calculated for the year 2002 and future conditions are calculated five years from that point, assuming all planned management actions were implemented during that period. Figures in parentheses indicate percent increase or decrease over year 2002 conditions. Note: portion of this aforementioned Cisc data includes areas from Block 18 since Compartment 280 spans two blocks.

**Table 3.15 Early Succession MIS* for Analysis Unit 22.**
**Acres of habitat by alternative and percent change from Current Condition**

| | Current Conditions | Proposed Action | No Action | Thinning Only | No Herbicide | Maximum Regeneration |
|---|---|---|---|---|---|---|
| Whitetail Deer | 291 | 292 (+1%) | 0 (-100%) | 0 (-100%) | 292 (+1%) | 421 (+44%) |
| Bachman's Sparrow | 36 | 95 (+163%) | 0 (-100%) | 0 (-100%) | 95 (+163%) | 152 (+322%) |
| Bobwhite Quail | 274 | 118 (-56%) | 0 (-100%) | 0 (-100%) | 118 (-56%) | 152 (-44%) |
| Eastern Meadowlark | 274 | 118 (-56%) | 0 (-100%) | 0 (-100%) | 118 (-56%) | 152 (-44%) |
| American Kestrel | 17 | 79 (364%) | 0 (-100%) | 0 (-100%) | 79 (364%) | 269 (+1400%) |
| Rufous-sided towhee | 0 | 0 | 0 | 0 | 0 | 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 3.16: Late Succession MIS* for Analysis Unit 22.**
**Acres of habitat by alternative and percent change from Current Condition**

| | Current Conditions | Proposed Action | No Action | Thin Only | No Herbicide | Maximum Regeneration |
|---|---|---|---|---|---|---|
| Eastern Wild Turkey | 1846 | 1554 (-16%) | 1846 (0%) | 1846 (0%) | 1554 (-16%) | 1425 (-23%) |
| Pileated Woodpecker | 1846 | 1554 (-16%) | 1846 (0%) | 1846 (0%) | 1554 (-16%) | 1425 (-23%) |
| Red-cockaded Woodpecker | 1846 | 1554 (-16%) | 1846 (0%) | 1846 (0%) | 1554 (-16%) | 1425 (-23%) |
| Fox Squirrel | 322 | 322 (0%) | 322 (0%) | 322 (0%) | 322 (0%) | 322 (0%) |
| Pine Warbler | 1414 | 1122 (-21%) | 1414 (0%) | 1414 (0%) | 1122 (-21%) | 933 (-30%) |
| Eastern Gray Squirrel | 108 | 110 (+2%) | 108 (0%) | 108 (0%) | 110 (+2%) | 110 (+2%) |
| Screech Owl | 91 | 91 (0%) | 91 (0%) | 91 (0%) | 91 (0%) | 91 (0%) |
| Hooded warbler | 19 | 19 (0%) | 19 (0%) | 19 (0%) | 19 (0%) | 19 (0%) |

| | Current Conditions | Proposed Action | No Action | Thin Only | No Herbicide | Maximum Regeneration |
|---|---|---|---|---|---|---|
| ** 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.

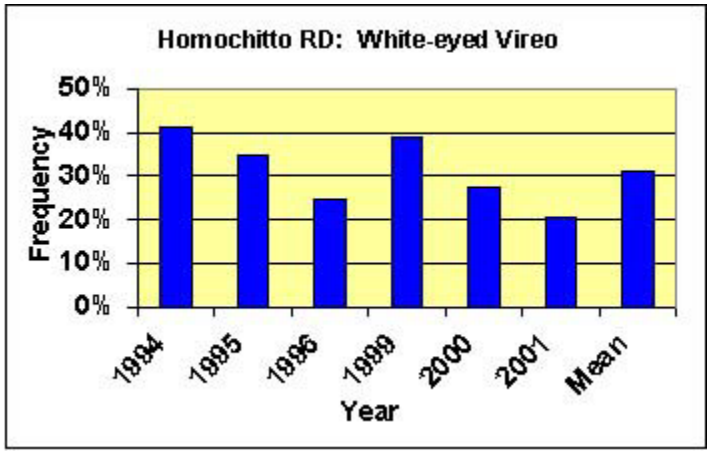
It must also be recognized that management must be done in the context of the land and its present as well as future capabilities. This must include the fact that at the present time Analysis Unit 22, because of its past management history contains a large amount of rapidly aging loblolly pine. Loblolly 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 Actions"

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




One such species, the white-eyed vireo is representative of the early-seral yellow pine habitat. 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.

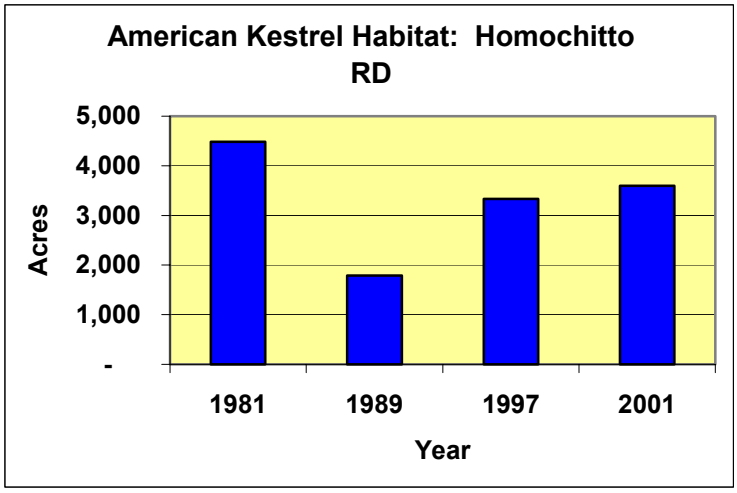
As with all early seral habitat species, preferred habitat has declined for the white-eyed vireo. Early seral yellow pine is currently at only about 50% of that available in 1981. In contrast, populations of the vireo have fluctuated in a pattern more typically associated with normal, short-term breeding 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.

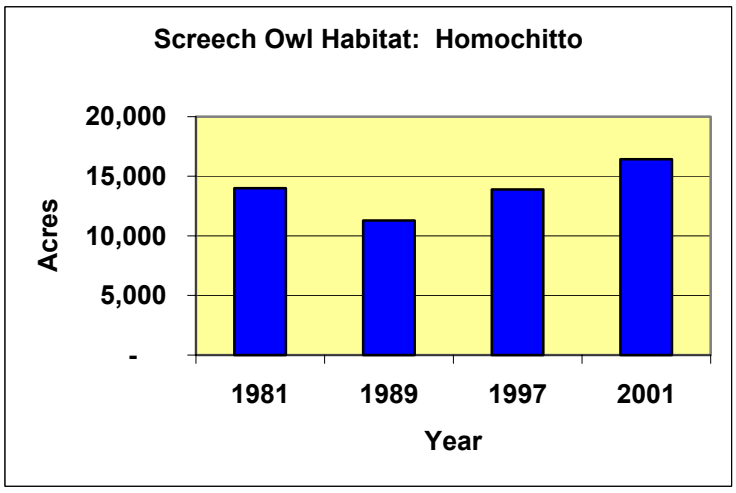
The results presented in the analysis table for the Bachman's sparrow are somewhat misleading. While the Forest Plan does select the species as an indicator of the early successional longleaf pine forest, this species does well in all older pine forest of all types as long as they are burned and thinned. There is a reported decline in habitat for this species in any of the alternatives, but with the "Proposed Actions" Bachman's sparrow habitat would be perpetuated in the long term with increase in habitat of 95 acres. Although not a Management Indicator Species, the yellow-breasted chat represents the 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.

