and may apply for other species (such as for Navasota Ladies' Tress) as well as those not yet identified

As well sites increase in number, size and longevity, the possibility of habitat fragmentation will increase The increasing fragmentation of species habitats will need to be evaluated Generally fragmentation is not considered a problem in forested areas unless the sites exceed 5-10 acres in size Most well sites do not exceed the 10 acre maximum that could occur Fragmentation should be addressed in the site specific analysis as it relates to any threatened or endangered species, or if the area is critical to interior forest species that may be emphasized in that area

For each two acres of well site there is an equal two acre loss of habitat until that site is totally revegetated and restored Drilling, pumping, road traffic, pipeline installation will all create a degree of disturbance within the surrounding wildlife community Some species will adapt, some will leave that area, and some will be attracted to the new opening These effects from the loss of habitat and disturbance will have to be evaluated on a case-by-case basis

Vegetation by itself is not a major concern on forests as the acres of potential well site will not have a significant impact on timber harvest capabilities or forage use by cattle In Grassland units the potential development is even less in any alternative The best way to evaluate potential impacts on the biological element is to identify the approximate amount of openings and soil disturbance for Forest and Grassland units by alternative These areas of disturbance will affect the seral stage and weed production that benefit some game species, yet may cause some negative impacts in interior forest species

ALTERNATIVES 1, 2, 3, and 4a

Brookeland Field (Angelina National Forest) - Under these alternatives, the most exploration and production of federal wells would occur Some areas of concern (though not affecting overall production) would be RCW emphasis areas, the Neches River corridor, and special areas The initial disturbance of the wells anticipated over the next ten years would be about 87 2 acres and after portions are reclaimed the area would be reduced to 46 acres

Brookeland and Saratoga/Annona (Sabine National Forest) - Under these alternatives, the most area is initially disturbed for oil and gas exploration Some 355 acres would be disturbed and reclaimation would reduce that area to about 70 acres. The initial disturbance of 37 wells being drilled over the next ten years could impact some of vegetation and wildlife components of this longleaf pine dominated area, however surface disturbance may have some beneficial effects on game or recreational species

East Bridges and Center Fields (Sabine National Forest) - Even though some area is added for RCW and special areas, oil and gas should not be greatly affected Disturbance would be approximately 65 6 acres over the first 10 years, but reclaimation efforts would reduce the area left for production to about 26 acres

Laura Lavelle and Glen Rose Fields (Davy Crockett National Forest) - The estimated Federal wells will not be affected by the RCW emphasis area. The proposed wells as indicated would be drilled. Over the next ten years, approximately 36 acres and 40 acres respectively will be disturbed for a total of 76 acres After reclaimation only 54 acres is expected to be disturbed over the next ten years

Thornberry Field (Sam Houston National Forest, Raven Ranger District) - There are no wells expected to be drilled on Federal or private minerals in any alternative This field will not have any appreciable impact on the biological resources in this area

Coline, Coldsprings, and Mercy Fields (Sam Houston National Forest, San Jacinto Ranger District) - Same 32 acres are estimated to be disturbed during the first 10 years of the Plan Twelve acres will be reclaimed leaving 20 acres of mineral openings on this area

Boonsville Conglomerate Field (LBJ National Grasslands) - About 10 wells are anticipated to be drilled during the first 10 years of this plan The eventual area used for this production would be about 13 acres. This level of disturbance is not anticipated to have any significant impact on wildlife or vegetation

No known oil and gas fields exists on the Caddo National Grassland No impact from minerals activities is anticipated on the biological resources of this area in any alternative

ALTERNATIVE 4

Brookeland Field (Angelina National Forest) - Larger RCW emphasis areas, the Neches River corridor, and special areas will decrease oil and gas production The initial disturbance of the wells anticipated over the next ten years would be about 52 acres and after portions are reclaimed the area would be reduced to 27 acres

Brookeland and Saratoga/Annona (Sabine National Forest/Yellowpine Ranger District) - This alternative would reduce the area initially disturbed for oil and gas exploration Some 155 acres would be disturbed and reclaimation would reduce that area to about 66 acres The initial disturbance of 37 wells being drilled over the next ten years could impact vegetation and wildlife components of this longleaf pine dominated area, however due to lease stipulations (EIS Appendix C) this is expected to be of minimal consequences

East Bridges and Center Fields (Sabine National Forest/Tenaha Ranger District) - Whole Forest areas are added for RCW, along with special areas and other concerns, reducing oil and gas disturbance Total disturbance would be approximately 51 acres over the first 10 years, but reclaimation efforts would reduce the area left for production to about 21 acres

Laura Lavelle and Glen Rose Fields (Davy Crockett National Forest) - The estimated Federal wells will be affected by the RCW emphasis area. Fewer wells in the Laura Lavelle and Glen Rose Fields would be drilled Over the next ten years, approximately 31 acres and 32 acres respectively will be disturbed for a total of 63 acres After reclaimation only 44 acres is expected to be disturbed over the next ten years

Thornberry Field (Sam Houston National Forest, Raven Ranger District) - Same as 4a

Coline, Coldsprings, and Mercy Fields (Sam Houston National Forest, San Jacinto Ranger District) - Same 19 acres are estimated to be disturbed during the first 10 years of the Plan Twelve acres will be left in production after reclaimation

ALTERNATIVE 4b and 8

Brookeland Field (Angelina National Forest) - The initial disturbance of the wells anticipated over the next ten years would be about 69 acres and after portions are reclaimed the area would be reduced to 36 acres

Laura Lavelle and Glen Rose Fields (Davy Crockett National Forest), Coline, Coldsprings, and Mercy Fields (Sam Houston) and Boonsville (Grasslands)Fields- Same as 4

East Bridges and Center Fields (Sabine National Forest/Tenaha Ranger District) - Same as 4a

Brookeland and Saratoga Fields (Sabine National Forest/Yellowpine Ranger District) - The initial disturbance of wells being drilled over the next ten year would be about 270 acres that would be reduce to about 85 acres in production after reclaimation

ALTERNATIVE 5

Brookeland Field (Angelina National Forest), Laura Lavelle and Glen Rose Fields (Davy Crockett National Forest), Coline, Coldsprings, and Mercy Fields (Sam Houston) - Same as 4a

Brookeland and Saratoga (Yellowpine Ranger District) - Same as 4.

East Bridges and Center Fields (Sabine National Forest/Tenaha Ranger District) - Same as 4a

Boonsville Conglomerate - National Grasslands - No leasing occurs in Alternatives 5, 6, and 7 Existing leases and development may approximate up to 9 acres of development over the first 10 years, with about 5 acres dedicated to production

ALTERNATIVE 6

Maximum Special Area and Wilderness Alternative 6 focuses on no leasing. Drilling would still occur on lands that are already leased but would taper off as the active leases expire Area allowed for production in this alternative would be about 14 acres/decade on the Brookeland Field (Angelina National Forest), 18 acres/decade on the Laura Lavelle and Glen Rose Fields (Davy Crockett National Forest), 48 acres/decade on the Sabine, and 4 acres on the Coline, Coldsprings, and Mercy (Sam Houston) Fields

ALTERNATIVE 7

Brookeland Field (Angelina National Forest) - Under Alternative 7, Federal wells would be greatly affected by wilderness and special area designations The Brookeland field Austin-Chalk formation is drilled horizontally but the sites would be hard to get outside of the wilderness area Under this alternative no wells would be drilled with about 4-5 acres left in production

Brookeland, Saratoga, East Bridges and Center Fields (Sabine National Forest) - Approximately 32 acres left in production

Laura Lavelle and Glen Rose Fields (Davy Crockett National Forest);Thornberry, Coline, Coldsprings, and Mercy Fields/Sam Houston National Forest - Same as Alternative 4a

Social Environment – Recreation

Some of the major affects from oil and gas activity involve more roaded access to currently primitive or semi-primitive non-motorized areas This access will create increased sounds when activity is to close to trails, roads and other recreational areas Roads and pipelines may cross use areas such as trails These occurrences would have negative visual impacts if within view of the trail or camping area Restrictions to recreational use, or less primitive settings may result

Sam Houston National Forest and Caddo/LBJ Grasslands are managed as Forests with a special urban emphasis, and have more exposure and sensitivity to visual impacts and conflicts with recreational uses The

ROS (Recreational Opportunity Spectrum) and VQO would be changed in the general vicinity of well sites and their access roads

The south side of the Angelina National Forest has a more concentrated use and larger number of special management areas than the north side Oil and gas activities in this Brookeland Field (Angelina National Forest) area will create more impacts on the south

Socioeconomic Considerations

Oil and Gas activities on the NFGT have not been as great an impact on County returns as has timber production, however, oil and gas activity does produce between $250,000-$300,000 annually for counties within NFGT Total returns to the U S Government from NFGT activities were approximately 8 million dollars in 1993. The NFGT is credited with 12 1/2 percent or just over 1 million dollars in 1993 from oil and gas activities Based on the one million dollar NFGT credit 25 percent was returned to counties ($272,000) in 1993 The returns from oil and gas have a more significant impact on Grasslands Counties Other benefits from oil and gas production are secondary jobs initiated from production efforts on active leases These jobs are directly correlated to mineral production (or about 20 jobs created for every million dollars in exploration) and to mineral refinement (or 3 jobs for every million dollars of oil/gas refined)

In an attempt to model the impacts of the reasonably forseeable oil and gas development by alternative, specific information relative to the scenario as discussed RFD was applied to FORPLAN II and IMPLAN (see Appendix B for details) In all alternatives the estimated returns to the counties are considered optimistic due to the way in which FORPLAN calculations were developed. Models generally consider a "perfect case" scenario where no restrictions exist from budgets, man-power, and legal or administrative activities which impact or reduce the ability to produce As in the estimated timber volume, the outputs are considered "perfect case" scenario (without impacts from budgets, personnel, legal, and environmental concerns which have not been entered into the equations) Appendix E discusses the development of these estimated outputs in detail

ALTERNATIVES 1, 2, 3, and 4a

It is anticipated that these alternatives would be closest to existing returns to the treasury and subsequent county benefits The production activities would have similar secondary employment impacts locally as currently exists Exploration and leasing would be similar Alternative 1 is estimated at $438,000 total returns from oil and gas activities after the first decade, Alternatives 2 through 4a are $435,000 These alternatives are projected to display a slight (10 percent) reduction in oil and gas proceeds over the 50 year horizon

ALTERNATIVE 4

Reduction in oil and gas leasing related to production would be approximately 5 percent within this alternative the first decade Total returns to the counties would be approximately $418,000 during this period, but the trend would be a general reduction of about 20 percent through the first 50 years

ALTERNATIVE 8 and 4b

If the wells were drilled as predicted in this alternative, counties would receive about $424,000 This is about only a 3 percent reduction from what the current or no action alternative would predictably generate These production estimates trend downward through the fifth decade, however, fully about 30 percent below the current alternative

ALTERNATIVE 5

In Alternatives 5, 6, and 7 leasing does not occur on the Grasslands Under Alternative 5 there is less commodity production, the emphasis is on special areas, uneven-aged management, RCW, and primary recreation and wildlife The returns to the treasury would be very similar to 4b with about $424,000 returned to the counties This situation in as in Alternative 4b would slowly decline in future decades due to the lease stipulations

ALTERNATIVE 6

With maximum Special Area and Wilderness, Alternative 6 focuses on no leasing Drilling would still occur on lands that are already leased but would taper off as the active leases expire The money from royalties and business in the local communities will not be generated There may be less additional jobs and salaries that are typically associated with oil and gas industry Industry will move from Federal surface and drill on private land and drain the Federal interests with more surface disturbance on private

This alternative would return just less to the treasury as 4b and 5 through the first decade, but as leases expire and new exploration is curtailed these returns will gradually shrink County returns would drop substantially by the the fifth decade to about 60 percent ($354,000) of the predicted levels in Alternative 1, period one The production may initially compare with what is in Alternative 7 near the end of the first period, but drilling would continue to taper off

ALTERNATIVE 7

With many Special Areas and Wilderness, Alternative 7 focuses on low impact One third of the forests would focus on wilderness, botanical research and natural areas Management Area 2, which focuses on Standards and Guidelines for the RCW, will have fewer acres available to lease This could affect activity during nesting season and some well sites may need to be relocated to SPB spots or storm damage areas to avoid creating additional openings

There would be less drilling on Federal surface under this alternative compared to all alternatives except 6 There will be fewer additional jobs and salaries that are typically associated with oil and gas industry Returns to the treasury and subsequent county returns would be just over $390,000 annually through the first decade These proceeds would continue a downward trend, and by the fifth period production would yield less than 45 percent of what could be expected in the no-action or current alternative

Part III (a)
The Socioeconomic Environment

Social and Economic Setting

Affected Environment - Forests and Grasslands

The forests of East Texas and the grasslands of North Central Texas play a significant role in the economic, social, cultural, and political environment of the state The U S Forest Service manages a significant portion of these forests and a small but important part of the Grasslands that are collectively called the National Forests and Grasslands in Texas (NFGT) Many local communities rely on the employment and income generated from the use of Forest and Grassland resources A measure of stability is derived from a continuous supply of timber being available for harvest from the forests, even though supply is not the only determinant of stable markets Income and employment are also derived from people traveling through communities on their way to use the Forests or Grasslands for recreation and other purposes An awareness of tourism's importance as a source of future economic and social activity for communities in East Texas is growing

In addition to economic activity, the quality of people's lives is greatly enhanced by the physical environment associated with the Forests and Grasslands A diversity of vegetation, wildlife, and other resource opportunities provide for a variety of quality recreation experiences, and the many scenic and other attractions provide an attractive place to live and work

All of these goods, services, and uses have value to the people who live in the area Changes in the quantity or quality of these attributes affect their lives With a limited resource base and increasing demands from a growing population, conflicts or issues related to the relative values of different goods, services, and uses are bound to arise

A socioeconomic study was initiated in 1990 to look at social and economic indicators in order to understand the environment within which decisions concerning practices and policies on the NFGT are made This summary highlights some of the major points discussed in that report More information can be found in the NFGT Socio-Economic Overview (Albers 1990) which is available for review in the planning records at the Supervisor's Office in Lufkin, Texas

Geographical Scope

Texas covers 266,807 square miles and contains 23 million acres of forested land East Texas, which is 55 percent timbered, includes 95 percent of the 12 million acres of productive timberland in the state The NFGT cover 673,926 acres including about 5 percent of the productive timberland in the State

The Angelina, Davy Crockett, and Sabine National Forests lie within eight counties of rural east Texas, where the economy is based on natural resources Yet, these forests are within a few hours of Houston, the fourth largest city in the United States

The Sam Houston National Forest lies within 55 miles of downtown Houston This forest covers roughly 60,000 acres in rural San Jacinto County, nearly 48,000 acres in fast-growing Montgomery County, and about 54,000 acres in relatively urban Walker County Population levels in the counties which encompass the Sam Houston National Forest are high, and fast growing, due to the proximity of the city of Houston

The Lyndon Baines Johnson (LBJ) and Caddo National Grasslands are located in three rural counties in north central Texas, where the population density averages 30 persons per square mile The economy of these counties is based primarily on livestock production and oil and gas exploration Both the LBJ and Caddo are within a two-hour drive of Dallas and Fort Worth, where 22 percent of all Texans reside

Demographics

The population of Texas is predominantly young and ethnically diverse Among the 10 most populous states, Texas has the largest share of residents under-age 25 and the smallest share of residents over age 45 Texas is ethnically diverse 63 percent Anglo, 12 percent African-American, and 23 percent Hispanic Yet, demographic characteristics vary markedly from rural to urban areas Population growth rates also vary and are highest in the urban areas

The population in the area encompassing the Angelina, Davy Crockett, and Sabine National Forests is older and less ethnically diverse than the State as a whole In Sabine, San Augustine and Trinity Counties, more than 20 percent of the residents are over 65, compared to only 10 percent statewide The population in this area is 77 percent Anglo, 19 percent Black, and 3 percent Hispanic However, ethnic diversity is projected to increase, by the year 2025 Angelina County, the most ethnically diverse county in the area, is projected to be 61 percent Anglo, 14 percent African-American, and 24 percent Hispanic