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. A new monitoring protocol is being established to gather base line data on this species in order to start documenting trends and frequencies. As regional data indicate however, this species shows a stable population trend, it would appear that this species either has a limited population on the Homochitto National Forest or that a different monitoring protocol is needed. To determine this, in 2002 the district developed new protocol for surveying populations of the American Kestral. (*Sampling Protocols for the American Kestrel and Eastern Screech Owl, 2002*) Based on updated survey results, the district has determined that the species is present and a suitable indicator but that past protocols were inadequate or inappropriate.

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. While at the same time preferred habitat for the eastern screech-owl (pine-hardwood forest type 40+ years old) will continue to increase, it already represents roughly four times more area than that of the American kestrel and has been steadily increasing since 1989. A survey conducted in 2002 (*Unpublished: Management Indicator Species Report for the American Kestrel & Eastern Screech Owl, Aug. 13, 2002*) on the Homochitto RD found American kestrel had an average frequency of 16.0%, abundance of 0.19, and local abundance of 0.68. The survey showed eastern screech owl had a frequency of 72.0%, abundance of 1.42, and local abundance of 1.97 on the Homochitto RD (USDA 2002). These numbers indicate an overall lack of early seral habitat on the Homochitto RD and an ever-increasing amount of late seral habitat. However, the "Proposed Action" will create some positive



effects by creating approximately 292 acres of early successional habitat for this species. 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. No alternative will affect screech owl habitat.

The wild turkey, while considered an indicator for the late successional habitat type, requires some early successional habitat for nesting and brooding. The 16% 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 16% 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.

The "Proposed Actions" would, in the long term, benefit the RCW by creating nesting and foraging habitat. The loss of late seral habitat will not affect the RCW since most of this is made up of pine/hardwood and not considered prime habitat.

Fox squirrels are known to be present in the older pine communities on the forest. There are only a few older longleaf pine stands within the analysis unit. None of the alternatives listed in this analysis will have any affect on the fox squirrel for 80+ years when and additional approximate 95 acres of mixed pine dominated by longleaf will become mature.

## "No Action" (Alternative 1)

Early successional Management Indicator Species would see habitat reduced by up to 100% 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 100% 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 an increase 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 1% 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 and there will be no unevenaged management.

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 56% less than present condition.

There is a reported decline in habitat for this species in any of the alternatives, but with the "Maximum Regeneration" Bachman's sparrow habitat would be perpetuated in the long term with increase in habitat of 214 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 421 acres of early successional habitat for this species (The "Proposed Actions" and "No Herbicide" will also have beneficial impacts but have less acreages). 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 16% 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 16% 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.

The "Proposed Actions" and action alternatives would, in the long term, benefit the RCW by creating nesting and foraging habitat. The loss of late seral habitat will not affect the RCW since most of this is made up of pine/hardwood and not considered prime habitat.

Fox squirrels are known to be present in the older pine communities on the forest. There are only a few older longleaf pine stands within the analysis unit. None of the alternatives listed in this analysis will have any affect on the fox squirrel for 80+ years when and additional approximate 95 acres of mixed pine dominated by longleaf will become mature.

The pine warbler shows a gain of 31% 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). However, as an MIS indicator of late seral yellow pine, this species should be benefited by this alternative.

## "No Herbicide" (Alternative 3)

The preferred habitat of 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.

With the "No Herbicide" alternative Bachman's sparrow habitat would be perpetuated in the long term with early seral habitat of 157 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 positive effects by creating 292 acres of early successional habitat for this species (The same acreage as the "Proposed Action". 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 2% 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 2% 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.

The "Proposed Actions" and action alternatives would, in the long term, benefit the RCW by creating nesting and foraging habitat. The loss of late seral habitat will not affect the RCW since most of this is made up of pine/hardwood and not considered prime habitat.

Fox squirrels are known to be present in the older pine communities on the forest. There are only a few older longleaf pine stands within the analysis unit. None of the alternatives listed in this analysis will have any affect on the fox squirrel for 80+ years when and additional approximate 95 acres of mixed pine dominated by longleaf will become mature.

## "Thin Only" (Alternative 4)

Early successional Management Indicator Species would see habitat reduced by up to 100%. 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 100% 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 "Proposed Actions" and action alternatives would, in the long term, benefit the RCW by creating nesting and foraging habitat. The loss of late seral habitat will not affect the RCW since most of this is made up of pine/hardwood and not considered prime habitat. Midstory thins may in some cases create RCW habitat from pine/hardwood habitat, but this is not expected to last an extended amount of time outside of the planned prescribed burn area.

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 3.17: 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 | 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 3.18: 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 3.19 : 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 3.20: 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 3.21: 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 3.22: 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 3.23: 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 3.24: 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 3.25: 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 22 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 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.

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.

**Table 3.26 Management Indicator Species - Homochitto National Forest** Acres of Represented Habitat for each terrestrial Management Indicator Species since 1980 baseline

| MIS | Natural Community Represented | Acres in 1980 | Acres in 2001 | Percent Change |
|---|---|---|---|---|
| White-tailed Deer | 0-10 years, all forest types | 40,531 | 20,981 | -48% |
| Bachman's Sparrow | 0-10 years, longleaf pine | | 1,268 | |
| Bobwhite Quail | 0-10 years, longleaf/yellow pine | 33,297 | 17,298 | -48% |
| Eastern Meadowlark | 0-10 years, yellow pine | 33,297 | 17,298 | -48% |
| American Kestrel | 0-10 years, pine/hardwood | 4,482 | 3,456 | -23% |
| Rufous-sided Towhee | 0-10 years hardwood | 2,752 | 227 | -92% |
| Eastern Wild Turkey | 40+ years, all forest types | 133,291 | 111,941 | -16% |
| Pileated Woodpecker | 40+ years, all forest types | 133,291 | 111,941 | -16% |
| Red-cockaded Woodpecker | 40+ years, longleaf/yellow pine | 110,070 | 77,667 | -30% |
| Fox Squirrel | 40+ years, longleaf pine | | 4,665 | |
| Pine Warbler | 40+ years, yellow pine | 110.070 | 77,667 | -30% |
| Gray Squirrel | 40+ years, pine/hardwood and hdwd. | 23,221 | 34,274 | +48% |
| Screech Owl | 40+ years, pine/hardwood | 14,001 | 24,630 | +60% |
| Hooded Warbler | 40+ years, hardwood | 9,106 | 9,853 | +8% |

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 56 active clusters in 2001. 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, by adding acres of improved habitat. The "Proposed Action" and alternatives 2-3 would replace approximately 95-152 acres of ageing loblolly pine stands with longleaf pine. 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 D.

Bachman's sparrow habitat currently, within the Analysis Unit, is zero. With the "Proposed Actions," and alternatives 2-3 will increase the 0-10 year old longleaf by 95-152 acres. This will benefit the fox squirrel in the long term.

No management activities are proposed in the natural communities represented by the Rufous-sided towhee, gray squirrel, 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 dated March 8, 2002. 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 2%, 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 declining across their range. Quail hunting dropped dramatically 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. A second factor is that quail populations have responded favorably to red-cockaded woodpecker habitat management (See Table 3.18). 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.

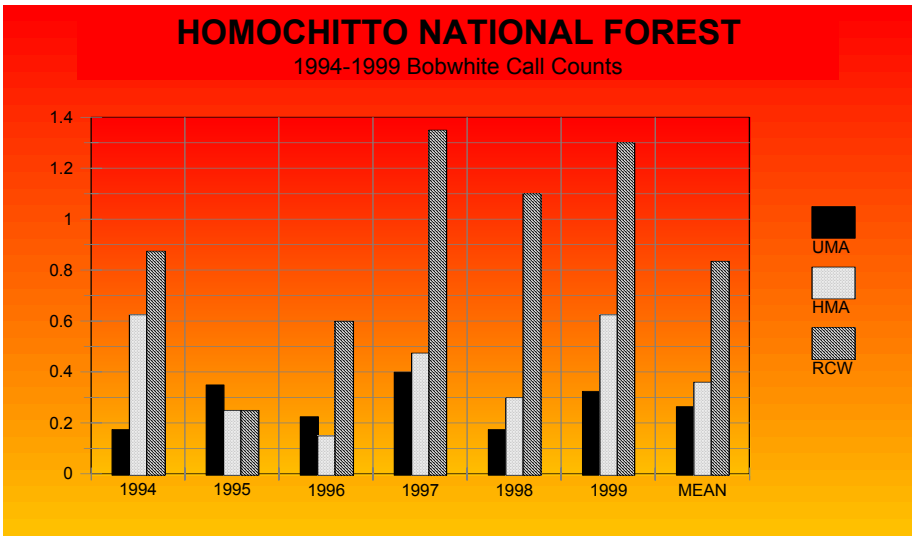



**Figure 3.3: Bobwhite call counts**

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 3.18 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

No cumulative effects on fish species were found 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 the AU-22 drainages. These watersheds have 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 22 approximately 1,553 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 157 acres of loblolly forest with the desired longleaf mixed pine forest. An additional 197 acres would be regenerated to loblolly pine-hardwood. Alternative 2 will have the approximately 214 acres of the desired longleaf mixed pine forest. 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 and the planting of hardwoods in the unevenaged areas. 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.

**(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.

**(Alternative 2):** Affects to game species should be similar to those discussed for the "Proposed Action".

**(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".

**(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 22. 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 (1998 Monitoring and Evaluation Report for National Forests in Mississippi - Monitoring Results and recommendations). 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.

The 1998 Monitoring Report summarizes the forest wide (National Forest in Mississippi) data in graphs (Appendix C.) and it is repeated here. 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

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 3.17 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.]

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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.

# Mature Forest Wildlife and 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 22 approximately 157 acres of this habitat would be created this entry.

## Environmental Consequences

### No Action

Under the "No Action" alternative, there would be no change in the distribution of age classes except that all stands would be 10 years older than last entry. The existing road system would remain in place without use, changes, or improvements. Roads currently open would remain open, and currently closed roads would not be opened or receive maintenance or other improvements. Fragmentation issues would not be relevant.

### Proposed Action and Action Alternatives

Under all action alternatives, some changes would occur in the vegetative cover. For the "Proposed Action," no more than 10% of the late successional habitat would be converted. Species, such as the Eastern wild turkey and pileated woodpecker, which utilize pine, pine-hardwood, hardwood, and hardwood-pine forests, would see only a 16% decline in overall habitat. The species utilizing forests with the most hardwood component (the Eastern gray squirrel, screech-owl, and the hooded warbler) might experience a short-term reduction, but would see small increases in habitat long-term habitat size.

In Analysis Unit 22, at the present time, the largest block of unfragmented forest habitat of age 40+ years is approximately 857 acres. Under the "Proposed Action" and the "Proposed Action

without Herbicides," this would be reduced to approximately 762 acres, which is still a large tract of unbroken forest. Under alternative 2, the unfragmented forest block would be reduced to approximately 705 acres.

In the current action proposals (except for the "Thinning Only" alternative), all regeneration areas are located as close to other young forest as 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, but the cluster of early seral stands would become the late seral stands of the future. They would also be close to enough to each other that future forest fragmentation would be minimized.

The result is that the action alternatives would tend to provide long-term stabilization of large habitat blocks of each seral stage. The "No Action" alternative would be subject to natural events to determine block size, seral distributions, and forest species composition. Protection from the historic fire regime, the presence of open system roads, and private lands would not allow the natural process that formed the historic forest communities of the past.

For the action alternatives, the transportation system required to access the harvest areas would be the same (refer to the Transportation Map in Appendix B of this document). It would utilize existing county roads, open Forest Development Roads, and low standard Forest Development Roads, which are present but closed between uses. Roads that have been gated or blocked by earthen mounds would also receive reconstruction and/or 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. On completion of harvesting activities, these intermittent and short-term roads would be closed with either a gate or an 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 that would reduce the amount of sediment potentially entering streams. The character of these roads is a well-defined roadbed cleared and maintained during use but with encroachment, which may include in-growth onto the roadbed, depending on the interval between uses. This over-all, long-term relationship would not change substantially.

Photo 3.6 An example of a short term road on the forest which has been reseeded to help reduce sediment entering streams.

## Cumulative Effects

Total late seral habitat on the Homochitto National Forest has declined from approximately 133,291 acres in 1980 to approximately 111,941 acres in 1999. 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 22, 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 1,159 acres of Analysis Unit 22. This is about 8% of the total analysis area and about 35% 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.

# Disturbance to Nesting Birds (Effects on 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

Based on this, the prescribed thinning combined with prescribed burning described in the "Proposed Action" and the other action alternatives 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 would likely benefit (Lucas 1993, Wilson et al 1995).

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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 affecting neotropical migrants 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 22, approximately 157-214 acres of the longleaf pine habitat would be created this entry depending on the alternative selected (except for the "No Action" and "Thinning Only" alternatives).

Logging during nesting season physically disturbs nests and alters the behavior of nesting adult Neotropical birds impacting reproductive success. Although hard data are 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 University, personal communication).

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 the conservation of Neotropical migrants. The strategy also sets in motion a plan for monitoring long-term trends of bird populations in Southern National Forests. National Forests in Mississippi contain over

1,000 monitoring points in a full range of habitats. Although the Conservation Strategy was completed in 1996, breeding bird surveys had started in 1994 and continued until 1996 and started again in 1999. These surveys are expected to continue indefinitely.

This intensive effort will document trends of songbirds associated with a wide range of habitats. With the information provided by using this level of monitoring, it is less critical to obtain stand-specific data on songbird populations. It is also unnecessary to ensure 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 49 priority bird species. This list serves as a starting point for assessing the effects of management activities on bird population viability.

## Cumulative Effects

In Analysis Unit 22, the total acres which would be either thinned or regenerated in any of the action alternatives 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. 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 to 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 these actions (both individually and cumulatively) would be small, and viable populations of all native birds can be maintained without eliminating logging during the nesting season.

Selective application of Class "A" herbicides would be used in the "Proposed Action" and alternative 2. Herbicide application rates and treatments are specific to plants treated. Class "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 for Class "A" herbicides have not been shown to cause cancer, mutations or birth defects, or accumulation in the food chain or the bodies of humans or animals (Record of Decision, Final Environmental Impact Statement for Vegetation Management in the Coastal Plain/Piedmont, page 10).

In Analysis Unit 22, thinning and regeneration activities during the last decade (1990-present) have been widely distributed and varied in size. Compartments are entered on a 10-year basis. 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 an approximate total of 1,159 acres. This represents approximately 35% of the Forest Service land that is in Analysis Unit 22. 89%

of the Homochitto has been regenerated at least once since 1910. The "Proposed Action," and alternatives 2-3 would regenerate approximately 292, 421, 292 acres, respectively. Proposed regeneration levels are based on forest health and represent a steady flow of early seral habitat.