The Sam Houston National Forest is located in a more urban setting than the other National Forests Montgomery, Walker, and San Jacinto Counties mirror statewide demographic trends typical of urban areas, Montgomery and Walker Counties have a young population while Walker County has high ethnic diversity Population growth rates are high in these counties, from 1980 to 1988 population growth rates exceeded 30 percent Montgomery County is projected to add close to 400,000 additional residents from 1990 to the year 2025, a 215 percent increase in population Walker County is projected to add more than 34,000 residents and San Jacinto will add close to 18,000 residents by the year 2025 Residents of Montgomery and Walker Counties are predominantly young, less than 8 percent of the population is over age 65, compared to 10 percent statewide Walker County, the most diverse of the three counties, is 69 percent Anglo, 21 percent Black and 8 percent Hispanic

The Houston Metropolitan Area, as defined by the State, includes one-third of the Sam Houston National Forest (Montgomery County). Houston is one of the 30 most ethnically diverse cities in the United States Over 3.5 million people currently reside in the Houston Metropolitan Area and the population is projected to increase to 7 million by the year 2025

Residents of the counties encompassing the LBJ and Caddo Grasslands are older and less ethnically diverse than more urban areas In Montague and Fannin Counties, over 20 percent of the population is over age 65 Wise County, the most ethnically diverse of these counties, is 7 percent Hispanic and is projected to be 22 percent Hispanic by the year 2025 From 1980 to 1988 Wise County experienced population growth rates of 30 percent while growth in Montague and Fannin Counties was less than 4 percent From 1990 to 2025 population growth is projected to be highest in Wise County (91 percent)

The Dallas and Fort Worth Metropolitan Areas, both within two hours of the Grasslands, are characterized by a young, ethnically diverse population In Collin and Denton Counties, less than 6 percent of the population is over age 65

Employment/Economy

In 1980, services (16 percent), manufacturing (15 percent) retail trade (15 percent) and State and local government (11 percent) were the largest employers in Texas By 1989, the four major sectors of employment were services (24 percent), retail trade (19 percent), manufacturing (14 percent) and State and local government (15 percent) The importance of the service sector, as a source of employment, has continued to grow Three-quarters of the new jobs created in Texas during the next decade will be in the service industries, yet, the importance

of various sectors of the economy varies tremendously from region to region

Manufacturing, which includes the forest products industry, is the largest sector of the economy in terms of employment and wages in Angelina, Jasper, Polk, Shelby, Newton and Sabine Counties The manufacturing of timber is a vital part of the Texas economy as well as the regional and national economy Texas wood-based industry is the ninth largest in the nation, and the fourth largest in the south Texas is third in plywood production, seventh in pulpwood, and twelfth in lumber production In 1981, the Texas wood-based industry had sales of $5 6 billion and indirectly contributed another $2 3 billion to the Texas economy

Timber, considered by many to be the most valuable agricultural crop in the south, is one of the top four cash crops in Texas. In 1984, almost 60,000 Texans were employed in the wood-based industry. An additional 228,000 Texans transport, sell, or use wood in other activities In 17 of the 43 East Texas counties, wood-based manufacturing is the largest of all manufacturing industries

In 1989 and 1990, unemployment rates in counties which encompass the Angelina, Sabine, and Davy Crockett National Forests ranged from 5 5 to 10 5 percent. Unemployment rates were slightly lower in the counties which encompass the Sam Houston National Forest and the LBJ and Caddo Grasslands Unemployment rates in San Jacinto, Montgomery, and Walker Counties ranged from 3.8 to 5 9 percent, while unemployment rates in the Grassland counties ranged from 4.9 to 6 7 percent

Income

Poverty rates are generally higher, and per capita income is lower in rural areas due to lower levels of education and lack of employment opportunities Poverty rates in counties which encompass the four National Forests range from 18 to 35 percent. The exception is urban Montgomery County, where the poverty rate is less than 9 percent Poverty rates in the Grassland counties range from 15 to 19 percent. In contrast, poverty rates in the urban metropolitan areas range from 3 to 18 percent

Per capita income in the Forest and Grassland counties are well below the State average with the exception of Montgomery County In 1988, San Jacinto ($8,832) had the lowest per capita income of the Forest/Grassland counties while Montgomery County ($13,811) had the highest per capita income and was close to the State average of $13,888 Per capita incomes in the counties which encompass the LBJ and Caddo Grasslands were below the State average. In contrast to the Forest and Grassland Counties, the per capita income in the metropolitan areas ranges from $11,193 to $19,155

Lifestyles

Outdoor recreation opportunities are abundant in Deep East Texas (1.919 acres per person) and developed recreation land (0 024 acres per person) is plentiful compared to other regions Roughly 15 percent of the total land area is available for recreation With over 440,000 surface acres of water contained in 30 large reservoirs, it is not surprising that 53 percent of residents participate in freshwater fishing Hunting and fishing are also traditionally popular activities and a recent study indicates hunting is the primary activity in wilderness areas

The National Forests, particularly the Sam Houston National Forest, are increasingly seen as an outdoor recreation destination by urban residents Lack of recreation land is a major concern to residents of Houston Both outdoor recreation opportunities (0 083 acres per person) and developed recreation (0 005 acres per person) are in great demand Consequently, areas such as Lake Conroe experience high visitor rates These and other high use recreation areas have already created positive economic benefits. Increased access to Lake Conroe and increased opportunities for other recreational activities could enhance tourism in the area Opportunities for off-road vehicle use are particularly limited, since the National Forests are the only public lands in the general area providing opportunities for this form of recreation

In the Dallas and Fort Worth area, outdoor recreation opportunities are limited (0 032 acres per person) and developed recreation (0 009 acres per person) is in great demand. The high population density (336.6 persons per square mile) makes overcrowding a problem at many recreation areas Forty-seven percent of resource based recreation by residents occurs outside the region. No other region has as large a percentage of residents leaving the home region to engage in outdoor recreation By the year 2025, the Dallas-Fort Worth and Arlington metropolitan area will have close to 6 million residents, further stressing recreation resources. The LBJ National Grasslands could provide quality recreation experiences to residents of Dallas, Fort Worth, and surrounding counties Hunting opportunities, in particular, are few and costly

In counties surrounding the Caddo Grasslands, recreationists from outside the region already outnumber local participants more than two to one Outdoor recreation land is comparable to other regions in the state (0 289 acres per person) and the region's supply of developed recreation ranks highest in the State (0 044 acres per person) Demand for leisure activities suited to older individuals will increase as the number of senior citizens retiring to the Lake Texoma area increases

The educational level of rural residents is generally lower than that of urban residents Sixty-two percent of the population in Texas has 12 years or more of schooling Of the forest counties, only Montgomery County (66 percent) exceeds the statewide average education level. In

Jasper, Wise, Angelina, Nacogdoches, and Walker Counties 52 to 61 percent have 12 or more years of schooling, and in the remaining counties, less than half of the residents have 12 or more years of schooling In contrast, at least half the residents in all nearby metropolitan counties have 12 or more years of schooling

Crime in rural areas is still less violent and less prevalent than in more urbanized areas, but this discrepancy is narrowing. The highest per capita crime rates are found in Dallas and Tarrant Counties with over 11,000 serious crimes per 100,000 residents Harris County also had a high crime rate with close to 7,000 serious crimes per 100,000 residents In Deep East Texas, crime rates are relatively low; serious crimes per 100,000 ranged from 5,000 in Angelina and Nacogdoches Counties to 1,500 in Sabine County The Grassland counties also have low crime rates in Wise County, there were 2,268 serious crimes per 100,000; while Montague and Fannin County had crime rates just over 3,000 crimes per 100,000 residents

Of the 12 counties which include National Forests, road usage is highest in Angelina and Montgomery Counties. Plans are currently underway for major reconstruction of Interstate 45 in Montgomery County The proximity of this major artery to the Sam Houston National Forest could have a tremendous impact on visitor accessibility, one of the major determinants in the success of any recreation area Recent interest has developed for construction of a completely new Interstate Highway 69 through East Texas, near Highway 59.

Receipts to Counties

Twenty-five percent of receipts from timber sales, recreation user-fees, and other revenue sources on the Forests and Grasslands are given to counties as grants and are to be used for education (50 percent) and roads (50 percent) During the last decade, the average annual payment to the 12 National Forest counties was $1,948,865 During this period, payments ranged from $1,519,025 in 1982, to a high of $4,194,180 in 1983 In 1987 payments totalled $3,753,309 and, on a per acre basis, were greater than the average per acre current-use tax paid by private timberland owners Payments going to schools represented less than one percent of the 1988-89 school budget in all counties except Houston, Sabine, San Augustine and Trinity, where payments comprised as much as 4 percent of the school budget The proportion of payments going to county roads in 1990 was less than 4 percent in all counties except Houston, Sabine, San Augustine, Shelby and Trinity, where payments accounted for as much as 35 percent of the road and bridge budget.

Summary

Significant demographic differences are found between urban and rural residents which could influence demands from the National Forests and Grasslands Urban residents are young and ethnically diverse while rural areas have populations which are significantly older and show less ethnic diversity The population of counties which encompass the Angelina, Sabine, and Davy Crockett National Forests and the LBJ and Caddo Grasslands are older and less ethnically diverse than the population of Texas as a whole Residents of Montgomery and Walker counties, by the Sam Houston National Forest, show demographic characteristics typical of urban areas and are younger and more ethnically diverse than the other Forest and Grassland Counties Montgomery and Walker Counties, as well as Wise County which encompasses the LBJ National Grasslands, have experienced and are projected to continue to see high rates of growth and change in their ethnic diversity and age characteristics

Differences in income and employment are found between urban and rural areas In general the Forest and Grassland counties have lower per capita incomes and higher poverty rates than more urban counties Many of the Forest Counties depend heavily on wood based manufacturing, while the service industry, already the largest employer in Texas, is expected to grow considerably in the next decade

The availability of outdoor recreation opportunities varies from region to region Outdoor recreation opportunities are abundant in Deep East Texas. In contrast, outdoor recreation opportunities and developed recreation opportunities, in the Gulf Coast region (includes the city of Houston and Walker and Montgomery Counties) and the North Central region (includes Dallas/Ft Worth and Wise County) are less than in the Deep East Texas region Outdoor recreation opportunities in the Texoma region (includes Caddo National Grassland) are comparable to levels found statewide and per capita developed recreation opportunities are among the highest in the state

Educational attainment levels in all Forest and Grassland counties, except urban Montgomery County, are below the statewide average and below educational levels found in most metropolitan counties Crime rates in the rural Forest and Grasslands counties are low, roughly 1/3 to 2/3 of the crime rate found in the metropolitan areas Receipts to the counties from forest revenues comprise up to 4 percent of the school budgets in Houston, Sabine, San Augustine and Trinity Counties These receipts constitute a more significant portion of the county road and bridge budget, comprising up to 35 percent of the budgets in Houston, Sabine, San Augustine, Shelby and Trinity Counties during the years examined

The rural Forest and Grassland counties are significantly different than nearby metropolitan areas and the state as a whole These counties have more abundant outdoor recreation opportunities, lower crime rates, less

ethnic diversity, more poverty, an older and less educated population, and a lower per capita income The manufacturing sector, which includes the forest products industry, is the major economic base in many rural counties while statewide the services sector is most important Montgomery County, and to a lesser extent Walker and Wise Counties, straddle this urban/rural interface and consequently, are intermediate in most of these aspects Counties which encompass the Sam Houston National Forest show many demographic characteristics typical of urban counties

Environmental Consequences of the Alternatives (Social and Economic)

The social and economic environment that surrounds the Forests and Grasslands will be affected as a consequence of implementing any of the proposed alternatives Change will occur through various direct and indirect effects on the communities, industries, and people that rely on them for employment, recreation, and other goods and services

The intent of the Forest Service management was stated shortly after the turn of the century as "the greatest good for the greatest number in the long run " It essentially means that the National Forests were established not for any single group, industry, or individual, but rather for the present and future benefit of the people of the United States This sort of utilitarian philosophy has been the guiding principle of National Forests and Grasslands management ever since Thus, both local and national issues and concerns are considered in Forest Service policies and decision-making

Management of resources affects many of the people and communities and around the counties which make up the Forests and Grasslands primary area of influence. The alternatives, which show different combinations of management options, will have certain impacts or effects on people who are employed by the Forest Service, those who work under contract for the agency, and businesses that use or renew the many resources The counties receive monies equivalent to 25 percent of the gross timber receipts in lieu of taxes that could be generated from National Forests or Grasslands lands The counties also receive 25 percent of the total revenues derived from other resource uses on the public lands, including campground receipts and grazing fees There is also a direct effect on recreation users, including individuals, families, and organized groups These people use the Forests and Grasslands for a wide variety of recreation opportunities that vary from wilderness to developed campgrounds The opportunities for participating in these leisure activities vary by alternative

The socioeconomic environment is affected by changes which are subtle and quite often difficult to measure These are indirect impacts which include expected changes in secondary employment due to changes in

direct employment Thus, the car dealer or grocery store may be affected by changes in the number of sawmill or Forest Service workers that are employed. Likewise, the employment and projects partially supported by the county monies will have indirect impacts that are real, but difficult to quantify Feelings of satisfaction with the local area influences citizen's beliefs, attitudes, leisure activities, and enjoyment of their work These are considered to be indirect because of the many other factors that may influence the people in an area more directly These include home mortgage interest rates, availability of work, hourly wages or salaries, family ties, savings, and amount of leisure time

The range of alternatives shows considerable variation in the resource outputs that can have an impact on the socioeconomic environment. For example, in one alternative the amount of timber to be sold could be 50 percent less than current volumes, while available recreation opportunities increase Effects may include a reduction in available jobs associated with timber harvesting, and county revenues and potential increases in recreation use if the alternative were implemented The secondary impacts would also be estimated in terms of the types of businesses that rely on income from timber processing employees, as well as aspects of the community that would benefit through an increase in recreation visits to the area

There are several basic factors that vary by alternative, with respect to their impact on the socioeconomic environment They are (1) jobs, which are heavily influenced by the amount of timber sold and subsequently harvested, (2) income, which is affected by dollar flows throughout the country; (3) payments to the counties which affect county funding, especially for schools and roads, (4) lifestyles, reflected in the amount of recreation opportunities, and (5) community cohesion, which reflects the amount or type of natural resources or management issues which pull together or split the communities

The Forest Service has the potential to affect the total number of jobs in its area of influence as a result of the mix and level of goods and services provided in each alternative The assumption in estimates of job impacts is that other supply and demand factors affecting the "markets" for forest products and uses are constant This assumption becomes more tenuous the further out in time projections of effects are made For example, the amount of timber offered for sale by the forest is not, and will not be, the only factor to affect the number of jobs in the timber industry. The timber industry is in a time of transition and the amount of workforce required per unit of output has decreased in some areas due to modernization of mills. Additional factors include union and non-union wage and benefit agreements, interest rates for home mortgages and business loans, closing of mills that cannot make a profit, import and export levels, production and shipping costs, regional competition, private and public land harvest levels and policies, volatility of the lumber, plywood, and chip markets, and estimating

what the availability and price of raw materials and finished products will bring

The number of jobs associated with each alternative was estimated using an input-output model called IMPLAN The data base in IMPLAN represents 1990 county information for 528 economic sectors In this model, job estimates are a function of changes in final demand resulting from changes in output levels. Changes in output or activity levels initiate expenditures in various sectors of the local economy which trigger the change in jobs and income Job and income effects are based on changes in four major outputs the amount of timber volume expected to be harvested; recreation use, payments to counties, and Federal government expenditures

Two impact areas exist for the National Forests and Grasslands in Texas They are those counties containing portions of the National Forests and those counties containing portions of the National Grasslands

National Forest Counties		National Grassland Counties
Angelina	Sabine	Fannin
Houston	San Augustine	Wise
Jasper	San Jacinto	Montague
Montgomery	Shelby	
Nacogdoches	Trinity	
Newton	Walker	

While these counties receive revenues from the National Forests and Grasslands in Texas as well as visitors to these areas, other metropolitan areas are also impacted The cities of Beaumont, Dallas, Ft Worth, Houston, and Tyler also benefit from their proximity to the National Forests and Grasslands in Texas

The socioeconomic consequences of the alternatives presented here need to be viewed as relative indicators of change rather than assessments of absolute changes that would occur in the social impact area. These predicted changes would have validity as absolute indicators only if no other factors were acting upon this economy. The analysis techniques are discussed in Appendix B where additional economic data may be found

The following table displays the changes in employment and income that could occur as a result of the management practices and policies contained in the alternatives Changes in employment and income are in comparison to current management as reflected in Alternative 1

Change in Employment and Income by Alternative

Alternative	Employment	Income (MM$)
1	0	0
2	+596	+21.211
3	+469	+17 483
4	-277	-12 758
4a	+110	+1 574
4b	-84	-7.230
5	-493	-16 891
6	-1144	-37.747
7	-948	-35 787
8	+201	+ 4 271

Estimated employment for current management for Alternative 1 is 4,765 jobs and an estimated $15,874,000 of total income is generated annually in the forest impact area

Twenty-five percent of receipts collected for the use of the forest land is distributed to counties that contain forest land The funds are earmarked for roads and schools

From 1986 through 1993, the 15 counties in Texas containing Forests and Grasslands have received the payments shown in the following table

Payments to Counties from 1986-1993.

Year	25 Percent
1986	$3 6 million
1987	$3 7 million
1988	$2 7 million
1989	$2 0 million
1990	$2 4 million
1991	$2 5 million
1992	$3.5 million
1993	$3 6 million

The following table displays the estimated 25 percent fund as a result of the management practices and policies contained in the alternatives

Estimated Annual 25 Percent Fund by Alternative for 1st Period.

Alternative	Millions of Dollars*
1 (Current)	$5 581**
2	$6 626
3	$6 295
4	$5 042
4a	$5.728
4b	$5 538
5	$4 537
6	$3 079
7	$3.862
8	$5 889

*Includes all dollars, minerals/recreation/timber/and range

**Based on 1987 Plan Allowable Sale Quanity (ASQ) with adjustment for court ordered 1,200-meter RCW guidelines

Present net value (PNV) calculations are required according to 36 CFR 219 12 (e)(f)(g)(h) and (j), and are used to measure economic efficiency of each alternative PNV is the sum of priced benefits minus the sum of costs for the 150-year planning period, discounted to the present PNV does not include all costs and benefits, however Some of the more important nonpriced benefits include ecosystem diversity, habitat for threatened, endangered, or sensitive species, water quality, and scenic quality The following table displays the selected analysis by alternative and benchmarks required in FORPLAN modeling for present net value, present net benefit, present value of costs, and cost benefit ratios.

ALT/BM	PNV	PNB	PVC	BEN/COST RATIO
MAXPNV	2189	2809	620	4 531
MAXTMB	2066	2725	659	4 135
ALT #1	1989	2495	506	4 931
ALT #2	1940	2536	596	4 255
ALT #3	1919	2524	605	4 172
ALT #8	1815	2453	633	3 875
ALT #4A	1789	2444	655	3 731
ALT #4B	1738	2390	652	3 666
ALT #4	1689	2333	644	3 623
ALT #5	1683	2265	582	3 892
ALT #7	1548	2132	584	3 651
ALT #6	1543	2043	500	4 086
MINLVL	1462	1815	353	5 280

SUMMARY OF ECONOMIC TRADEOFFS BY ALTERNATIVE

		JOBS	INCOME MM$		JOBS	INCOME MM$
TMB PROCESS	ALT 1	2235	78 492	ALT 2	2714	96 455
TMB EXPEND		106	3 532		126	4 198
25% FUND		304	7 703		360	9 145
RECREATION		2094	60 342		2130	61 354
PURCH.CREDIT		27	0 806		32	0 934
TOTAL		4765	150 874		5362	172 085
TMB PROCESS	ALT 3	2599	93 025	ALT 4	1877	63 315
TMB EXPEND		130	4 306		118	3 928
25% FUND		342	8 687		274	6 958
RECREATION		2130	61 354		2171	62 509
PURCH.CREDIT		33	0 985		47	1 406
TOTAL		5234	168 357		4488	138 116
TMB PROCESS	ALT 4A	2211	76 140	ALT 4B	2036	67 910
TMB EXPEND		135	4 490		128	4 271
25% FUND		312	7 905		301	7 642
RECREATION		2171	62.509		2171	62 509
PURCH.CREDIT		47	1 405		44	1 311
TOTAL		4875	152 448		4681	143 644
TMB PROCESS	ALT 5	1795	62 960	ALT 6	1253	45 143
TMB EXPEND		97	3 229		67	2 232
25% FUND		247	6 261		167	4 249
RECREATION		2100	60 515		2101	60 548
PURCH.CREDIT		34	1 018		32	0 958
TOTAL		4272	133 983		3621	113 129
TMB PROCESS	ALT 7	1377	45 001	ALT 8	2308	79 117
TMB EXPEND		104	3 469		125	4 158
25% FUND		210	5 330		321	8 126
RECREATION		2101	60 532		2171	62 509
PURCH.CREDIT		25	0 754		41	1.235
TOTAL		3817	115 087		4966	155 145

DIFFERENCE FROM ALTERNATIVE 1 (NO ACTION ALTERNATIVE)

	ALT 2	ALT 3	ALT 4	ALT 4A	ALT 4B	ALT 5	ALT 6	ALT 7	ALT 8
JOBS	596	469	-277	110	-84	-493	-1144	-948	201
INCOME (MM$)	21 211	17 483	-12 758	1 574	-7 230	-16 891	-37 747	-35 787	4 271

Part III. (b)
The Socioeconomic Environment

Dispersed Recreation Uses

This section of the Socioeconomic Environment provides a discussion of the various uses and values that attract users to the National Forests and Grasslands in Texas (NFGT) Recreational settings occur throughout the NFGT providing a range of recreation or leisure opportunities through numerous dispersed recreation facilities, or just natural undeveloped landscapes. Settings range from dense thicket type forests to open prairie grasslands on about 675,570 acres

Users are attracted to the NFGT by areas established as wilderness, scenic, and wildlife management areas along with the general national forest environment incorporating trails for hiking, horseback, and motorbikes, or all terrain vehicles Forests and Grasslands scenery, heritage values, and unique ecosystems provide enjoyable open spaces for people's leisure activities These open spaces provide therapeutic relief to persons working in highly developed urban areas

The Forests accommodate a variety of dispersed recreation activities including hunting, camping, picnicking, fishing, swimming, hiking, horseback riding, off-road vehicle (ORV) use, mountain biking, shooting, driving for pleasure, firewood gathering, wildlife viewing, viewing scenery, boating, canoeing and gathering of forest products

Accessibility by all users regardless of physical capability is an important aspect of providing dispersed recreation facilities and activities as well as at the more developed facilities. As a public agency, the Forest Service is required by law to provide facilities that are accessible by people with disabilities

In order to meet the June 26, 1990 Americans with Disabilities Act (ADA) standards, all recreation sites will require some type of modification or replacement of facilities, over time. Not all facilities and/or activities will require the same type of modification There are four levels of accessibility, ranging from easy to most difficult These levels of difficulty will be tied to the Recreation Opportunity System (ROS) The levels of difficulty will normally relate to ROS as follows Rural - easy, Roaded-Natural - moderate, Semi-Primitive - difficult, and Primitive - most difficult

Increased public use of the National Forest System has created conflicts between users who compete for the limited resources Before the 1970's,

the foremost law problem of the NFGT was arson Today, many serious crimes are being committed against Forest users Crimes formerly considered urban type offenses now occur on the NFGT

Law enforcement officers are assigned to Ranger Districts and criminal investigators are available to the Forest Supervisor Each field officer completes a minimum of 240 hours of law enforcement training to serve as a fully qualified technician In addition, cooperative agreements with local law enforcement offices provide additional enforcement assistance This provides a minimal protection level, however, additional law enforcement presence would assure better user safety

Interpretive services activities and programs are designed to enhance a visitor's interest, enjoyment, appreciation, and understanding of the natural environment of the NFGT Interpretive needs will not change through the alternatives The opportunities for providing interpretation will increase as the number of recreation facilities increase

Recreation Supply and Demand

Recreational use on USFS lands and particularly the NFGT continues to grow in importance and visibility Accurate planning for future recreational development and management should be based on a thorough review of the full recreational supply and demand situation from a national, regional, state and local level The following discussion summarizes the recreational supply and demand situation on the NFGT and is based on extensive documentation from the AMS, the Socio-Economic Report (Albers 1991), and the RPA

Supply Summary

Recreation supply can be defined as the amount of recreational trips available at a certain time and place to an individual The supply of recreational trips is a function of many factors including the availability of recreational facilities and resources available to potential visitors such as transportation, equipment, technology and personal skills, knowledges and abilities

Approximately 2,010,400 acres of parkland (developed and undeveloped) were provided by federal agencies in Texas The NFGT comprises just over 675,000 acres or about 1/3 of Federal "parklands" open for public recreation In general, the U.S Fish and Wildlife Service and the National Park Service offer more primitive recreation activities prohibiting activities which require motorization or development, with the U S Forest Service slightly more developed, and the Corps of Engineers having the most developed facilities The state of Texas provides an additional 30 percent of the recreational land in the state with 1,120,434 acres of land The remaining 1/3 is comprised of a number of counties, cities, and other local entities or the private sector

The NFGT provides a substantial variety and amount of recreational opportunities on Texas's 1/3 federal parklands These recreational activities are best summarized in terms of identifiable activities Recreational trips are defined on NFGT in 12 hour "recreational visitor days" (RVD's); or specifically for hunting and fishing as "wildife and fish user days" (WFUDS) NFGT survey data indicates that fishing was the most popular activity in fiscal year (FY) 1990, as 805,200 RVD's occurred The next most common activity on the NFGT was camping, at 448,600 RVD's The third most frequently occurring activity on the NFGT was hunting at 248,800 RVD's Motorcycle and scooter travel accounted for 129,600 RVD's. Power boating and viewing scenery each resulted in 67,000 RVD's Accounting for 56,100 and 49,600 RVD's were picnicking and automobile travel, respectively

Demand Summary

The estimated expenditures of Texans for recreation equipment in 1987 was $1,045,953,000. The typical American family may be smaller, with more discretionary income, but less free time. The result will be shorter, but more frequent, planned vacations With the aging population, lifetime activities will gain in popularity such as walking for pleasure and nature study More people in Texas participate in walking for pleasure than any other outdoor recreational activity Although only a predicted 19 percent occurs on trails Some other popular activities are picnicking, swimming, fishing, camping, boating, hunting, nature viewing, off-road vehicle riding and horseback riding

The Texas Outdoor Recreation Plan (TORP) ranks projected participation in many outdoor recreation activities The projections are driven primarily by population growth Life-time activities, such as walking for pleasure and nature study, will make slight gains in participation (15 percent each from 1990 to 2000) as they attract participants from all ages. Activities projected to increase at 13 percent include freshwater fishing, camping and hiking The activities projected to increase at 12 percent are hunting and horseback riding Picnicking and ORV riding are projected to increase by 11 percent each, and freshwater swimming will only increase 10 percent if the projections are correct (AMS 1992)

The RPA Assessment depicts the national projection of recreationconsumption by activity to the year 2040 if recent past trends of recreational opportunities are continued.

The growth of ***land-based trips*** is projected to accumulate across activities to about 15 percent by the year 2000 The expected consumption by the year 2000 of land activities which occur on the NFGT includes backpacking (+24 percent), day hiking (+23 percent), developed camping (+20 percent), walking for pleasure (+16 percent), photography (+15 percent), horseback riding and sightseeing (+14 percent), pleasure driving and picnicking at 10 percent each, primitive camping

(+8 percent), wildlife observation (+7 percent) and nature study (-1 percent)

The expected consumption of ***water-based activities*** which are projected to grow most rapidly includes canoeing (+13 percent), lake swimming(4 percent) and motor boating (+7 percent)

Considering the forecasted number of trips, the most popular recreational activities by the year 2000 will be day hiking, warm water fishing, developed camping, walking for pleasure and sightseeing

Conclusions

Most pressures will be on supply of areas and facilities for physically active pursuits, particularly warm weather activities on roaded, partially developed lands near population centers. Other pressures will be for nonconsumptive uses such as walking for pleasure, day hiking, wildlife observation and nature study The continual discussion and difficulty during this and any planning decision is evaluation of trade-offs, commodity versus amenity, timber production versus aesthetics. These issues are all the real key to ecosystem management and NFGT ability to assure long term sustainability and enjoyment of our resources

National Forests near urban areas represent one of the most important opportunities to meet the increasing demand for outdoor recreation closer to people's homes. Urban forests will also be able to reach an ethnically diverse audience. Better information about outdoor recreation opportunities, partnerships with local government and private entrepreneurs, education of the visitor, facility upgrades, and intensified management can improve the accessibility of these opportunities. Overcrowding and user conflicts such as conflicting uses between hunters, hikers and ORV riders will intensify in the future Educating users and managers, redistribution of use concentration, and greater use of volunteers is needed The alternatives address various levels of these demands and and trade-offs Some alternatives emphasize recreation and aesthetics at the expense of production, these concerns are the heart of any decision making process

Affected Environment - Forests and Grasslands

Motorized Uses

Driving for pleasure has long been recognized as one of the most popular dispersed recreation activities on National Forest land Whether users tour on paved roads and highways or are four-wheeling on rough roads, the NFGT offer a variety of experiences to the visitor

Licensed drivers of off-road vehicles (ORV) are allowed on NFGT roads that are open for public travel, provided the vehicle and the operator are

in compliance with state motor vehicle laws A number of NFGT level "D" roads provide a challenging off-road experience These roads are typically narrow, curving, and/or infrequently maintained, and some may be seasonally opened for hunting

ORV use off designed roads is currently prohibited on the Caddo and Lyndon Baines Johnson (LBJ) National Grasslands to stop the excessive erosion from occurring No designated ORV trails exist on the Grasslands The most serious erosion occurred on the LBJ unit of the Grasslands on the fragile limestone based soils Much of the damage done prior to 1976 is still visible today

The Grasslands are relatively small in comparison to Forest acreage (LBJ 20,313 acres, Caddo 17,785 acres) and has very fragmented ownership If ORV use was allowed, it would become very concentrated, and potential conflicts with other users, private land owners, and resource damage (i e., soil and water, wildlife and vegetation) would be high

Most ORV use occurs on the west side of the Sam Houston and southern Angelina National Forests Approximately 55 miles of designated ORV trails are located on the western part of the Sam Houston NF, these are designated for motorcycles and all-terrain vehicles including four-wheelers less than 50 inches in total width Also, an open area of approximately 14,000 acres is designated for the same type of ORV's. The open area and the 55 miles of designated trails were officially recognized in 1976; but prior to that date and since that time, many other trails have evolved creating what is now a maze of trails crisscrossing the western part of the district These are not officially recognized and are estimated to be in excess of 250 miles

The Angelina National Forest is managed as "open cross-country" and with substantial ORV activity, this has created an estimated 300 miles or more of trails in the Longleaf Ridge or Boykin Springs area These existing trails include some level "D" roads, but primarily they are comprised of old logging trams, firelines and woods trails. Concerns over increasing ORV use of these trails and soil erosion have been identified

The Davy Crockett and Sabine National Forests are managed as "open cross-country", except for special areas closed to ORV use Closed areas include wilderness, scenic areas, developed recreation areas, administrative sites, utility corridors, special management areas, sensitive soils areas, and other areas that may be administratively closed by the Forest Supervisor for resource protection

The management problem caused by "open cross-country" use is the basic lack of control This lack of control causes conflicts in uses, soil and water degradation, wildlife conflicts, safety and protection, and law

enforcement. Statistics indicate Texas has approximately 61 motorcycles per 1,000 public acres, which is a relatively high number compared to such states as California with 8.7 motorcycles per 1,000 public acres This is created by the relatively low 2.1 percent of land in the state being in public ownership of which 20 percent is National Forest The impact of less public land per capita in itself increases demand for open space to be utilized for such uses as ORV recreational needs which accentuate the demand on the National Forests in Texas

Many trails on the Angelina and Sam Houston National Forest are very close or possibly encroach upon sensitive, threatened, and endangered species such as the red-cockaded woodpecker (RCW) Management of the RCW, adds further resource concerns that limit ORV access, as the court decision (Sierra Club v United States, case No L85-69-CA, dated October 20, 1988), where ORV's were either limited or prohibited from RCW sites The Endangered Species Act of 1973, protecting endangered species, takes precedence over recreation uses.