Historic thinning records have not been maintained. Site evaluations by professional staff observing indicators, such as stumps and stump holes, growth ring patterns, and woods road use, indicate that thinning was common and very wide-spread until the 1960's. Thinning continued over the next two entries but at a reduced rate based on need. Thinning is an intermittent treatment, and growth over the past 20 years has resulted in a large number of stands reaching high densities, which, again, require thinning to reduce southern pine beetle hazard and maintain vigor.

Thinning does not change age class or forest type. Since thinning has been applied intermittently as needed, it has varied widely by 10-year entry. All action alternatives include approximately 150 acres of first thinning. Intermediate thinning acres consist of approximately 402 for the "Proposed Action" and alternative 3; approximately 681 acres for the alternative 4; and approximately 374 acres for alternative 2. This represents a normal variation for a managed forest and is not cumulative.

Thinning along with prescribed burning would result in increased levels of grasses and herbaceous vegetation on the forest floor with corresponding reduction in woody midstory vegetation. This represents a return to historic conditions prior to early century harvests rather than a cumulative effect. As previously noted, the long-term cumulative effect has been the loss of this forest condition and habitat.

# Open Roads

## Affected Environment

Access to Analysis Unit 22 is achieved by means of Forest Development Roads and County Roads. County Roads include 118, 118A, 191, 192, and 192A. The existing open Forest Development Roads in Analysis Unit 22 include 165B, 191B, and 192B. 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 Analysis Unit 22 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 Analysis Unit 22. 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. The Forest Development Roads in Analysis Unit 22 have deteriorated from their planned use and were built from outdated 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 highways 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 22, although there is one proposed closure. 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 Action Alternatives

For the "Proposed Action" and the other action alternatives, the transportation system required to access the harvest areas would be the same. The "Proposed Action" and the other action alternatives require limited, low level road construction; road reconstruction; and road maintenance in order to ensure the continued safe public use of these roads. Roads, which have been gated or blocked by earthen mounds, would also require reconstruction and maintenance prior to administrative use.

Forest Development Roads would be reconstructed or maintained as necessary to support this project in accordance with Forest Plan, Appendix A. The "Transportation Map" and the attached "Transportation System Summary" detail road improvements and disposition. Altogether, approximately 9.4 miles of reconstruction, 1.4 miles of construction, and .9 miles of maintenance, and 2.1 mile of temporary roads would occur in Analysis Unit 22 Project.

Upon completion of harvesting activities, these intermittent and short-term roads would be closed with either a gate or an earthen mound. Intermittent roads would then revert to a Maintenance Level 1, and short-term roads would revert to resource production. Roads associated with Analysis Unit 22 Project can be found in Appendix B under the "Transportation

Map" heading and in the attached "Transportation System Summary" table.

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 reconstruction associated with the "Proposed Action" and the other action alternatives would improve the present transportation system within Analysis Unit 22, offset short-term impacts, and provide a direct benefit to the investment previously made in road development in Analysis Unit 22.

Photo 3.7 – Short-term road undergoing conversion back to resource production of forage and trees after logging use


Photo 3.8-- Road maintenance improves safety and stability for the public and Forest Service.

## Cumulative Effects

There are no cumulative effects associated with the transportation system for Analysis Unit 22. Roads closed or seasonally closed prior to Analysis Unit 22 project would return to their current management after completion of 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 Productivity". A roads analysis report was completed and the transportation systems utilized for this project are appropriate and do not conflict with longer term, transportation needs within the analyzed area for this project.

### Table 3.27 Road Activity

| Road Type | Road Number | R-O-W | Length |
|---|---|---|---|
| Temp | Temp | | 360 |
| Maintenance | 191D | | 1600 |
| Temp | Temp | | 920 |
| Reconstruction | 191C | YES | 1900 |
| Reconstruction | 192B1 | | 500 |
| Temp | Temp | | 750 |
| Temp | Temp | | 858 |
| Temp | Temp | | 1800 |
| Temp | Temp | | 765 |
| Reconstruction | 165B4 | | 2588 |
| Temp | Temp | | 912 |
| Temp | Temp | | 350 |
| Temp | Temp | | 755 |
| Reconstruction | 165B3 | | 2435 |
| Maintenance | 165B4 | | 735 |
| Maintenance | 165B2A | | 2450 |
| Reconstruction | 165B2 | | 2950 |
| Reconstruction | 165B2 | | 2315 |
| Reconstruction | 165C1 | | 1952 |
| Reconstruction | 165C1A | | 1015 |
| Reconstruction | 165C2 | | 5206 |
| Reconstruction | 118B1 | | 4821 |
| Temp | Temp | | 741 |
| Reconstruction | Temp | | 425 |
| Temp | Temp | | 1833 |
| Construction | 192A1 | | 1940 |
| Temp | Temp | | 663 |
| Reconstruction | 192A | | 5229 |
| Reconstruction | 118B | YES | 2413 |
| Construction | 165B2B | | 1483 |
| Construction | 192E | | 3108 |
| Construction | 192B3 | YES | 418 |
| Construction | 192B2 | YES | 478 |
| Reconstruction | 165B | | 15620 |

# Economics (Issue 8)

## Local Businesses

Specific concerns relating to economics include local businesses, county returns, cost/revenue ratios, returns to the treasury, and harvest sustainability. These concerns, as well as other general economic concerns, are discussed in this section.

## Affected Environment

Mississippi's primary source of revenue is based on agricultural production, which includes timber. In 1996, poultry provided $1.3 billion and timber provided $1.2 billion worth of revenue (Jackson Clarion Ledger). 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 2002, money in the form of stabilized payments totaled $2,433,392. Amite County relies primarily 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 boundaries for Analysis Unit 22 are as follows: Block 35 to the North; Block 18 to the south; roads 191, c192, and 165B roads to the south. Analysis Unit 22 contains approximately 3,290 acres of National Forest land and approximately 12,323 acres of privately owned land.

Approximately 31 private landowners share ownership of these 12,323 acres. Private land-use within close proximity to the Analysis Unit 22 Project Area is predominately timberland. There are some scattered parcels of private land currently utilized as cropland or pasture.

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 Adams and Lincoln, these counties are rural in nature and are dominated by small towns. The

seven counties are almost entirely dependent on 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 the 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 United States economy (15% in 1988), more than 60 million service jobs are directly dependent on manufacturing. Typical examples for the forest industry would be homebuilders and home building materials 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 used for recreation. Even though the value of timber in Analysis Unit 22 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.

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

## Returns from the Alternatives

The level of returns available to the counties have been stabilized through the selection of stabilized payments. This represents a commitment of approximately 2.4 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 3.20 and 3.21:

**Estimated Value Generated (Table 3.28)**

| Alternative | Estimated Present Net Value Generated | Revenue/Cost Ratio |
|---|---|---|
| Proposed Action | $984,252 | 2.11 |
| No Action | $0 | 0 |
| Proposed Action Without Herbicides | $1,124,886 | 2.50 |
| Thinning Only | $417,626 | 2.47 |
| Maximum Regen | $1,524,932 | 2.62 |

**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 |

# Cumulative Effects

The above table does not imply that there is no value to the resources of Analysis Unit 22, 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 "Proposed Actions" and Alternatives 2, 3, and 4 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.

## No Action

Within Analysis Unit 22, there are approximately 12,323 acres of private land. Employment within the counties included in the Homochitto National Forest is largely dependent on wood products. The effects of producing a timber sale would maintain or enhance the present level of employment depending on market conditions and private timber producing entities. Implementation of the "No Action" alternative would not produce tangible economic benefits and may impact those that use federal timber to supplement timber production from private forestlands.