Some stream bank crossings show signs of soil movement creating gullies two and three feet deep leading to the stream Trails in other areas have trenches one to two feet deep where water running down the trail erodes exposed soils Few rock or gravel stone are found in the soils that could help reduce ORV impact Through a Challenge Cost-Share Agreement with the Trail Riders of Houston, stream crossings on the permanently marked trail system are being reinforced with concrete blocks

The Angelina National Forest is the second most used area by ORV's, but it has no designated trail system All use on the Angelina is open cross-country, utilizing a maze of existing trails Although motorcyclists and some four-wheel drive enthusiasts (OHV) have created a large network of trails concentrated in the Boykin Springs Area, none of these trails have been formally designated

Four-wheel drive vehicles, as off-road vehicles, have been limited mostly to hunters using Level D roads constructed for timber sales and other system roads in all areas except the southern Angelina National Forest

Non-Motorized Uses

Approximately 240 miles of trails designed for hiking, horseback riding, mountain biking, backpacking, and canoeing are located throughout the four Forests and two Grasslands Most of the NFGT trails were not built to regional standards, but they are usable and safe for their intended use. Trail maintenance levels are below that prescribed at the current level and also below the level that is needed to fully maintain the trail system to regional standards Consequently, the condition of some of the trails on the NFGT system are slowly declining. The maintenance shortfalls have not resulted in the closure of any trails

because volunteers from various groups have kept resource damage to a minimum

The trail systems were originally planned and designed to provide a representative cross section of a managed forest environment. It was designed to work in harmony with other resource management activities, while neither dominating nor being subordinate to them. It was recognized that this would involve compromise between trail management and other resource management and activities

The greatest apparent demand for non-motorized use trails is for horses and mountain bicycles The existing designated non-motorized trail system provides 188 miles of hiking trails and 52 miles of horse trails The only mountain bicycle trails are within the Double Lake Recreation Area and are considered part of the developed facilities.

The trails which comprise the NFGT hiking trail system are· the 127 mile Lone Star Hiking Trail (Sam Houston National Forest), the 28 mile Trail-Between-The-Lakes (Sabine National Forest), the 20 mile 4-C's Hiking Trail (Davy Crockett National Forest), the 5 mile Sawmill Trail (Angelina National Forest); a 4 mile trail between Black Creek Recreation Area and Cottonwood Lake (LBJ National Grasslands), and 19 miles of undesignated trails, interpretative trails, and scenic area trails

Horseback riding is a popular use of National Forests and Grasslands, occurring singly, in small groups, or as permitted event rides At present, few problems with excessive wear on vegetation, soil, and water resources, or conflicts with other users The 52 miles of designated horse trails on the Davy Crockett National Forest presents few problems with excessive wear on vegetation, soil, water resources, or conflicts with other users

A twelve mile canoe trail in the Big Slough Wilderness and along the Neches River on the Davy Crockett National Forest, is a loop trail which begins at Scourloch's Camp trailhead This trail has been difficult to maintain because of limited access through the wilderness and downed trees from the Neches River waterway

Mountain bike use and demand is on the increase There are approximately 15 miles of mountain bike trails inside the Double Lake Recreation Area

Hunting for squirrel and deer is a very popular use of the NFGT Although the use is limited to about three and one-half months during the fall and winter months, it creates a very heavy impact on weekends during that time. Designated hunter camps have been used on the Sam Houston and Davy Crockett National Forests in order to provide

more safety, reduce conflicts, control litter, and minimize indiscriminate shooting. With more and more private land being restricted from hunting, additional pressures are being put on public lands for hunting.

Dispersed area camping is popular during the fishing and hunting seasons Some camping occurs along with hiking and horseback riding activities Some problems associated with this camping include excessive use of popular areas, site deterioration, littering, and vegetation damage Camping along the shorelines of Lake Conroe and Sam Rayburn Reservoirs have caused site deterioration, litter, and accumulations of human waste in these areas

Indiscriminate target shooting incidents are increasing and there are frequent complaints of stray bullets. Portions of the Sam Houston National Forest have several large sub-divisions butting-up against Forest Service land and have been the source of several complaints about stray bullets The LBJ Grassland shooting incidents increased until restrictions were placed on firearm use and areas were closed to target shooting

There are currently five recreation areas with interpretive trails The NFGT Master Interpretive Plan, which is on file in the Supervisor's Office, proposed further development of interpretive trails

Environmental Consequences of the Alternatives (Dispersed Recreation)

Non-Motorized Uses

The responsibility to provide access to persons with disabilities will not change between the alternatives. The needs for accessibility are dictated by the Americans and Disabilities Act, and any new construction will provide for accessibility through universal design of the facility An inventory of facilities that do not meet ADA standards is completed and a transition plan developed in order to program rehabilitation of existing facilities to provide the proper accessibility

The need and application for law enforcement activities on NFGT will be equal to the current situation or will increase across most alternatives Enforcement activities will be especially in demand to provide regulation compliance for recreation sites, protect resources, and special areas Specific law enforcement needs will be for arson, recreation related needs, resource protection to include endangered species, management of ORV trails and shooting ranges.

Alternatives 3, 4, 4a, 4b, 5 and 8 have an increasing number of special area designations, developed recreation sites, and trails The law enforcement effort will have to increase accordingly across these alternatives to protect more designated areas Alternatives 6 and 7 will

have large allocations of wilderness, which will also demand greater enforcement efforts to secure the integrity of wilderness

The interpretive needs will remain the same through the alternatives, except that the opportunities for providing these services will increase from Alternative 1 through 4 and 8

Alternatives 2, 3, 4, 8, 4a and 4b add 15 miles of hiking trail to the Forests' existing mileage Alternatives 1, 5, 6 and 7 would maintain the same number of trail miles as currently exists On the Grasslands Alternative 8 indicates the most increase in hiking trail (and multi-use trail) with 29 miles Alternative 2 and 4-7 adds 6 miles of trail, and Alternative 3 adds 10 miles to the Grasslands

Most existing hiking trails have concentrated use only on selected areas The highest priority for hiking trail development would be to create loop trails on existing trail segments Alternative 6 would provide up to a 300 foot trailside zone on either side of the trail that would not receive any type of timber management Proposed management along the trails would meet the adopted Visual Quality Objective (VQO) of Retention The VQO for trailside zones would be consistent with the other alternative themes

Alternatives 2, 3, 4, 4a, and 4b add approximately 10 miles of canoe trails in Winters Bayou of the Sam Houston National Forest to the existing 12 miles Fifty miles are added in Alternative 8

Mountain bike use is increasing on the National Forests and is a somewhat recent demonstrated need Alternatives 2 and 3 add 20 miles, while Alternatives 4, 4a, 4b and 8 add 50 miles to the existing system For the Grasslands, Alternatives 2 and 3 add 20 miles and Alternatives 4, 4a, and 4b would add 10 miles of mountain bike trails The most trail miles on the Grasslands occurs in Alternative 8, where approximately 18 miles of mountain bike and another 25 miles of multi-use lake traverse trail miles are proposed

Several areas are being used by horseback riders, but only the Davy Crockett has a designated Alternatives 2, 3, 5, and 7 add 26 miles on the Angelina National Forest already being used for competitive events Alternatives 4, 4a, 4b, 6, and 8 add 90 miles which includes the 26 miles on the Angelina, plus another 64 miles on the Sam Houston National Forest The establishment of multi-use trails would provide considerably more miles of use for each user Alternative 2 would add 15 miles and Alternatives 3 through 7 would add 25 miles, and Alternative 8 would add 35 miles of horse trails on the Grasslands

Motorized Uses

Currently, the Forests are basically open for ORV cross country use, plus the 55 miles of designated ORV trails on the Raven District of the Sam Houston National Forest Alternative 2 would still allow the Forests to be open for cross country use and have 55 to 100 miles of designated trails on the Sam Houston and Angelina National Forests Alternative 3 would limit the open areas to the Sabine and Davy Crockett National Forests, but would increase the designated ORV trail miles on the Sam Houston and Angelina by 200 miles Alternatives 4, 4a, and 4b would all leave the open areas to the Sabine and Davy Crockett National Forests, but would increase the designated trail miles on the Angelina and Sam Houston by 250 miles on the Forests Alternative 5 would allow open cross country use only on the Sabine and Davy Crockett and not add any miles to the designated trail system Alternative 6 would close the Forests completely to ORV use Alternative 7 would not allow any cross country use but would add 250 miles of designated trails to the system with some mileage being on each forest Alternative 8 would all leave the open areas to the Sabine, northern Angelina and Davy Crockett National Forests, but would increase the designated trail miles on the southern Angelina and Sam Houston by 250-300 miles or 355 miles total on the Forests This alternative also allows a transition period for trail inventory, evaluation and designation

Alternatives 1, 2, 3 and 8 prohibit ORV use on the Caddo and LBJ National Grasslands All motorized use would be restricted to system roads that are open for vehicular traffic

Alternatives 4 through 7 provide both open areas for ORV use and designated trails for ORV's on both Grassland units Alternative 4, 4a, and 4b call for 10 to 50 miles of designated trails while Alternatives 5, 6, and 7 call for 20 to 40 miles of designated trails Alternative 8 on the Grasslands prohibits ORV use Any ORV trails located on the LBJ would probably have to have a reinforced trail tread, similar to a roadway Trail location would be critical to minimize conflicts and resource damage Costs would be high compared to other trail construction costs of $2,000 per mile Trails on the Caddo would be similar in problems, but would probably not be so costly as on the LBJ

Off-Road Vehicle Trail Miles

Alternative	Number Miles Forest	Number Miles Grasslands
Alternative 1	* 55	0
Alternative 2	*100	0
Alternative 3	*255	0
Alternative 4, 4a, & 4b	*305	10-50
Alternative 5	* 55	20-40
Alternative 6	0	20-40
Alternative 7	*305	20-40
Alternative 8	*355	0

*** includes 55 miles existing**

Uncontrolled ORV use may have an adverse impact to vegetation, soil, and water values. Areas of concentrated use will have a decrease in soil productivity caused by compaction and soil loss Water quality may also be affected by sedimentation on stream channels which could lead to a violation of the 319 section of the Clean Water Act Animals may be disturbed and even displaced from their home range by the noise When ORV use is intense, reproductive success for some species can be lower

In all alternatives (except Alternative 6), soils and water run-off will be the main concerns for trail location and mitigation needs. As new trails are planned and designated, they will have to avoid RCW clusters This will be quite restrictive in locating additional mileage

Scenery/Visual Quality

Affected Environment - Forests and Grasslands

This East Texas area is heavily oriented to agricultural and forest industry, most of it being covered by forest of shortleaf, loblolly and some longleaf pine. These are interspersed with hardwood stands and flowering species such as dogwood, redbud and magnolia Stands of old residual pine provide habitat for the RCW (an endangered species) The old trees having "red heart" provide nesting sites (holes) The vegetation of the National Forests is predominately shortleaf and loblolly pine with red oak, white oak and sweetgum Longleaf stands usually have an open understory whereas the loblolly and shortleaf have a more heavily vegetated understory.

The river bottoms and sloughs are predominately willow, cherrybark, water and overcup oaks, sweetgum and a variety of other bottomland hardwood species The ridges terraces and slopes have a dense understory while the river bottoms and sloughs have a sparse understory The general character of the forests is a continuous vegetative cover with little variety except at river bottoms andsloughs

The LBJ National Grasslands are located in the central lowland landscape character type This area is characterized by rather level and some gently sloping surfaces lying at different levels with a relatively steep and straight, cliff-like face or slope of considerable linear extent Main streams are entrenched Vegetation is a mixture of tall and pasture grasses, live oaks, black jack oak, post oaks and mesquite

The LBJ National Grasslands is also quite open on the ridges and on top of the mesas, and the drainages and bottomlands are covered with oaks A considerable amount of variety exists, primarily through landforms Long distance views, unlike the forests, are often available The Caddo National Grasslands have in most areas a heavy cover of post oak, blackjack oak and Eastern red cedar

The landform within the National Forests varies from flat to gently rolling uplands to low hardwood bottoms and is very weak. The Sam Houston National Forest has the least amount of landform followed by the Davy Crockett, Angelina, and the Sabine National Forests which has the most amount of landform Long distance views across the forest are very limited All long distance views have a line of site of less than 10 percent slope making most management practices in middle ground or background unseen

Because of the relatively flat terrain and the obvious lack of long distance views, foreground is the primary mapping unit on the VQO inventory

Timber management activities are the most common activity affecting landscape management. There has been a shift in timber management philosophy on the National Forests in Texas from clearcutting to seed tree and shelterwood cutting There has also been recent policy change to favor more hardwood in pine stands, especially in clumps There is also an emphasis on leaving flowering trees and shrubs wherever possible, even in red-cockaded woodpecker areas One of the reasons for these changes is concern for visual quality.

Current management (Alternative 1) for each of the four VQO's are·

Forest Data

Visual Quality Objective	**Acres**
Preservation	39,546
Retention	40,369
Partial Retention	104,805
Modification	488,301
Total	673,021

Caddo/LBJ Grasslands Data

Visual Quality Objective	Acres
Preservation	380
Retention	0
Partial Retention	3,366
Modification	21,009
Total	24,755

Environmental Consequences of the Alternatives (Scenery/Visual Quality)

The percentage of each VQO is an approximation of emphasis within management area which can be directly applied to acres in each alternative This was derived through assessment of current VQO maps

Forest VQO by Management Areas (MA)

	Preservation	Retention	Partial Retention	Modification
MA-1			15%	85%
MA-2*		10%	25%	65%
MA-4		80%	20%	
MA-5		33%	66%	
MA-7	100%			
MA-8	20%	80%		
MA-9		100%		
MA-10			50%	50%
MA-11		10%	50%	40%

* Includes MA-6

Grasslands VQO by Management Areas (MA)

	Preservation	Retention	Partial Retention	Modification
MA-3			15%	85%
MA-4		90%	10%	
MA-5		100%		
MA-8	100%			

In all alternatives, utility corridors present a marked contrast in line, form and texture to the natural landscape These contrasts are mitigated to the extent practical

Developed recreation areas, administrative sites, oil well sites and communications sites also contrast with the surrounding landscape These are rehabilitated, designed and constructed under all alternatives to the extent feasible in a manner that minimizes impact or harmonizes with the natural environment

All alternatives allow for the application of the enhancement and rehabilitation VQO's These short term VQO's are applied when necessary and appropriate in order to meet a long term VQO They will not be applied where a preservation VQO has been adopted An example of this is the application of a rehabilitation VQO in a retention zone that has extensive mortality from SPB killed timber The removal of dead snags and other efforts to clean up the area are necessary in order to meet the long term retention VQO Enhancement is applied when visual resources are of primary importance in order to open vistas or otherwise enhance the scenic resources of the Forest.

Standards have been developed to guide vegetation management, road construction, and other management activities relative to visual resources Contrast reducing techniques appropriate for each management practice and VQO are given and are applicable under all alternatives

Approximately 90 percent of the forests would be managed under the uneven-aged management system in Alternatives 6 and 7 This would present a mostly closed canopy scene with few openings The views from the roadways would be restricted to the immediate foreground areas All the other Alternatives would have a mix of even-aged and uneven-aged management ranging from 20 to 50 percent of each These alternatives would present more variety and provide longer views into the forest The use of prescribed burning, especially in longleaf pine stands, will provide even longer views into the forested areas.