The "No Action" alternative would restrict timber supplies in the local area and would negatively affect the local economy by reducing the need for woods workers, logging support businesses, primary and secondary manufacturing jobs, and facilities. Valuable timber lost on unsalvaged acres would represent a significant irretrievable loss to the public and the local economy. The

decision not to harvest would forego an estimated income of $984,252 when compared to the "Proposed Action." In addition, this alternative would incur costs due to planning expenses to date, including data collection, integrated resource analysis, field reconnaissance, etc. These costs are also included in the action alternatives.

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 $16,450. Other costs are based on an analysis of the non-connected activities.

### Proposed Action and action alternatives

The "Proposed Action," alternatives 2 and 3 provide the highest returns to taxpayers. If the county is to maintain the same level of services, differences between the "Proposed Action" and the other action alternatives represent the funding from other sources that would be required. Typically, property taxes are used to provide this difference.

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.

## Number of Jobs Created by Alternative in AU- 22 (Table 3.30)

| Alternative | MMBF | Jobs Created in Mississippi | Jobs Created Outside Mississippi | Total Jobs Created |
|---|---|---|---|---|
| No Action | 0 | 0 | 0 | 0 |
| Alt. 2 Max. Regen | 12.82 | 142 | 70 | 212 |
| Alt. 3 No Herbicides | 10.22 | 113 | 56 | 169 |
| Alt. 4 Thin Only | 6.2 | 68 | 34 | 102 |
| Alt. 5 Proposed Action | 10.22 | 113 | 56 | 169 |

# Cumulative Effects

There are an approximate total of 15,613 acres in the planning area for Analysis Unit 22. Of this total, the Forest Service administers approximately 3,290 acres or 21%, and non-industrial private landowners control approximately 12,323 acres or 79%. The following table summarizes estimates of the past, and future activities of all landowners in the planning area for the "Proposed Action"' and its alternatives. Future activity levels on lands other than those administered by the Forest Service are anticipated to be similar to the past 10 years.

## Estimate of Activities for the Past & Future 10 Years (Table 3.31)

| Activities | Unit of Measure* | Past 10 Years | Proposed Action | No Action | Proposed w/o Herbicides | Thinning Only | Max Regen |
|---|---|---|---|---|---|---|---|
| Regeneration | Acres | 406 | 292 | -- | 292 | -- | 421 |
| | % of Area | 12 | 9 | -- | 9 | -- | 13 |
| Thinning | Acres | 1,159 | 518 | -- | 518 | 831 | 524 |
| | % of Area | 35 | 20 | -- | 20 | 25 | 16 |
| Prescribed Burning | Acres | 1,553 | 1,553 | 1,553 | 1,553 | 1,553 | 1,553 |
| | % of Area | 47 | 47 | 47 | 47 | 47 | 47 |

The cumulative effects of the alternatives evaluated in this assessment on soil, water, air, visual, and cultural resources in Analysis Unit 22 Planning Area 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 Analysis Unit 22, the Proposed Action, and alternatives 2, 3, and 4 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 Analysis Unit 22 from disturbances that occurred over five years ago have essentially ceased. As a result of the mitigating measures described in Appendix C, harvesting and reforestation activities in the "Proposed Action" and its alternatives would be expected to maintain the current level of watershed and air quality in Analysis Unit 22 even if thinning was increased.

Continued harvesting and subsequent reforestation activities in Analysis Unit 22 would continue to expose undiscovered heritage resources on federal lands and virtually all heritage resources on private lands to potential damage. The increase of thinning activities on federal lands in the "Proposed Action" and the other action alternatives 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 Analysis Unit 22 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 in the table above, this activity is expected

to continue at slightly less than its current rate over the next ten years under all of the alternatives except the "No Action" alternative.

From another perspective, expanded thinning of mature stands on federal lands under the "Proposed Action" and the other action alternatives would serve to open stands and provide expanded view sheds that are uncommon to forested landscapes in the Analysis Unit 22. 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 Analysis Unit 22 Project Area would be essentially neutral, as one would tend to offset the other.

# Recreation (Issue 9)

Specific concerns relating to recreation include recreational settings, visual quality, and transportation systems. These concerns, as well as other general recreation concerns, are discussed in this section.

## Affected Environment

Driving for pleasure represents the majority of dispersed recreation use. Hiking, bird watching, canoeing, and other resource vehicle (ORV) use are approximately equal. (Forest Plan, 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 [which] is represented by such activities as swimming, camping, picnicking, etc."

As defined in the Forest Plan, the desired future condition for recreation in Analysis Unit 22 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 the area within Analysis Unit 22 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 National Forest 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). With the 1995 statewide hunting regulations, Mississippi prohibited the harvest of does on public lands by non-resident hunters. At the same time, the harvest of does was liberalized on privately leased lands for both residents and non-residents. In 1996, harvesting was further restricted to protect "spike" bucks throughout the state.

There is an observed but undocumented trend towards out-of-state hunters moving to private hunting leases to increase their opportunities for success. Game laws and bag limits are controlled by the state and are, therefore, 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 490,900 wildlife and fishery user days in Mississippi, and 648,000 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 22, the dispersed recreation that would be most affected is 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 would be reduced sight distances and restricted travel routes due to the denseness of these poletimber stands. Hunting and fishing demand on public lands 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 (Forest Plan, page 3-23). The Homochitto National Forest contains two state administered wildlife management areas, Caston Creek and Sandy Creek 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. The wildlife is managed by the state, and the Forest Service manages the habitat.

# Environmental Consequences

## No Action

Under the "No Action" alternative, approximately 150 acres of 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 poor 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.

## Proposed Action and Action Alternatives

Under the "Proposed Action" and the other action alternatives, direct impacts to hunting associated with timber harvesting would last the duration of the sale activities. Depending upon the weather, timber harvesting would most affect hunting during the months of October, November, and March. These direct impacts would include logging trucks on forest roads, noise from heavy machinery, and the inability to hunt in the area where active logging is taking place.

The total acreage of all areas to be treated under the "Proposed Action" and the other action alternatives is approximately 831-945 acres depending on the alternative chosen. This represents approximately 24% of Forest Service land in Analysis Unit 22. Using the assumption that at least 50% of the logging would happen outside of the hunting seasons, only 12% of Analysis Unit 22 would be logged during hunting seasons. Active logging would take place over approximately a three-year span of time. Therefore, it is estimated that only 6% of logging activities would happen during hunting seasons in any one year.

# Cumulative Effects

## First Thinning

Under the "Proposed Action" and the other action alternatives, 150 acres of pulpwood stands would receive first thinning. Dispersed recreation and hunting opportunities would be increased as a result of the following:

- The remaining mast-producing hardwoods would be allowed to develop.
- The herbaceous plants and mid-story brush that provide forage, browse, nesting, and bedding for wildlife would be increased.
- The sight distances within the thinned stands would be increased.
- The travel-ways within the stands would be cleared, and the Forest Service system roads would be maintained and spot reconstructed.

The harvesting of pine-hardwood and 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 the other action alternatives would not harvest any pure hardwood stands but would impact some hardwood trees. This reduced number of hardwoods, however, would not adversely affect hunting opportunity.

### Prescribed Burning

Prescribed burning provides better habitat for whitetail deer, wild turkey, and Northern bobwhite 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 should have enough warning of activities to be able to make alternate plans or take safety precautions as needed.