In all Alternatives, a large portion of the Forests will be guided by the management necessary to provide for the RCW, a threatened and endangered species This special management will limit the options available for scenic resource management

Most of the Grasslands scenic resource is pastural, and provides long distance viewing All alternatives would remain basically the same. Alternatives 2 and 3 would provide for the least emphasis on scenic resources (with the most area occurring in MA-1), and Alternatives 4 through 8 (with the least occurring in MA-1) would concentrate more effort on the visual aspects of management

Recreation Opportunity Spectrum (ROS)

Affected Environment - Forests and Grasslands

The Recreation Opportunity Spectrum (ROS) offers a framework for understanding the relationships between different physical settings and recreation experiences The Spectrum has been divided into six major classes Rural (R), Urban (U), Roaded-Natural (RN), Semi-Primitive Motorized (SPM), Semi-Primitive Nonmotorized (SPNM); and Primitive (P) From a dispersed recreation standpoint, the following discussion is concerned with the Roaded-Natural, Semi-Primitive Motorized, Semi-Primitive Nonmotorized and Primitive classes The Rural and Urban ROS classes apply to developed recreation

In order to address several key issues raised during the planning process, the NFGT has further subdivided the Roaded-Natural class. Under the Roaded-Natural class, the two subclasses are Roaded-Natural (RN) and Roaded Modified (RM) RN areas are managed under a VQO of partial retention, retention or preservation RM areas are assigned a VQO of modification and are open to a full spectrum of management activities

Demands for both motorized and non-motorized recreation experiences are high. People come from the Houston metropolitan area and the Dallas-Ft Worth Metroplex to backpack, horseback and mountain-bike ride, to participate in ORV activities, and to day-hike on the Forest's developed trail system or in the general forest areas The recreation opportunity spectrum provides a method to assess the capacity of lands on the Forest to provide recreation opportunities in different settings compared to the anticipated demand for these opportunities

Planning and managing recreation is an inherently difficult task. It is made even more complex by unpredictable changes The typically low accuracy and reliability of recreation use projection is indicative of the difficulty of anticipating these changes This makes the task of planning into the future extremely difficult Despite the complexity of the issue, recreation will remain one of the principal services provided by forests

The basic assumption of the ROS is that quality in outdoor recreation is best assured by providing a diverse set of opportunities Providing a wide range of settings varying in level of development, access and other factors, insures the broadest segment of the public will find quality recreational experiences, both now and in the future Although the notion of quality is relative–a value judgement–the concept of quality can be stated for management decision purposes in this way Quality depends on what experiences the individual is looking for, how much of it is realized, and the degree of satisfaction

The ROS is a helpful concept for determining the types of recreation opportunities to be provided After a basic decision has been made about the opportunity desirable in an area, the ROS provides guidance

about appropriate planning approaches and standards by which each factor should be managed

Environmental Consequences of the Alternatives (ROS)

The percentage of each ROS class is an approximation of emphasis within management areas which can be directly applied to acres in each alternative This was derived through assessment of current ROS maps.

Forest ROS by Management Area (MA)

	Rural	RN	SPM	SPNM	Primitive
MA-1		75%	25%		
MA-2		75%	25%		
MA-4		10%		90%	
MA-5			100%		
MA-7					100%
MA-8		10%		90%	
MA-9	90%	10%			
MA-10		100%			
MA-11	10%	70%	20%		

Grasslands ROS by Management Area (MA)

	Rural	RN	SPM	SPNM	Primitive
MA-3		80%	20%		
MA-4				100%	
MA-5	100%				
MA-8					100%

From Alternative 1 through 4b and Alternative 8 there is a decrease in the amount of Roaded-Natural and Semi-Primitive Motorized areas and less opportunities for Semi-Primitive Non-Motorized experiences. These Alternatives provide a relatively large number of acres in Roaded-Natural. In these areas, social interaction with other forest visitors is likely Both Motorized and Non-Motorized uses might be occurring in the same area Experiences of solitude and remoteness would occur primarily in wilderness and special management areas.

Alternative 5 would be close to Alternative 1 except there would be more special management areas and wilderness, which would provide

more Semi-Primitive Non-Motorized and Primitive recreation experiences In Alternative 5, there would be more opportunities to experience remoteness and solitude within the special management and wilderness areas.

Alternative 6 would provide the greatest number of acres in the Semi-Primitive Non-Motorized and Primitive recreation experiences There would be little or no Semi-Primitive Motorized areas There would be no ORV trails or any ORV use allowed Many of the existing roads would be closed to public use Alternative 6 would provide the largest acreage in wilderness and special management areas This Alternative would provide the least amount of Roaded-Natural area

Alternative 7 would allow for 305 miles of designated ORV trails but not allow any other ORV use The amount of Semi-Primitive Non-Motorized and Primitive acres would be somewhere between Alternative 5 and Alternative 6

On the Caddo/LBJ National Grasslands, the ROS experience will be the same for Alternatives 1 through 3 and 8 Alternatives 5 through 7, with the increase in special management ares, would provide more Semi-Primitive Non-Motorized areas. Also, with the development of more recreation areas, the rural ROS would increase The increase in trails will require the construction of more parking and access, and increase the roaded-natural ROS Alternatives 4, 4a, and 4b would be quite similar to Alternatives 5 through 7 The overall affect from Alternative 1 to 7 is Even though the special management areas would be classified as Semi-Primitive Non-Motorized experience, the addition of recreation areas, trails, roads, and parking create an overall situation with less Semi-Primitive Non-Motorized and more rural and roaded-natural ROS experiences

Cultural Resources

Affected Environment - Forests and Grasslands

Cultural History Synopsis

The NFGT, which occupy a significant portion of area known as the East Texas Pineywoods and the North Texas Tall Grass Prairie are unique as several distinct, yet contemporary, cultural groups are represented Information derived from surveys of major river basins prior to inundation indicates a broad spectrum of variability in cultural resources from the northeast to southwest limits of the National Forests Due to the concentration of survey efforts within the river systems, a sampling bias is evident, a bias which excludes the greater portion of the upland environment Despite this, however, some knowledge of the aboriginal inhabitants of east and north Texas, including a rather complete chronological framework, has been established (Keller 1977, Jurney et al 1989) A broad simplification of the north and east Texas

chronologies follow Although somewhat generic and simplified, it provides an insight to the diversity of cultural materials to be found within the NFGT

1. Paleo-Indian (ca 15,000 -6,000 B C)

Finds representative of this stage of cultural development are rare in eastern Texas, but they do occur In north Texas, such finds are somewhat more common Included are sites and complexes associated with early style fluted points, such as Clovis and Folsom, as well as more regionally distinctive styles such as Dalton, San Patrice, and Scottsbluff Although regional variances are distinct, certain attributes are shared by these artifact types 1) a more or less lanceolate outline, 2) ground basal and lateral margins, 3) a base often thinned by fluting or long, multiple flakes, 4) preference for high quality raw material, and 5) evidence of careful curation, the refurbishing or recycling of the point into other tools such as scrapers, drills and knives (Story et al 1990)

2. Archaic (ca 6,000 - 1,500 B C)

Sites relating to this time period are relatively abundant and apparently represent a localized but mobile population with effective extractive subsistence strategies Despite the relative abundance of Archaic materials, little more is known about this stage in eastern Texas than with the Paleo Indian era. Present understanding would indicate that a majority of sites, and especially the larger and more long term occupations, are concentrated in areas of seasonally abundant subsistence resources For this reason, the modern floodplain is expected to have somewhat higher site densities, although the great depth of the floodplain sediments (sometimes in excess of 20 meters) hampers site discovery and excavation Chipped stone tools of the Archaic are generally less carefully fashioned, and are made from less exotic materials, than those of the preceding period At various times in the Archaic, several new technologies are introduced, most notably stone-lined hearths and baking pits and the use of milling implements (Story et al 1990)

3. Woodland (ca 1,500 B C - 700 A D)

Although the differences between this and the preceding period are unclear (Shafer, 1975), it would seem plain that the basic settlement pattern of the Archaic continued with some structural and perhaps religious alterations Sites are normally found in a similar scattered arrangement, although larger sites and such structural associations as mounds are apparently concentrated in the lowlands adjacent to major streams drainages

It is evident the Woodland development in Texas owes much to influences from the Mississippi and even the Ohio Valleys The connective cultural fabric is incompletely understood, but drastic alterations in the Archaic lifeway, with the exception of the introduction of new technologies such as pottery, arrow points and an increasing emphasis on the use of cultigens, do not appear to have taken place This basic cultural conservatism appears to be somewhat characteristic of southeastern Texas where the Woodland expression survives until Historic times.

4. Mississippian - Caddoan (ca 700 - 1600 A D.)

In Northeast Texas and adjacent areas generally centered on the Red River, a new and vigorous cultural development succeeds the Woodland tradition This Caddoan expression is not well defined in the Angelina area where it tends to merge with indigenous Woodland developments, and the settlement pattern, as known, does not differ markedly from that of the preceding period However, the agricultural nature of the Caddoan subsistence system, and presumably that of later Woodland development (Davis, 1970), would imply sites are largely confined to the fertile bottomlands where horticulture was most practicable Decorated pottery, large habitation and ceremonial centers, and extensive use of cultigens characterize these occupations

5. Historic (1500 A D - Present)

The general history of the area after European contact and settlement is well known Indeed a number ofhistoric towns, (Nacogdoches, San Augustine, Zavalla, etc), are located in close proximity to forest boundaries and examples of smaller but related developments may be present on National Forest lands Thus, while general chronological data and settlement information is more accessible, there is still relatively little archeological knowledge of this period Among the kinds of sites which could further contribute to our understanding of this period are Spanish colonial missions and presidios, sawmills, mill towns, farmsteads, New Deal Era camps and structures and sites associated with historic Native American groups indigenous to this area

Over 300 cultural resource properties are known to be present within the proclaimed boundaries of the NFGT Approximately 50 of these, within current ownership, have been subjected to some level of evaluation, either to determine National Register eligibility or to facilitate a management decision. Determinations of eligibility have been solicited on eight (8) properties (one of which is a multi-structure district), and positive determinations of eligibility have been received on six Lake Fannin, Ratcliff Lake Picnic Shelter, Ratcliff Lake Bathhouse, 4-C's

Mill, Double Lake Bathhouse, and Aldridge Mill Archeological excavations at a number of archeological sites (41TN26, 41TN14, 41HO22, AND 41SY46) has provided enough information to determine either further study necessary or the site (41TN13, 41TN73, 41THO61, 41HO72, 41HO74 AND 41TN20) is determined not eligible for listing and no further work is necessary Analytical data from these excavations has not as yet been synthesized and published Numerous other sites have been evaluated by less intensive methods designed to provide enough data to make management decisions concerning project redesign or movement.

A comprehensive archeological and historical overview of the National Grasslands in Fannin, Wise and Montague Counties was conducted by Southern Methodist University from September 1988 to June 1989 (Jurney et al 1989) A cultural-historical overview of the history, ethnology and prehistory of the three units of the Caddo Grasslands and the LBJ Grasslands highlight some of the differences in human ecology and natural environments found on these units Major trends in population and depopulation of the historic and prehistoric inhabitants of the areas are summarized An inventory of known prehistoric and historic resources in each Grassland area is presented. Based on these data and data from adjacent areas, each Grassland has been stratified into resource zones useful for evaluating the general potential for the presence of previously unidentified properties These zones are mapped for each National Grassland and are discussed in the overview Specific recommendations for evaluating cultural resource data gaps, identification strategies, National Register evaluation historic context and property type eligibility and resource needs, enhancement options, and interpretive potentials for the Grasslands are reviewed in the document.

In recent years, a shift in emphasis has occurred which will carry Heritage Resource Management (HRM) to a new level of involvement The change in terminology from "Cultural Resource Management" to "Heritage Resource Management" is only an outward manifestation of much greater change in the approach to inventory, evaluation, protection and nomination of significant cultural resources Early in 1993, the Regional Forester and the Executive Director of the Advisory Council on Historic Preservation signed a Programmatic Agreement concerning the management of Historic Properties on National Forest Lands in the Southern Region This agreement directs the Forests to develop, in partnership with their State Historic Preservation Officer (SHPO), an implementing Memorandum of Understanding (MOU) which would incorporate elements of Heritage Management into the already established compliance process

The MOU between NFGT and the Texas SHPO is currently under development However, the basic framework and philosophies which will guide its implementation have been agreed upon

1 Traditional compliance surveys will be conducted only on selected compartments where the forest research design will be tested Approximately half of the remaining forest acreage will be categorically excluded from the normal compliance process Criteria for the designation of "compliance" and "exempt" zones are being jointly developed by the Forest Heritage Team and SHPO staff

2 More emphasis will be placed on site evaluations and interpretation instead of on "by-the-book" compliance More scholarly reports, public education and involvement in site studies, and an active contribution to the bank of knowledge of east Texas prehistory and history represent the anticipated benefits from the change in the compliance program

3 Personnel and funding levels must remain at current levels in order for the heritage program to continue its development Key to the MOU will be a stipulation that failure to maintain these levels will result in the return to project specific consultation and compliance on all actions

4 The Forest and SHPO agree to work together in all facets of the heritage management program A visible symbol of this cooperation will be the integration of GIS and GPS equipment and knowledge into a shared data base and network connecting the two offices

The proposed Heritage Management program would incorporate five components into the stewardship of the Forest's heritage resources inventory, evaluation, curation, monitoring, and program management The program will shift away from a supporting role to other resources, to a more independent status stressing the importance of heritage resources on their own merits Budgeting will/should be shifted to a single budget code to more accurately reflect the program management identity rather than the support role of the program

Environmental Consequences of the Alternatives (Cultural Resources)

Heritage (Cultural) Resources are protected under all alternatives All surveys will be conducted in accordance with the terms of the Southern Region Programmatic Agreement, the Forest/State Memorandum of Understanding and the Forest Heritage Management Plan Consultation with SHPO under Section 106 of NHPA will be completed prior to the signing of decision documents which authorize implementation of activities not excluded from consultation by prior agreement Eligible sites will be nominated to the National Register of Historic Places

The possibility of site disturbance due to fire fighting activities exists under all alternatives To the extent practical, an archeologist will be

called to assist in locating fire lines to avoid sites in areas having the highest probabilities of heritage resource sites

In all alternatives, significant sites will be interpreted for the public as funding allows and demand dictates

In Alternatives 2, 3, 4, 4a, 4b, 5, 6, 7 and 8 the Old Aldridge Sawmill and Town site on the Angelina National Forest are given special interest area designation. Under Alternatives 3, 4, 4a, 4b, 5, 6, 7 and 8 this designation is also extended to areas along the Attoyac River and Ayish Bayou on the the Angelina National Forest and the segment of Cochino Bayou within Compartment 54 of the Neches Ranger District Special use area (Historical) designation will allow only those management activities which enhance the interpretation and preservation of sites within those areas Other areas of historical significance which may fall under this category are included in protective riparian zones under all alternatives

Under all alternatives, site evaluations will be conducted as directed in the Forest Heritage Resource Management Plan, and tiered to answering pertinent research questions identified in the Statewide Preservation Plan

Under Alternatives 4 through 8, the Lake Fannin Organizational Camp on the LBJ Grassland will be afforded designation as a Special Interest Area Special interest area designation will allow only those management activities which enhance the interpretation and preservation of sites and structures within that area.

Chapter IV
List of Preparers

Introduction

The following is a listing of those participating in preparing the Environmental Impact Statement (EIS) and Revised Forest Plan for the National Forests and Grasslands in Texas (NFGT) Beginning with Interdisciplinary (ID) Team members, biographical sketches follow for current members of the Core Team and other primary participants. Information regarding qualifications (education and experience) and involvement in the preparation of the Forest planning documents is found within this chapter.

In addition, others involved in this Revision process are shown as members of working groups, technical assistants, management team members, and other contributors

Interdisciplinary (ID) Team

Core Group

DENNIS ROBERTSON (*Staff Officer*) B S in Agriculture with 28 years experience Provided leadership among planning activities, management team, and USFS Regional Office

BILL BARTUSH (*Planning Team Leader*) B.S and M.S in Wildlife and Ecology with 16 years experience Provided coordination in the development and preparation of the Forest Plan and EIS documents

JOE METZMEIER (*Operations Research Analyst*) B S in Engineering with 24 years experience. Provided economic analysis and budgets for EIS and Forest Plan Responsible for overall coordination of FORPLAN and IMPLAN input into planning process

BETTE MINER (*Resource Specialist*) B S. in Forestry with 20 years experience Provided silvicultural and natural resource management technical assistance

CATHERINE ALBERS (*Economics and Recreation Specialist* 1990-1992) B S in Geography, B.S. in Forest Management and M.S in Economics with five years of experience

REESE POPE (*Planning Team Leader* 1990-1992) B S Forest Management and M S Agronomy with 16 years of experience

In addition to the Core Group shown above, the following personnel participated on the ID Team:

Specialists

JOHN DOIRON *Engineering and Facilities* B S in Civil Engineering with 24 years of experience

BILL FLOYD *Lands and Minerals* B B.A in Business Administration and M F. in Forestry with 20 years experience.

RON HAUGEN *Silviculturist* B.S in Forestry with 20 years experience

JOHN IPPOLITO *Archaeologist* B S. in Polital Science and B A. in Anthropology with 19 years of experience.

AL MATECKO *Public Affairs Specialist* B.A. and M A. in Communication with 18 years of experience

RODNEY PETERS *Soil Scientist* B S in Agronomy with 22 years experience.

WARREN STARNES *Range Conservationist/Wildlife Biologist* B S. in Wildlife Management with 20 years experience.

DUANE STROCK *Landscape Architect/Recreation Specialist* B.S. in Landscape Architecture with 29 years of experience.

Working Groups

Silvicultural Working Group - Keith Baker, Ron Haugen, Bette Miner, Bob Smiley, and Bobi Stiles

Ecological Classification System Working Group - Rob Evans, Larry Ford, Sten Olsen, Rodney Peters, Bruce Silvey, Duane Strock, and George Weick.

Old Growth Working Group - Steve Clarke, Ron Haugen, Bette Miner, Don Phillips, and Warren Starnes

Management Indicators Working Group - Dawn Carrie, Rob Evans, Dave Peterson, Craig Rudolph, and Warren Starnes

Minerals Working Group - Holly Erimias, Beverly Giza, Kenn Frye, and Harry Switzer

Other Technical Assistance

Contributions were also made by many District Foresters, Range Conservationists, Technicians, and Budget and Finance Personnel

Timber Management Specialist - Don Benner
Graphics - Melvin Bell and Dale Bounds
Pest Management Specialist - Steve Clarke
Botanist - Rob Evans
Fire and Fuel Specialist - Larry Ford
Editing - Gay Ippolito
Fisheries Specialist - Dave Peterson
Hydrology Specialist - Dan Range
Map Preparation - Bruce Silvey
Silviculture - Karl Stoneking
Planning Assistants - Sheila Sprague/Vicki Howard
ORA Assistant - Carmen Wanner
NEPA/Appeals Specialist - George Weick
Recreation - Greg Cohrs

Document Preparation and Format

Clerical and editorial assistance provided by the following personnel:

Lawanda Forsythe
Donna Griffith
Barbara Harris
Vicki Howard
Sid Jackson
Saundra Law
Lue Nell Miller
Tonya Ritnour
Marie Short
Sheila Sprague
Terry Terry

Leadership Team Members

Executive Members

Forest Supervisor - Alan Newman
Deputy Forest Supervisor - Ron Bertsch
Secretary/Stenographer - Betty Jones

Team Leaders

Land Management Planning and Public Affairs - Dennis Robertson
Forest Management and Protection - Don Phillips
Resources - Larry Bonner
Law Enforcement - Doug Hobbs
Lands and Recreation - Harry Switzer
Engineering - Ruben Natera
Administration - Phil Ingram

District Rangers

Angelina National Forest (Angelina Ranger District) - Glenn Donnahoe
Sam Houston National Forest (Raven & San Jacinto Ranger Districts) - Tim Bigler
Davy Crockett National Forest (Neches & Trinity Ranger Districts) - Sten Olsen
Sabine National Forest (Tenaha & Yellowpine Ranger Districts) - Larry Potts
Caddo & LBJ National Grasslands - Ben Harbour

Diversity Team Members

Catherine Albers
Lynn McDonald

Former Management Team Members

Law Enforcement - Billy Ball
District Ranger, San Jacinto - Joe Carmical
Diversity Team Member - Verma Coleman
District Ranger, Tenaha - Milt Evans
Public Affairs Staff Officer - Carl Gidlund
District Ranger, Yellowpine - Ike Hawkins
Forest Supervisor - Mike Lannan
District Ranger, Trinity - Dick Lukes
Fire, Recreation, Communication and Law Enforcement Staff Officer - Jim Morphew
Timber Staff Officer - Dave Oates
Diversity Team Member - Barbara Stiles
Lands and Minerals Staff Officers - Harry Switzer

Other Contributors

Richard Conner - Southern Forest Experiment Station
David Diamond - Texas Parks & Wildlife Department
Jim Dickson - Southern Forest Experiment Station
Mike Krueger - Texas Parks & Wildlife Department
Mike Fountain - Stephen F Austin State University
Rick Larkin - Texas Parks & Wildlife Department
Mike Legg - Stephen F. Austin State University
Jack McCullough - Stephen F. Austin State University
Ike McWhorter - The Nature Conservancy
Elray Nixon - Stephen F Austin State University
Melissa Parker - Texas Parks & Wildlife Department
Micah Poteet - Texas Parks & Wildlife Department
Jeff Reid - U S Fish & Wildlife Service

Mary Jo Stegman - U S. Fish & Wildlife Service
Ron Thill - Southern Forest Experiment Station
Fred Werner - U.S. Fish & Wildlife Service
Monty Whiting - Stephen F. Austin State University

NOTE. Not all persons who were consulted are mentioned above.

Chapter V
Agencies, Organizations, and Others on the Revised Plan and EIS Mailing List

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FEDERAL

Agricultural Stabilization & Conservation Service
Animal & Plant Health Inspection Service
Big Thicket National Preserve
Caribbean National Forest
Chattahoochee & Oconee NF
Cherokee National Forest
Congress of the U S House of Representatives, Washington, D C *
Daniel Boone National Forest
Environmental Protection Agency
Farmers Home Administration
Federal Aviation Administration
Federal Energy Regulatory Commission (FERC)
Federal Highway Administration
Federal Railroad Administration
Food & Nutrition Service (FNS)
Francis Marion & Sumter NF
General Services Administration
George Washington Nat'l Forest
Interstate Commerce Commission (ICC)
Jefferson National Forest
Kisatchie National Forest
Office of Equal Opportunity (OEO)
Office of Environmental Compliance
Office of General Counsel
Office of Program Review and Education
National Agri Statistics Service
National Forests in Alabama
National Forests in Florida
National Forests in Mississippi
National Forests in N. Carolina
National Marine Fisheries Service
National Park Service
National Resource Conservation Service
NOAA Ecology and Conservation Office

Ouachita National Forest
Ozark-St Francis Nat'l Forest
Rocky Mountain Experimental Station
Rural Electrification Administration (REA)
Southern Forest Experiment Station
Tennessee Valley Authority (TVA)
U S Army, Engineering Division Southwestern, CESWD
U S. Department of Housing and Urban Development (HUD)
U S Department of the Interior (USDI)
U S Department of Transportation (DOT)
U S. Fish and Wildlife Service
U.S Geological Survey
USDA, National Agricultural Library
USDA OPA Publications Stockroom

*Mailings were made to those senators and representatives having NFGT lands within their appropriate districts

STATE

Governor's Office Budget/Planning
Historical Commission
Martin Dies Jr State Park
Railroad Commission of Texas
Rural Electrification Administration
State Conservationist
Texas Agricultural Extension Service
Texas A&M Campus
Texas Department of Agrigulture
Texas Department of Health
Texas Farm Bureau
Texas Forestry Association
Texas Forest Service
Texas Land Commissioner
Texas Parks & Wildlife Dept
Texas State Department of Highways
Texas Natural Resource Conservation Commission
Trust for Public Lands

*Mailings were made to those County Judges, City, and County Commissioners having NFGT lands within their appropriate districts

LOCAL/TRIBAL

Ala-Coushatta Tribal HQ
Angelina County Farm Bureau
Caddo Tribal Center
Centerville ISD
Deep East TX Development Assoc
Huntington ISD
Kurth Memorial Library
Montague County Courthouse
Prairie View A&M University
Pineywoods RC&D
SALT-Trinity Bay
SFA School of Forestry
Texoma Council of Governments
Tunica-Biloxi Indians of LA

SPECIAL INTEREST

American Fisheries Society
American Fishing Tackle Assoc
American Motorcycle Assoc
American Rivers
Angelina Forest Trail Riders
Atlantic States Marine Fish
Baylor University
Center for Marine Conservation
Central Distance Riders
Concerned Citizens Nacogdoches
Down to Earth Researching
EZ Riders
Golden Triangle Group
Houston Orienteering Club
Houston Sierra-Trail Maintainence
International Association Fish and Wildlife Agencies
Izaak Walton League of America
Lone Star Chapter, Sierra Club
Montgomery County Adult Horse Committee
Montogomery County Landowners
National Audubon Society
National Campground Owners Assoc
National Off-Highway Vehicle Conserv
National Wildlife Federation
Outdoor Nature Club of Houston
Prairie & Timber Audubon
San Jacinto County Wilderness Club
Southeast Texas Off-Road Riders Club
Sierra Club
Sierra Club Legal Defense Fund

Sport Fishing Insitute
Sportsmen Conservationists Texas
Southwest Paso Fino Horse Assoc
TERA
Texas ATV Association
Texas Endurance Riders
Texas Environmental Center
Texas Nature Conservancy
Texas Recreation & Park Society
The Irland Group
Trail Riders Associations
Trails Riders of Houston
Trout Unlimited
Texas Committee on Natural Resources
Texas Endurance Riders Assoc.
Texas Environmental Action Coalition
Texas Organization Endangered Species
Texas Society American Foresters
United 4WD Association
Wilderness Society
Wildlife Management Institute
Woodlands Hiking Club

COMMODITY INTEREST

American Assoc Petroleum
Anderson County Timber Growers
Champion International Corp
Conroe Creosoting Co
Duke City Lumber Company
EXXON
Georgia Pacific Resins, Inc
Gregg Robinson Logging
Houston County Forest Landowners
Jasper-Newton Landowners Association
Justin Seed Co
Kirby Forest Industries
Koch Hydrocarbon, Pipeline Div
Lost Pines Timbergrowers Assoc
Louisiana-Pacific Corp
Louisiana-Pacific/Kirby
Maersk Energy Inc.
McMoran Oil & Gas Co
Mitchell Energy Corp
Montgomery County Landowners
Moran Corp
Nacogdoches County Forest Timber
National Forest Products Association
NFPA/Timber Purchasers Council

Phillips Petro Co
Sabine-San Augustine Timber Growers
San Jacinto County Landowners
Shell Pipeline Corp.
Temple-Inland
Texas Eastern Transmission
Texas Forestry Association
Thornberry Oilfield Services
Trinity County Forest Landowners
Texas Indep Producers & Royalty
Trinity County Forest Resources Assoc.
Walker Bros Lumber

In addition, copies were mailed to approximately 484 individuals found on the National Forests and Grasslands in Texas Planning Mailing List

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Glossary

Many of these definitions are referenced to the following numbered sources Some definitions are referenced to Forest Service Manuals (FSM), Forest Service Handbooks (FSH), or other sources that are too numerous to list Other definitions are not referenced but are those in general use on the National Forests and Grasslands in Texas

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A

ACCESS CLASS - Classification of land where classification is based on distance from an existing road (11)

Class 1 land - Land within 1/4 mile of an existing road and not separated from the road by a physical barrier such as a major stream or private land (11)

Class 2 land - Land within 3/4 mile of an existing road and not separated from the road by a physical barrier such as a major stream or private land (11)

Class 3 land - All land not in Class 1 or Class 2 (11)

ACID RAIN - Precipitation with a high concentration of acid (11)

ACTIVITY - A measure, course of action, or treatment that is undertaken to directly or indirectly produce, increase, or maintain forest and rangeland outputs or achieve administrative or environmental quality objectives FSH 1309 11, The Management Information Handbook, sets forth definitions, codes, and units of measure for Forest Service activities (12)

ACTIVITY OUTPUTS - The quantifiable goods or services resulting from any management actions taken on a Forest (11)

ACTIVITY TYPE - The further description of the measure, course of action, or treatment within an activity See FSH 1309 11 for definitions of activity types (12)

ADMINISTRATIVE UNIT (Forest) - A geographic area containing at least one proclaimed National Forest where a single line officer is responsible for the management of resources and activities. (2)

ADVANCE REGENERATION (Reproduction) - Seedlings or saplings that develop or are present in the understory (22)

ADVISORY COUNCIL ON HISTORIC PRESERVATION - Created by the National Historic Preservation Act (1966) to advise agencies of proper procedures for protecting, preserving, and enhancing historic and prehistoric cultural resources (Wildersen 1977) (11)

AGE CLASS - A distinct aggregation of trees originating from a single natural disturbance or regeneration cutting (22)

AIR QUALITY - The composition of air with respect to the quantities of pollutants Most frequently used in connection with standards of maximum acceptable pollutant concentrations (2)

ALL-AGED STAND - A stand that contains trees of all or almost all age classes Tree crowns are at various levels and the canopy very uneven or irregular (11)

ALLOTMENT - An area designated for use by a prescribed number and kind of livestock under one plan of management (11)

ALLOWABLE SALE QUANTITY (ASQ) - The quantity of timber that may be sold from the area of suitable land covered by the Forest Plan for a time period specified

by the Plan This quantity is usually expressed as the "average annual allowable sale quantity" (36 CFR 219 3) (12)

ALLOWABLE USE - (1) The degree of use estimated to be proper until proper use is known A rule of thumb on ranges in good or excellent condition is 30 to 50 percent of the annual growth by weight (2) The amount of forage planned to be used in order to accelerate range improvement (11)

ALTERNATIVE - One of several policies, plans, or projects proposed for decisionmaking (12)

ANALYSIS AREA - A specified area of land where responses to proposed management practices may be analyzed Responses may be in the production, improvement, or maintenance of forest and rangeland outputs, and in environmental quality objectives and economic and social impacts (12)

ANALYSIS OF THE MANAGEMENT SITUATION (AMS) - A determination of the ability of the planning area to supply goods and services in response to society's demand for those goods and services (2)

ANIMAL-MONTH - A month's tenure on range by one animal Not synonymous with animal-unit month (11)

ANIMAL UNIT - Considered to be one mature (1,000 lb) cow or the equivalent based on an average daily forage consumption of 26 lbs of dry matter per day (2)

ANIMAL UNIT MONTH (AUM) - The amount of forage required by an animal unit for 1 month (2)

AREA REGULATION - A method of controlling the amount of suitable forest land to be harvested annually or periodically on the basis of stocked area (11)

ARTERIAL ROADS - Roads that provide access to large land areas and usually connect with public highways or other Forest Service arterial roads to form a network of primary travel routes (2)

ARTIFICIAL REGENERATION/(REFORESTATION) - Creation of a new age class by renewal of a tree crop by direct seeding, or by planting seedlings or cuttings (22)

ASSESSMENT - The Renewable Resource Assessment required by the Forest and Rangeland Renewable Resources Planning Act (11)

B

BACKGROUND - In visual management terminology, the visible terrain beyond the foreground and middleground Individual trees in the background are not visible, but are blended into the total fabric of the stand Also, a portion of a view beyond 3 to 5 miles from the observer and as far as the eye can detect objects (6)

BASAL AREA - The area of the cross-section of a tree stem near the base, generally at breast height (4 5 feet above the ground) (3)

BASE SALE SCHEDULE (BSS) - A timber sale schedule formulated on the basis that the quantity of timber planned for sale and harvest for any future decade is equal to or greater than that for the preceding decade The planned sale and harvest for any decade is not greater than the long-term sustained yield capacity This definition expresses the principle of nondeclining flow (1,12)

BENCHMARK - The physically or biologically determined maximum of a resource output that can be obtained from Forest lands when minimum legal requirements for production of other resources and maintenance of soil and water productivity are met Benchmarks define the range within which alternatives can be formulated (11)