# Visual Quality

## Affected Environment

The visual quality objective for Analysis Unit 22 is "maximum modification" meaning that "management activities may visually dominate the characteristic landscape" (Forest Plan, 6-37), except along county roads 101 and 192 where the visual quality objective is "modification".

Currently, the travelways within Analysis Unit 22 are County Roads, which include 191 and 192. The existing, open Forest Development Roads in Analysis Unit 22 include 191B, 192A, and 165B. In addition, state highway 33 forms the southern boundary of Analysis Unit 22. Other roads associated with Analysis Unit 22 Project can be found in Appendix B under the "Transportation Map" heading.

These travelways are 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 travelways in Analysis Unit 22 include evidence of road building, cuts into slopes, and various stages of plant growth including herbaceous species, shrubs, and trees from seedlings to large trees up to 120 feet in height.

There are approximately 11 located garbage dumps within the Analysis Unit 22. These are located in very visible areas. Current prevention signs do little to discourage continued dumping on Forest Service land.

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 (Forest Plan, page 3-3). Permanent openings in Analysis Unit 22 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 Analysis Unit 22 are considered from view sheds of roads, highways, and the Homochitto River. Consideration is given for retaining visually pleasing mitigations for harvesting activities, which 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, 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, 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 will be in timber management. As timber production is increased, more activities will be evident and, consequently, more effects will be viewed. The Forest may take on a more 'managed' look. This condition will 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 will 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 upon 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 progressing very slowly from birth to death. In nature, forests are renewed by natural catastrophes. Under management, harvest cutting renews the forest. In nature, one successional stage will usually cover a large area as a result of fires, disease, etc. In a managed forest, all stages of succession will 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 will provide continuing habitat for plants and animals which may do well during one stage of succession but poorly during another (Forest Plan, page 3-10).

# Environmental Consequences

## No Action

With the "No Action" alternative, there would be no thinning 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. Wind damage, fire, or southern pine beetles would create openings. 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.

In the "No Action" alternative, the absence of timber harvesting would increase the amount of solitude for the forest visitor. Over time, visual variety would decrease and sight distances would be restricted. Wildfires are more intense, often crowning, which increases mortality and creates a negative visual effect (USDA-FS 1989). Garbage dumps in the analysis unit will not be removed and will likely encourage additional garbage dumps.

## Proposed Action and Action Alternatives

The "Proposed Action" and the other action alternatives would all result in changes to the current visual quality. The proposed thinnings would create more open stands with longer sight distances than existed prior to thinning. Prescribed burning would also help increase the sight distances associated with these thinnings. Public response to this type of management in other project areas has affirmed our decisions.

The "Proposed Action and alternatives 2 and 3 seedtree, and the clearcut with reserves regeneration methods which create pronounced long distance viewing opportunities. Leaving clumps of reserve trees or feathering trees along the edges of regeneration areas could mitigate the visual impacts associated with these cuts. Many people find early seral stands less visually appealing than mature forests. However, these early seral stands do tend to add diversity to the landscape. As already described, this activity is expected to continue at slightly less than its current rate over the next ten years under all alternatives except the "No Action" alternative.

The planned harvesting in the "Proposed Action" and the other action alternatives would create stumps and logging slash visible to the public. However, in the regenerated sites, naturally occurring vegetation and planted trees would offset these effects in approximately 3 to 5 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 ¼ mile.

Immediately after harvesting operations under the "Proposed Action" and the other action alternatives, logged-over areas would be visually displeasing due to remaining debris, damage to understory vegetation, and road scars (Forest Plan, page 4-22). Road reconstruction would result in removing vegetation (Forest Plan, page 4-10). Road reconstruction would be visually displeasing while in progress (Forest Plan, page 4-23). Vegetation deadened during site

preparation or release activities would be unsightly until it is screened from view by new vegetation (Forest Plan, page 4-23).

All action alternatives will provide the means to minimize the visual impacts of garbage dumps. These dumps will be cleaned and new prevention signs installed in key locations along forest service roads.

# Cumulative Effects

Removal of timber and establishment of new stands occur on the Forest annually. Portions of the Forest also receive intermediate cuts each year. When timber is harvested, there would be adverse effects on aesthetics. Overstory trees are removed; understory vegetation is damaged; debris 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 (Forest Plan, page 4-29).

At the same time, timber-harvesting activities can be effectively utilized to achieve visually acceptable variety along travelways. This would create changing and more interesting landscapes along the roads (Forest Plan, pages 4-22 and 4-23). In the "Proposed Action" and the other action alternatives, thinning would contribute to visual variety and increase visual distances into the Forest (Forest Plan, page 4-23). Properly shaped and placed regeneration cuts enhance the visual variety, and thinning increases and enhances the visual absorption (Forest Plan, page 4-7). Thinning would have the effect of increasing visual penetration and promoting visual variety (Forest Plan, page 4-23). Visual disruption from thinning treatments should be negligible after three to four months (USDA-FS 1989).

# Mitigation

After timber is harvested, the vegetation competing with the reforestation would be removed. Site preparation to control competing vegetation would provide for accelerated growth of young trees reforesting the area (Forest Plan, page 4-10). Mitigation measures would protect the visual quality for future use. Because visual quality is based upon vegetation, it is a renewable resource, and there would be no long-term loss (Forest Plan 1985).

**Seed tree – Modification**

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

**Commercial Thin – Modification**

- K. Lop and scatter slash to within 2" of ground within 50' zone beyond R-O-W edge (in seen area).
- L. 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:**

- A. Required: Establish irregular stand shape avoiding straight lines or geometric forms except as necessary along land lines (follow natural features).
- D. Reduce openings along road to as narrow as possible (¼-mile preferred maximum).

# Heritage Resources (Issue 10)

## Affected Environment

Lands in Analysis Unit 22 and across the Forest have been timbered one or more times, and some sites were in row crops prior to acquisition. Most sites have been thinned, selectively harvested, or entered for suppression of the southern pine beetle between acquisition and 1970. Portions of the historic record may have been affected by these activities.

The District archaeologist and technicians in consultation with the Mississippi State Historic Preservation Office conducted a heritage resource inventory and survey of Analysis Unit 22. 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.

As a result of heritage resource surveys completed in Analysis Unit 22, five sites were found to have additional information (Class II Properties) making them eligible for nomination as National Register sites. Location and distribution information collected for these sites meets historical record needs. The eligibility of the sites was considered "unknown". In accordance with our Memorandum of Understanding, the sites will be protected until further testing can be completed and their status confirmed. These five sites will also 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

There are five sites that were located and listed as "unknown" 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 was submitted to the State Historic Preservation Officer 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 four protected sites identified during pre-project survey will 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 will be notified and activity at that location will be suspended until an evaluation of the resource is made.

Harvesting and subsequent reforestation activities that are proposed in the "Proposed Action" and the other action alternatives 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, as already discussed, will serve to minimize the possibility of lost information from federal lands.

## Cumulative Effects

There is no reasonable expectation of cumulative effects on the archaeological record from Analysis Unit 22 Project. To have a cumulative effect, sufficient information would have to be lost over time and over the Forest such that understanding of pre-history and settlement activities would be lost. 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 record on private land is independent of Analysis Unit 22 Project. Historic information is completely site-specific, and additional surveys within Analysis Unit 22 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 Analysis Unit 22 Environmental Assessment.

## Environmental Consequences

No site-prep herbicide application is proposed under the "No Action" alternative or alternatives 3 and 4. 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 alternative 2 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.