BENCHMARK ECOLOGICAL TYPES - Reference sites on representative ecological types These sites reflect the results of management actions in the shortest timeframes Sites which contain sensitive plants or critical habitat for threatened and endangered species should be considered (12)

BENEFIT (VALUE) - Term used to describe the results of a proposed activity, project, or program expressed in monetary or quantitative nonmonetary terms (12)

BENEFIT/COST RATIO - The total discounted benefits of an activity divided by the total discounted costs (10)

BEST MANAGEMENT PRACTICES (BMP) - A technique that is determined to be the most effective, practical means of preventing or reducing pollutants from nonpoint sources in order to achieve water quality goals (2)

BIOLOGICAL ASSESSMENT - A biological evaluation conducted for major Federal construction projects requiring an environmental impact statement, in accordance with legal requirements under section 7 of the Endangered Species Act (16 U S C 1536(c) The purpose of the assessment and resulting document is to determine whether the proposed action is likely to affect an endangered, threatened, or proposed species (10)

BIOLOGICAL EVALUATION - A documented Forest Service review of Forest Service programs or activities in sufficient detail to determine how an action or proposed action may affect any threatened, endangered, or sensitive species or species proposed for such classification (10)

BIOLOGICAL GROWTH POTENTIAL - The average net growth attainable in a fully stocked natural forest stand (36 CFR 219 3) (12)

BOARD FOOT (BF) - The amount of wood equivalent to a piece of wood measuring 1 foot by 1 foot by 1 inch (3)

BOARD FOOT/CUBIC FOOT CONVERSION RATIO - The number of board feet per cubic foot of volume varies with tree species, diameter, height, and form factor For the NFGT, the Forest-wide average conversion ratio is 5 54 board feet per cubic foot This factor is applied to the cubic-foot FORPLAN outputs to give board-foot estimates (11)

BURNING, PRESCRIBED - The application of fire, usually under existing stands and under specific conditions of weather and fuel moisture, in order to control vegetation to meet goals of silviculture or hazard reduction (22)

C

CFR - Code of Federal Regulations

CANOPY - The cover of branches and foliage formed by the crowns of adjacent trees and other woody growth (2)

CAPABILITY - The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at given levels of management intensity Capability depends upon current conditions and site conditions such as climate, slope, landform, soils, and geology, and on the application of management practices such as silviculture or protection from fire, insects, and disease (36 CFR 219 3) (1,12)

CAPABILITY AREA - Geographic areas delineated on the basis of land and resource characteristics in integrated forest planning Capability areas may be identical with ecological land units, ecosystems, or land response units (12)

CAPITAL INVESTMENT - An input that increases the stock of natural or manmade resources (assets) needed to maintain or increase the flow of outputs in the future Benefits resulting from capital investments are normally recouped over periods longer than 1 year (12)

CHARGEABLE VOLUME - All volume that is included in the growth and yield projections for the selected management prescriptions used to arrive at the allowable sale quantity, based on Regional utilization standards Planned production of fuelwood is not included in the allowable sale quantity and therefore is generally nonchargeable However, unforeseen conditions may make it appropriate to sell as fuelwood some volume that was included in the allowable sale quantity–for example, when timber is severely damaged by fire or insects In such cases, fuelwood volume is chargeable (11)

CIVILIAN CONSERVATION CORPS - A public employment program of the 1930's and 1940's It accomplished various conservation tasks on public land (11)

CLAIM - Challenge to U S ownership of a tract or portion of a tract (11) Can include a claim of an easement interest or other partial right

CLIMAX - The culminating stage in plant succession for a given site Climax vegetation has reached a highly stable condition (6)

CLIMAX FOREST - Plant community dominated by trees representing the culminating stage of natural succession for the specific locality and environment (20)

CLIMAX SPECIES - Plant species that will remain essentially unchanged in terms of species composition for as long as the site remains undisturbed (20)

CODOMINANT - See crown class

COLLECTOR ROADS - Roads that serve small land areas, are usually connected to public highways or Forest Service arterials, and collect traffic from local roads or terminal facilities (2)

COMMERCIAL FOREST LAND (CFL) - Forest land that is producing or is capable of producing crops of industrial wood and (1) that has not been withdrawn from production of such crops by Congress, the Secretary, or the Chief, (2) that can produce timber without irreversible damage to soils, productivity, or watershed conditions with existing technology and knowledge, and (3) for which existing technology and knowledge provide reasonable assurance that adequate restocking can be attained within 5 years after final harvesting (2)

COMMERCIAL THINNING - Cutting by means of sales for products (poles, posts, pulpwood, etc) in immature stands to improve the quality, growth, and vigor of the remaining stands (11)

COMMERCIAL TIMBER SALES - The selling of timber from National Forest lands (11)

COMPARTMENT - The basic operating and record-keeping unit of the Forest, having permanently defined boundaries and containing 1,000 to 2,000 acres of commercial forest land (11)

COMPETITION - Struggle among trees and other vegetation, generally for limited nutrients, light, and water present on a site Competition can cause reduced tree growth (20)

COMPLEX PLANNING ACTION - A planning action in which individual components of the alternatives require separate decisions (see FSM 1970 62) (12)

CONFINE FIRE - To restrict the fire within determined boundaries established prior to the fire, during the fire, or in an analysis of an escaped fire situation (11)

CONSUMABLE SPECIES - Game and fur-bearing wildlife species harvested for sport, food, study, or commerce (11)

CONTAIN FIRE - To surround a fire and any spot fires with control line, as needed, that can reasonably be expected to check the fire's spread under prevailing and predicted conditions (11)

CONTINUOUS FOREST INVENTORY (CFI) - A procedure for determining forest growth, mortality, and standing volume by periodic remeasurement at permanent sample locations (11)

CONTINUOUS INVENTORY OF STAND CONDITIONS (CISC) - A computerized system that maintains a continuous inventory of stand conditions on Forest land (11)

CONTROL FIRE - To complete the control line around a fire, any spot fires, and any interior islands to be saved, to burn out any unburned area adjacent to the fireside of the control line, and to cool down all hot spots that are immediate threats to

the control line until the line can reasonably be expected to hold under foreseeable conditions (11)

CORDUROY - A road formed by logs or other material laid side-by-side crosswise (7)

CORRIDOR - A strip of land identified for the present or future location of transportation or utility rights-of-way within its boundaries (1,12)

COST, CAPITAL INVESTMENT - The cost of manmade structures, facilities, or improvements in natural resources used as inputs in production processes to produce outputs over one or more planning periods (12)

COST COEFFICIENTS - Values that relate to a particular dollar cost in a specified period of time (11)

COST-EFFECTIVE - Achieving specified outputs or objectives under given conditions for the least cost (6,12)

COST EFFICIENCY - The usefulness of specified inputs (costs) in producing specified outputs (benefits) Some outputs including environmental, economic, or social impacts, are not assigned monetary values but are to be achieved at specified levels at the least cost Cost efficiency is usually determined by comparing present net values, although use of benefit-cost ratios and rates of return may be appropriate (12) (36 CFR 219 3)

COVER TYPE - Vegetation currently occurring on a given site (11)

CROP TREE - Any tree that is selected to become a component of a future final harvest (22)

CROWN - The part of a tree or woody plant bearing live branches and foliage (22)

CROWN CLASS - A class of tree based on crown position relative to the crowns of adjacent trees (22)

Codominant - Trees with crowns forming the general level of the main canopy in even-aged groups of trees, receiving full light from above and comparatively little from the sides (22)

Dominant - Trees with crowns extending above the general level of the main canopy of even-aged groups of trees, and receiving full light from above and partly from the sides (22)

Intermediate - Trees with crowns forming the general level of the main canopy in even-aged groups of trees, receiving full light from above and comparatively little from the sides (22)

Overtopped (Suppressed) - Trees of varying levels of vigor that have their crowns completely covered by the crowns of one or more neighboring trees (22)

CROWN CLOSURE (CANOPY CLOSURE) - In a crop or stand, the progressive reduction of space between crowns as they spread laterally, increasing the canopy density (2)

CROWN COVER - The ground area covered by the crowns of trees or woody vegetation as delimited by the vertical projection of crown perimeters and commonly expressed as a percent of total ground area (syn Canopy Cover) (22)

CROWN DENSITY - The amount, compactness, or depth of foliage of the crowns of trees and/or shrubs (22)

CUBIC FOOT (CF) - The amount of timber equivalent to a piece of wood measuring 1 foot by 1 foot by 1 foot (3)

CULMINATION OF MEAN ANNUAL INCREMENT (CMAI) - The age at which the average annual growth of a stand of trees is greatest Mean annual increment is expressed in cubic feet and is based on expected growth according to management intensities and utilization standards assumed in accordance with 36 CFR 219 16(a)(2)(i) and (ii) Culmination of mean annual increment includes regeneration harvest yields and any additional yields from planned intermediate harvests (10)

CULTURAL ECOLOGY - The study of the relationship between humans and their environment or between organism and habitat (11)

CULTURAL RESOURCE - Potential knowledge about human cultural systems, in the form of historical and prehistorical products and by-products of man Physical remains (such as artifacts, ruins, burial mounds, petroglyphs, etc) and their cultural meanings that are useful or important when land-use planning decisions are being made (2)

CUNIT - 100 cubic feet (11)

CURRENT MANAGEMENT - Management of NFGT under existing standards and guidelines with annual outputs and costs based on the outputs and costs for FY 1989 (11)

D

D.B.H. - Diameter at breast height The diameter of a tree measured 4 5 feet from the ground (2)

DECISION CRITERIA - Guidelines or rules used to evaluate alternatives and to select a preferred alternative (11)

DECISION VARIABLE - A component of an alternative in which activities and their costs, outputs, and benefits are identified and this information used in analysis and decisionmaking All activities and costs necessary to obtain the outputs and benefits are included See FSH 1309 11 for decision variable definitions and codes (12)

DEMAND - The amount of an output that users are willing to take at a specified price, time period, and condition of sale (10,12)

DEMAND ANALYSIS - A study of the factors affecting the schedule of demand for an output, including the price/quantity relationship, if applicable (10)(12)

DEMAND SCHEDULE (CURVE) - A schedule of quantities of an output that users are willing to take at a range of prices, at a given time and under given conditions of sale (see Price/Quantity Relationship) (12)

DEPARTURE - A schedule that deviates from the principle of nondeclining flow by exhibiting a planned decrease in the timber sale and harvest schedule at any time in the future (12)

DESIRED FUTURE CONDITION - A portrayal of the land or resource conditions that are expected to result if goals and objectives are achieved fully

DEVELOPED RECREATION - Recreation that requires facilities that in turn result in concentrated use of an area Examples might include roads, parking lots, picnic tables,
toilets, drinking water, ski lifts, and buildings (2)

DEVELOPED RECREATION AREA - An area that will accommodate up to 1,000 persons at one time with a full range of facilities provided facilities include picnic tables, potable water, vehicular access, and sanitary facilities (11)

DIOECIOUS - Having staminate (male) flowers and pistillate (female) flowers on different plants of the same species (19)

DIRECT HABITAT IMPROVEMENT - Land treatments done or structures built to improve wildlife habitat These are habitat improvements not accomplished through coordination with other resource activities (11)

DISCOUNTING - An adjustment, using a discount rate for the values of money over time so that costs and benefits occurring in the future are reduced to a common point in time, usually the present, for comparison (FSM 1905) (6,12)

DISCOUNT RATE - An interest rate that represents the cost or time value of money in determination of present values of future costs and benefits (6,10,12)

DISPERSED RECREATION - Dispersed Recreation outside a developed recreation site, this includes activities such as driving, for the purpose of viewing scenery, recreation in primitive environments (2)

DIVERSITY - The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan See also edge, horizontal diversity, and vertical diversity (2,12)

DOMINANT - See crown class

DUFF - Organic matter in various stages of decomposition on the floor of the forest (4)

EARLY FOREST SUCCESSION - The early developmental stage or condition of a plant community (6)

ECONOMIC EFFICIENCY - See cost efficiency

ECONOMIC EFFICIENCY ANALYSIS - An analytical method in which incremental market and nonmarket benefits are compared with incremental economic costs (2)

ECONOMIC INPUT-OUTPUT MODEL - A linear programming system used to assess social and economic impacts of management strategies being considered (11)

ECOSYSTEM - An interacting system of organisms considered together with their environment, for example, the vegetation and animals within marsh, watershed, or lake ecosystems (2)

ECOSYSTEM MANAGEMENT - Managing the forest ecological units for their uses and values using knowledge about patterns of relationships between organisms and their environment in ways that sustain the diversity and productivity of the ecosystems for the future

EDGE - Where plant communities meet or where successional stages or vegetative conditions within plant communities come together See also edge contrast and horizontal diversity (2)

EDGE CONTRAST - A qualitative measure of the difference between the structure of two adjacent vegetated areas, for example, "low," "medium," or "high" edge contrast (2)

EDGE EFFECT - The influence of one adjoining plant community the composition and density of populations at or near the margin of another (11)

EFFECT (IMPACT), ECONOMIC - The positive or negative change, in economic conditions, including the distribution and stability of employment and income in affected local, regional, and national economies, that directly or indirectly results from an activity, project, or program (12)

EFFECT (IMPACT), PHYSICAL, BIOLOGICAL - The positive or negative change in the physical or biological conditions that directly or indirectly results from an activity, project, or program (12)

EFFECT (IMPACT), SOCIAL - The positive or negative change in social and cultural conditions that directly or indirectly results from an activity, project, or program (12)

ENDANGERED SPECIES - Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range Plant or animal species identified by the Secretary of the Interior as endangered in accordance with the 1973 Endangered Species Act (2)

ENDING INVENTORY CONSTRAINTS - A FORPLAN model timber constraint ensures that the total inventory volume left at the conclusion of the planning horizon will equal or exceed the volume that would occur in a regulated Forest managed in accordance with the prescriptions selected for regeneration of timber stands This prevents liquidation of the timber growing stock at the end of the planning period (2)

ENVIRONMENTAL ANALYSIS - An analysis of alternative actions and their predictable short-term and long-term environmental effects, which include physical, biological, economic, social, and environmental design effects and their interactions (11)

ENVIRONMENTAL ASSESSMENT - Documentation of the Environmental Analysis (11)

ENVIRONMENTAL IMPACT STATEMENT (EIS) - A formal document that must meet the requirements of NEPA and follow Council of Environmental Quality (CEQ) guidelines and directives of the agency responsible for the project proposal (11)

EPHEMERAL STREAM - One that flows briefly and only in direct response to precipitation in the immediate locality and that receives little or no water from springs or other sources The channel of the stream is above the water table at all times (11)

EVEN-AGED MANAGEMENT - A combination of actions that results in the creation of stands in which trees of essentially the same age grow together Managed even-aged forests are characterized by stands of varying ages (and therefore tree sizes) distributed throughout the forest area The difference between the ages of trees forming the main canopy level of an even-aged stand usually does not exceed 20 percent of the age of the stand at harvest rotation age Regeneration in individual stands is obtained during a short period at or near the time when each stand has reached the desired age or size for regeneration and is harvested Clearcut, shelterwood, or seed-tree cutting methods produce even-aged stands (12) (36 CFR 219 3)

EVEN-AGED STAND - A stand of trees containing a single age class in which the range of tree ages is usually less than 20 percent of rotation (22)

EVEN-AGED SYSTEM - A planned sequence of treatments designed to maintain and regenerate a stand with one age class The range of tree ages is usually less than 20 percent of the rotation (see Clearcutting, Seed Tree, Shelterwood, Coppice) (22)

EXCHANGE - A discretionary, voluntary transaction involving mutual transfers of land or interests in land between the Secretary of Agriculture acting by and through the Forest Service and a non-Federal entity (1)

EXTIRPATED SPECIES - A species that no longer occurs in all or significant portions of its former range but occurs as small populations or individuals in isolated portions of its range or is maintained in captivity or cultivation (11)

FEATURED SPECIES - Selected wildlife species managed to occur in relatively large numbers in particular places for particular purposes (2)