## Toxicity Data for Proposed Herbicides* (Table 3.32)

| Ingredient | Formulation | Oral LD-50 (for rats) | Dermal LD-50 (for rabbits) |
|---|---|---|---|
| Imazapyr | 2lb/gal | > 5,000 mg/kg | > 2,148 mg/kg |
| Triclopyr-amine | 3lb/gal | 2,000-3,000 mg/kg | > 4,000 mg/kg |
| Triclopyr-amine | 4lb/gal | 2,000-2,500 mg/kg | > 4,000 mg/kg |
| Sulfometuron methyl | 75% | > 5,000 mg/kg | > 2,000 mg/kg |
| Hexazinone | 25%, 2lb/gal | > 4,495 mg/kg | > 2,000 mg/kg |

* From the Herbicide Handbook of the Weed Science Society of America, 6th edition, 1989; and Agriculture Handbook #633, Pesticide Background Statements, USDA-Forest Service, 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 will 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 Garlon 4 straight from the bottle in order to reach the minimum oral LD-50 for Triclopyr. Once the herbicide is mixed and ready for application, that worker would have to ingest nearly 10 gallons of the mixture to reach the 2,000-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 22 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 vegetaion** | | | | | | |
| 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 22 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.

When compared to ingesting common food and household goods such as table salt or borax, the herbicides proposed for use in the Analysis Unit 22 Project 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 will have no cumulative effects on the human environment. The only chemical proposed for use in the Analysis Unit 22 Project which has been shown to have a significant effect on human health are Velpar L and Garlon 3A which can cause severe eye irritation. Dow Chemical Company states that, “goggles are recommended during handling or use of Garlon 3A before dilution.” (Agriculture Handbook #633, pg. T-15).

Mixed with the pesticidal chemical to produce the marketed product such as Garlon or Arsenal are other chemicals known as inert ingredients. The herbicide producer for various reasons adds these inert ingredients 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 within the formulation.

In addition to previously cited research, risk assessments were performed for the Final Environmental Impact Statement for Vegetation Management in the Coastal Plain/Piedmont, which 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 22 Project. If label directions are not followed properly, all of these chemicals can cause eye and skin

irritations to workers. This is equally or more true for common materials such as salt, gasoline, bleach, shampoo, and other common household chemicals. For typical application, these herbicides are heavily diluted, and the potential for eye and skin irritation drops dramatically. Therefore, the use of these chemicals poses a low risk to safety.

Health risk associated with herbicides in the water supply was also a concern. As noted under the "Water Quality" section of this chapter, herbicides are not expected to enter the water at a rate that would cause harm. There are no identified down stream human consumption uses of water from the Homochitto.

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).

# Cumulative Effects

All of the above herbicides are Class "A" chemicals, and the methods of applications are addressed Final Environmental Impact Statement for Vegetation Management in the Coastal Plain/Piedmont. Research and technical data reviewed in preparation of the above environmental impact statement and the Material Safety Data Sheets for these herbicides indicate that they have short half-lives and biodegrade through microbial action. Therefore, they do not build up between treatments (see Table 3.6 in the "Water Quality" section of this chapter).

Also, these herbicides are soluble and do not bioaccumulate in animals or humans. The preparation of the Final Environmental Impact Statement for Vegetation Management in the Coastal Plain/Piedmont included risk assessments evaluating actual field applications and personal exposure data. Tests included actual mixed herbicide formulations, which included surfactants and inert ingredients. The applicator exposures were below the standards set for human health. Further discussion of herbicide formulations can be found in Appendix G of this document.

# Civil Rights and Environmental Justice (Issue 12)

## Affected Environment

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 containing the Homochitto National Forest are Adams, Amite, Copiah, Franklin, Jefferson, Lincoln, and Wilkinson. These counties are rural in nature consisting mainly of small towns except for the more urban areas of Natchez and Brookhaven. The seven counties are almost wholly dependent on the timber and oil and gas industries. Much of the area is forested, and farms tend to be small family and part-time operations. Agricultural practices on interspersed private land within the Forest are mainly cattle ranches, dairy operations, minor grain and cotton operations, and subsistence farming.

In southwest Mississippi, approximately 70% of the land is timberland; therefore, forestry plays an important role in the economics of the region. Much of the forestland located in the seven-county area is under active forest management by industry and consulting foresters. Over 22% of this forestland is, in fact, owned by the timber industry.

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 standard. Average unemployment for over the last 10 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.

Amite, Franklin, and Wilkinson counties are sparsely populated counties with less than 16 people per square mile and a total of 32,203 people (based on Census 2000 Redistricting Data). Populations in the general Forest area have been declining since peaking during the logging boom of 1910 at 56,222 people. The remainder of the areas located within and adjacent to the Forest possesses statistics that are similar to these counties.

Approximately 45% of the population, in the seven county area of the Homochitto National Forest, is either under 18 or over 65. African-Americans and other ethnic minorities represent 49.9% of the areas population. Two of the counties have over 30% of their family households headed by females (1990 U.S. Census Bureau Data).

Based on information available from 1999-2001 at http://quickfacts.census.gov, statistics for counties within the proclamation boundary of the Homochitto National Forest are as follows:

**Table 3.35 County Statistics**

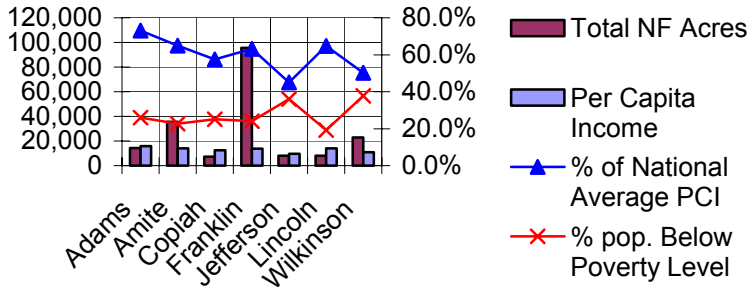
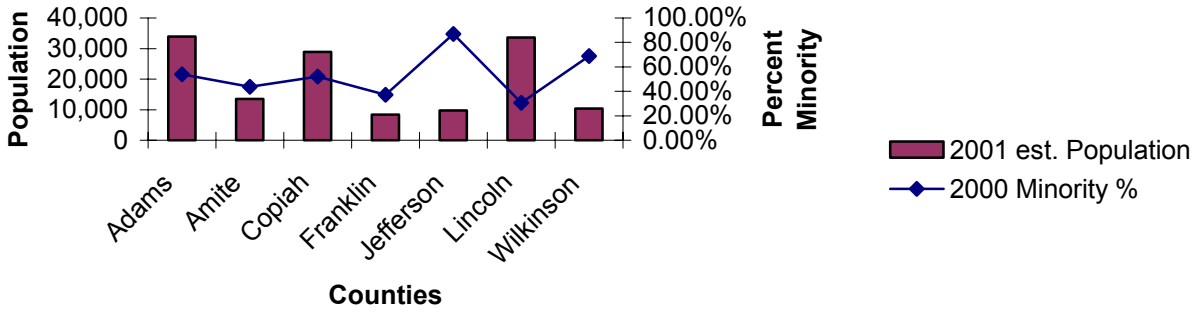



**Table 3.36 County Population and Minority Status**




# Environmental Consequences

The United States Department of Agriculture, Forest Service, is a diverse organization committed to equal opportunity in employment and program delivery. The Department of Agriculture prohibits discrimination on the basis of race, color, national origin, sex, religion, age, disability, political affiliation, and familial status. All documents and notices related to the Analysis Unit 22 project were understandable and readily accessible to all segments of the public. See Chapter 4 for a list of people contacted. In addition, notices were placed in the Clarion-Ledger, the paper of record, detailing proposed activities.

The timber industry provides a large proportion of jobs in the counties surrounding the Homochitto National Forest. Many service and retail jobs within the community are heavily dependent on incomes earned from the harvest and manufacture of forest products. Restricting forest product outputs would affect both minority and non-minority individuals in the local area.

# Cumulative Effects

A Civil Rights Impact Analysis is not needed as a separate document in an environmental analysis. The CRIA 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.

The forest industry employs a large percentage of the minority population through open contract bidding. All sales on the Homochitto National Forest are open to any financially responsible member of the public, which includes both minorities and non-minorities. We cannot identify a certain group of people. In addition, contractors who win Forest Service bids are required by law not to discriminate and do employ a mix of minority and non-minority workers. The district also participates in a small business set aside sale program, which also achieves the objective of getting work to minority populations.

The action alternatives presented by this analsys tend to be a continuation of the current relationship and don't represent a change in the counties surrounding the Homochitto National Forest. However, a no action alternative would represent a change in the reduction of work available to minorities as well and non-minorities. Alternatives 2-5 do not introduce any detrimental or harmful environmental variables that are specific to any group of people and will not cause a lifestyle change.

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). Many counties have now elected stabilized payments under the Secure Rural Schools and Community Self Determination Act of 2000. These are fixed payments based upon past National Forest Receipts

# 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 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.

## No Action

The "No Action" alternative 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-historic 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 four-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 the "No Action" alternative, 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, the "No Action" alternative 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. Furthermore, jobs and related personal income and life style not currently available could not be recovered in the future. As a consequence, the "No Action" alternative would result in irretrievable economic and social losses.

## Proposed Action and Action Alternatives

The Proposed Action and the other action alternatives 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. This, however, does not represent an irreversible commitment of resources since all losses are computed (Table 3.4) to be well within the Tolerable Erosion Losses where productivity and water quality can be maintained, (Forest Plan, Appendix L).

Loblolly pine, which currently occupies most of these sites, is a relatively short-lived tree. And on typical Homochitto sites, it requires replacement on a 50-year to 110-year rotation (Forest Plan 4-87) to maintain healthy, well-stocked stands. Unlike the "No Action" alternative, which does not plan orderly replacement, the period is planned on a 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 reduce potential tree mortality, there is a reduction in the potential economic loss associate with salvage.

# Cumulative Impacts

## Cumulative Effects on Resources

Cumulative effects are evaluated by considering two types of impacts: 1) impacts cumulative over time and 2) impacts cumulative over the area. An evaluation of cumulative impacts is based upon changes from the current or historical condition. Discussions for cumulative impacts are provided for each resource area. The following information sets baselines values for activities and impacts distributed over time and area. Cumulative impacts are based upon these baseline values. No cumulative impacts other than those discussed under specific resource areas have been identified or identified as an issue.

## Timber Harvest

On the Homochitto National Forest, 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 unmerchantable at the time of harvest, there are no remnants of the original forest that existed 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-1960's growing 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 indicated that only about 2% of the forest had a stand birth 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 pine. Because of its unique regeneration characteristics, this longleaf pine 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. The Homochitto consisted of approximately 170,000 acres of maturing forest that was becoming 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 pine had replaced longleaf pine on nearly 70 million acres across the region limiting the time available to replace this aging, 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, as defined in the

National Forest Management Act, were legislated to deal with these new challenges on Forest Service land.

Beginning in the late 1960's, less than 4,000 acres of even-aged harvests were initiated on the Homochitto National Forest. By 1970, regeneration has taken place at a relatively uniform pace: 1970-1979 -- 21,877 acres; 1980-1989 -- 24,910 acres; and 1990-1998 -- 24,877 acres. 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. However, on-the-ground observations by professionals during field inventories indicated that many stands were thinned in the 1960's prior to initiating a sizable regeneration program. By the mid 1980's, these stands grew and required thinning again, and regeneration areas began to reach merchantable size. Thinning treatments have grown steadily since that time.

## Roads

Because of the dissected character of the land, access is provided along ridge tops. An extensive network of roads was established from settlement activity to logging prior to public acquisition to continued activities under Forest Service management. The Forest Plan (page 4-75) indicates, "basically, all traffic service level A, B, and C roads are in place and may only require some reconstruction...." There are existing woods roads on most ridges that have been used on a regular to intermittent basis since settlement times.

The Forest Plan (page 4-75) directs that "Existing woods roads, planned to become part of the Forest Development Road System will be reconstructed, where needed, to TSL (Traffic Service Level) -D or C standards on the existing location except for short sections where the alignment may need to be changed...." "System roads can be designed and constructed or reconstructed to the same low standard (TSL-D) as temporary roads, except that better drainage and alignment could be provided." Typically, on the Homochitto, there is no new construction, except where new roads must be established to cope with right-of-way or accessibility limitations. Level D construction and reconstruction, which comprises much of the construction or reconstruction, consists only of spot work to install improved drainage structures and spot surfacing.

## Soil and Water

Soils and water were heavily impacted in the1920's and early 1930's by a combination of channelizing the Homochitto River where it entered the Mississippi River (west of the District) and nearly total harvesting of hundreds of thousands of acres in the Homochitto drainage. Since that time, reforestation and revegetation programs have recovered and stabilized the National Forest lands as well as many private lands. Adjustment of the stream channels in response to channelization continues, but harvest activities are not the driving factors. Several factors that might influence soil conservation and water quality have been at a relatively steady state for the past 30 years: regeneration averaging 2,000-2,500 acres annually; and roads being periodically upgraded or maintained but with minimum new construction.

The Forest has employed practices exceeding Mississippi's "Best Management Practices" for more than 20 years. The Forest Plan recognizes that activities will result in some soil movement.

Tables are provided that identify Tolerable Erosion Losses or "soil losses that can be tolerated over rotation periods and still reproduce a productive organic mineral soil service maintaining a healthy watershed". Herbicides and prescribed burning have been the primary site preparation used on the Forest since the 1970's.

## Heritage Resources

Intensive shovel test surveys have been employed on the Homochitto since 1991. Potentially important sites have been protected and additional undiscovered sites have not been located during management activities. Sites are not being impacted regardless of the management activity levels.

## Social and Economic

Historically, timber harvest and oil production have resulted in substantial outputs and employment sources for the local economy. These have also contributed to the national supply of natural renewable and non-renewable resources. Harvest volumes have varied, somewhat, but have generally fallen between 50 and 80 million board feet, annually. The direct benefit has been consistent payments of approximately $2,000,000 annually to the counties, which is earmarked for schools and roads.

The average per acre payment has been about $12.00 per acre for the past 15 years. Indirectly, Forest Plan data indicated that 7 jobs were created in Mississippi for each million-board foot harvested. On the average, 455 jobs have depended upon timber outputs from the National Forests. Because of the large local minority population, many of these jobs have supported minority families.

Hunting is identified as the primary recreation activity on the Homochitto. The Forest has enhanced and expanded camping, hiking, mountain biking, and horseback riding in accordance with Forest Plan advice (Forest Plan, pages 4-42-43 and 4-79-80). Fee incomes have steadily increased, and data from the two wildlife management areas indicate that hunter use of these areas has increased over time. This would indicate that vegetative management activities, including regeneration and thinning at historic levels, have not adversely impacted recreation on the Homochitto. Since hunter use is maintained through success, and deer and turkey habitat is enhanced by these treatments, the appearance is that harvest programs have supported dispersed recreation uses and not adversely impacted developed recreation on the Homochitto.