FILTER STRIP - An area of varying width of relatively undisturbed vegetation retained to intercept overland water flow, decrease its velocity, and collect sediment (11)

FIRE MANAGEMENT - All activities required for the protection of resources from fire, and the use of fire to meet land management goals and objectives (2,6)

FLOODPLAIN - The lowland and relatively flat areas adjoining inland and coastal waters (including debris cones and floodprone areas of offshore islands) including, at a minimum, those areas subject to a 1-percent or greater chance of flooding in any given year (100-year recurrence) (2)

FORAGE - All browse and nonwoody plants that are available to livestock or game animals and used for grazing or harvested for feeding (6)

FOREGROUND - A term used in visual management to describe the portions of a view between the observer and up to 1/4 to 1/2 mile distant (6)

FOREST - A plant community composed predominantly of trees and other woody vegetation growing more or less closely together A common shortened form of the term "National Forest " Also the area within the administrative boundaries of a National Forest, irrespective of ground conditions or cover (2)

FOREST AND RANGELAND RENEWABLE RESOURCES PLANNING ACT OF 1974 - (RPA) - An Act of Congress requiring the preparation of a program for the management of the National Forests' renewable resources and the preparation of land and resource management plans for units of the National Forest System It also requires a continuing inventory of all National Forest System lands and renewable resources (6)

FOREST DEVELOPMENT ROAD - An access road wholly or partly within or adjacent to and serving a National Forest and that has been included in the Forest Development Transportation Plan (11)

FOREST HIGHWAY - A Forest road under the jurisdiction of and maintained by a public authority and open to public travel (11)

FOREST LAND - Land at least 10 percent occupied by forest trees of any size or that formerly had such tree cover and is not currently developed for nonforest use Lands developed for nonforest use include areas for nonforest crops, improved pasture, residential or administrative areas, improved (constructed) roads of any width and adjoining road clearings and powerline clearings of any width (36 CFR 219 3) The term "occupancy," when used to define forest land, shall refer to measured canopy cover of live forest trees at maturity The minimum area to be classified as forest land is one acre or greater, consistent with Regional mapping standards Unimproved roads, trails, streams, and clearings in forest areas are classified as forest if they are less than 120 feet in width (1,10,12)

FOREST PROGRAM - The summary or aggregation of project or activity information that makes up an integrated (multifunctional) course of action for a given level of funding on a National Forest and is consistent with the Forest Plan (12)

FOREST REGULATION - The organization and control of the growing stock for a sustained yield of forest products from a specific forest area Forest regulation performs the vital task of balancing the yield (production) from the specific forest area with growth or productive capacity (2)

FOREST SERVICE HANDBOOK (FSH) - A handbook of directives that provide detailed instructions for proceeding with specialized phases of programs or activities for Forest Service use (10)

FOREST SERVICE MANUAL (FSM) - A system of manuals that provide direction for Forest Service activities

FOREST SYSTEM ROADS - Roads that are part of the Forest development transportation system, which includes all existing and planned roads as well as other special and terminal facilities designated as Forest development transportation facilities (See arterial roads, collector roads, and local roads)

FOREST TREE IMPROVEMENT - All practices designed to produce genetically more desirable forest trees, for example, forest tree breeding, the selection and protection of superior seed trees, and some provenance studies (2)

FOREST TYPE - A classification of forest land based upon the tree species presently forming a plurality of stocking in live trees For trees of poletimber size and larger, stocking is expressed as basal area per unit land area For trees with d b h less than 5 0 inches, stocking is expressed as number of trees per unit land area (2)

FORPLAN - A linear programming system used for developing and analyzing Forest planning activities (10)

FRAGMENTATION - The process of reducing the size and connectedness of stands that make up a forest (16)

FUEL MANAGEMENT - The practice of planning and executing the treatment or control of living or dead vegetative material in accordance with fire management direction (10)

FUELS - Combustible wildland vegetative materials The term is usually applied to aboveground living and dead surface vegetation, but also applies to roots and organic soils such as peat (10)

FULL-SERVICE MANAGEMENT - Management of developed recreational facilities to provide optimum maintenance (11)

G

GAME SPECIES - Any species of wildlife or fish for which seasons and bag limits have been prescribed and which are normally harvested by hunters, trappers, and

fishermen under state or Federal laws, codes, and regulations (6)

GOAL STATEMENT - A concise statement that describes a desired condition to be achieved at some time in the future It is normally expressed in broad, general terms and does not specify a date by which the goal is to be achieved Goal statements form the principal basis from which objective statements are developed (12)

GOODS AND SERVICES - The various outputs, including on-site uses, produced from forest and rangeland resources (12)
(36 CFR 219 3)

GRASS-FORB - A stage in the succession of coniferous forests that is dominated by grasses and forbs Not the same as grassland (2)

GRASSLAND - Plant communities whose potential natural and dominant vegetation is grasses or grasslike plants Also, and administrative unit of the U S Forest Service (more frequently "National Grassland") (2)

GRAZING ALLOTMENT - An area designated for use by a prescribed number and kind of livestock under a plan of management (2)

GROSS NATIONAL PRODUCT (GNP) - The market value of goods and services produced by the Nation's economy (2)

GROUP SELECTION - See regeneration

H

HABITAT - The place where a plant or animal naturally or normally lives and grows (2)

HABITAT CAPABILITY - The estimated ability of an area, given existing or predicted habitat conditions, to support a wildlife, fish, or plant population It is stated in terms of potential population numbers (12)

HABITAT CAPABILITY MODEL - A model of the relationship between species population size and a variety of habitat factors such models can be used to predict changes in (animal numbers) as responses to habitat change (12)

HABITAT TYPE - The aggregate of all areas that support or can support the same primary vegetation at climax (2)

HARVESTING METHOD - A cutting method by which a stand is harvested Emphasis is on meeting logging requirements rather than silvicultural objectives (see Regeneration Methods) (22)

HERBICIDE - A chemical used to control, suppress, or kill plants or to severely interrupt their normal growth processes (14)

HISTORIC ARCHEOLOGY - Archeology dealing with historic sites (i e those of

post-European contact) These might include Spanish, British, early American, and Civil War Period sites (11)

HORIZONTAL DIVERSITY - The distribution and abundance of plant and animal communities or successional stages across an area of land, the greater the number of communities, the higher the degree of horizontal diversity See also vertical diversity (2)

HYDROLOGIC CONDITION - The characteristics of a watershed that influence its ability to absorb and release precipitation through surface and subsurface water flow and through evaporation and transpiration of vegetation (2)

HYDROLOGY - The scientific study of the properties, distribution, and effects of water in the atmosphere, on the Earth's surface, and in soil and rocks

I

ID TEAM - See interdisciplinary team

IMPLAN - A computer-based system used by the Forest Service for constructing nonsurvey input-output models to measure economic input The system includes a data base for all counties in the United States and a set of computer programs to retrieve data and perform the computational tasks for input-output analysis (10)

INCLUSION - A community of trees with all the attributes of a stand, but not meeting minimum criteria for stand size or shape (11)

INDICATOR SPECIES - (1) Species that indicate the presence of certain environmental conditions, seral stages, or previous treatment (2) One or more plant species selected to indicate a certain levelof grazing use (11)

INDIRECT IMPACT - Effects on the environment that are not immediate or direct results of an action but that are less likely to occur without it Indirect effect is the extent to which a project or action exposes resources, within or adjacent to the development to such adverse effect as accelerated erosion, construction of private homes or commercial buildings, road building, increased vandalism, or other disturbance attendant on the action An indirect impact can be beneficial, as when a project results in development that helps protect a site from vandalism (11)

INDIVIDUAL TREE (SINGLE TREE) SELECTION - See regeneration

INFRASTRUCTURE - Includes all facilities, roads, buildings, etc and associated structural components

INPUT - Land, labor, or capital required for production processes (12)

INPUT-OUTPUT ANALYSIS - A technique for analyzing the interdependence of producing and consuming sectors in an economy (12)

INTEGRATED PEST MANAGEMENT - A process for selecting strategies to regulate forest pests in which all aspects of a pest-host system are studied and weighed The information considered in selecting appropriate strategies includes the impact of the unregulated pest population on various resource values, alternative regulatory tactics and strategies, and benefit/cost estimates for these alternative strategies Regulatory strategies are based on sound silvicultural practices and ecology of the pest-host system and consist of combinations of tactics (for examples, timber stand improvement ands selective use of pesticides) A basic principle in the choice of strategy is that it must be ecologically acceptable (12) (36 CFR 219 3)

INTEGRATED RESOURCE MANAGEMENT - A management strategy that emphasizes no resource element to the exclusion of others or in violation of the minimum legal standards for others (12)

INTERCHANGE - A land transfer in which the Secretary and another person exchange lands or interests in lands of approximately equal value without a formal appraisal (1)

INTERDISCIPLINARY TEAM (ID TEAM) - A group of individuals with different training assembled to solve a problem or perform a task Such a team is assembled because no one scientific discipline is sufficiently broad so that its practitioners can to adequately solve the problem (6)

INTERMEDIATE - See crown class

INTERMEDIATE TREATMENTS (Tending) - A collective term for any treatment designed to enhance growth, quality, vigor, and composition of the stand after establishment of regeneration and prior to final harvest (22)

INTERMITTENT STREAM - A stream that flows cyclically in response to water table levels During normal years, flow of an intermittent stream ceases during dry periods and resumes when water table levels rise during wet periods The channel of an intermittent stream is dry for a large part of the year, ordinarily for more than three months (11)

INTERPRETIVE SITE - A developed site at which a broad range of natural or cultural history is interpreted or described for the enjoyment of the public (11)

INTRODUCED SPECIES - A species not a part of the original fauna or flora of the area in question (11)

INVADER - Plant species that were absent or present only in very small numbers in undisturbed portions of a specific range site and will invade following disturbance or continued overuse (11)

IRON-ORE GRAVEL - See plinthite

IRRETRIEVABLE - Incapable of being recovered, applied to losses of production, harvest, or commitment of renewable natural resources For example, some or all of the timber production from an area is irretrievably lost during the time an area is used as a winter sports site If the use is changed, timber production can be resumed The production lost is irretrievable, but the action is not irreversible

(11)

IRREVERSIBLE - Incapable of being undone, applied primarily to the use of or damage to resources, such as minerals or cultural resources, or to those factors that are renewable only over long time spans, such as soil productivity Irreversible decisions cannot be repealed and eliminate future options (11)

ISSUE - A point, matter, or question of public discussion or interest to be addressed or decided through the planning process

K

KEY AREA - Unit of land managed primarily for wildlife food, water, or cover Key areas supplement the nearby forest management types and enable them to meet the habitat requirements of the featured game species at the population size objective within a unit area They can be stand-sized or smaller and be managed through timber sales, cultural treatments, or wildlife stand improvements (11)

KV - The Knutson-Vandenberg (KV) Act of June 9, 1930, as amended by the National Forest Management Act of October 22, 1976, is the authority for requiring purchasers of National Forest timber to make deposits to finance sale area improvement activities needed to protect and improve the future productivity of the renewable resources of forest lands on timber sale areas Activities include sale area improvement operations and maintenance and construction for reforestation, timber stand improvement, range, wildlife, and fish habitat, soil and watershed protection, and recreation (10)

L

LAND AND WATER CONSERVATION FUND (L&WCF) - Funds collected from sales of surplus Government real property, motorboat fuels taxes, recreation use fees, etc and available to purchase and develop certain qualifying lands for recreational purposes

LAND CAPABILITY - The suitability of land for use without permanent damage "Land capability," as the term is ordinarily used in the United States, expresses the effect of physical land conditions, including climate, on the suitability of land for use without damage for production of crops that require regular tillage, for grazing, for timber management, and for wildlife management Land capability involves consideration of (1) the risks of land damage from erosion and other causes and (2) the difficulties in land use that result from physical land characteristics, including climate (11)

LAND MANAGEMENT - The intentional process of planning, organizing, programming, coordinating, directing, and controlling land use actions (6)

LANDSCAPE MANAGEMENT - The art and science of planning and administering the use of forest lands in such ways that the visual effects achieved maintain or upgrade man's psychological welfare It is the planning and design of the visual

aspects of multiple-use land management (2)

LAND SUITABLE FOR GRAZING OR BROWSING - Land with vegetation that can be used by domestic and wild grazing animals, without damage to soil and water resources (12)

LEASE - A special use authorization that conveys a right of occupancy and use of National Forest System land or facilities for a specified period and purpose and is both revocable and compensable according to its terms (1)

LEVEL IV LAW ENFORCEMENT OFFICER - A Forest Service employee who has graduated from the Federal Law Enforcement Academy and holds a law enforcement commission signed by the Regional Forester District Level IV officers generally perform other duties as well as law enforcement

LIBERATION - A release treatment made in a stand not past the sapling stage in order to free the favored trees from competition of older, overtopping trees (22)

LITHIC SCATTER - An archeological site consisting of lithic (stone) material, often containing cast-off flakes from the manufacture of stone tools Usually considered to represent a prehistoric hunt camp (11)

LOCAL ROADS - These roads connect terminal facilities with Forest Service collector or arterial roads or with public highways and normally serve single resources (2)

LONG-TERM SUSTAINED-YIELD TIMBER CAPACITY (LTSY) - The highest uniform wood yield from land being managed for timber production that may be sustained under a specified management intensity consistent with multiple-use objectives (1) (12)

M

M - Thousand

MBF - Thousand board feet

MM - Million

MMBF - Million board feet

MAINTENANCE BURNING - The use of prescribed burning to maintain vegetation in a desired condition (11)

MANAGED SEASON - That period of time when developed recreational sites are open for public use, with routine maintenance, cleanup, and operation on a scheduled basis (11)

MANAGEMENT AREA - An area whose parts are managed for similar objectives and under a common management prescription (1,10,12)

MANAGEMENT CONCERN - An issue, problem, or condition that constrains the range of management practices identified as suitable by the Forest Service in the planning process (1,12)(36 CFR 219 3)

MANAGEMENT DIRECTION - A statement of multiple-use and other goals and objectives, the associated management prescriptions, and standards and guidelines for attaining them (1,12)
(36 CFR 219 3)

MANAGEMENT EMPHASIS - The values to be featured or enhanced (11)

MANAGEMENT INDICATOR SPECIES - A species whose welfare is presumed to indicate the welfare of other species using the same habitat A species whose condition can be used to assess the impacts of management actions on a particular area (8)

MANAGEMENT INFORMATION HANDBOOK (MIH) - A part of the Forest Service Directives System, it contains standard definitions for types of work and units of measure (11)

MANAGEMENT INTENSITY - The management practices or combinations of management practices and associated costs designed to produce different levels of goods and services (1,12) (36 CFR 219 3)

MANAGEMENT PRACTICE - A specific activity, measure, course of action, or treatment (12) (36 CFR 219 3)

MANAGEMENT PRESCRIPTION - Management practices and intensity selected and scheduled for application on a specific area to attain multiple-use and other goals and objectives (1,12)
(36 CFR 219 3)

MANAGEMENT TEAM - Decisionmaking group consisting of the Forest Supervisor, Staff Officers, and District Rangers (11)

MANAGEMENT TYPE - The species or species group that is best suited to the site for commercial timber production or to meet other resource needs Site productivity is typically a primary determinant of management type, but the overriding necessity to provide for one or more nontimber forest uses may influence or determine management type (11)

MAST - The fruit of trees such as oak, beech, and sweet chestnut, and also the seeds of certain pines (such as longleaf and pinnon pines), particularly where considered as food for livestock and certain kinds of wildlife (2)

MATURE TIMBER - Trees that have attained full development, particularly in height, and are in full seed production (3)

MAXIMIZE - To find the maximum value of a specific resource without regard to other resources or constraints (11)

MAXIMUM MODIFICATION - See visual quality objectives

MEAN ANNUAL INCREMENT - The total increment of volume growth per acre up to a given stand age, divided by that age Culmination of mean annual increment is the stand age at which the mean annual increment of growth is greatest or reaches its highest point (2)

MIDDLEGROUND - A term used in visual resource management to describe the visible terrain beyond the foreground, in the middleground, individual trees are still visible but do not stand out distinctly from the stand, usually up to 3 to 5 miles from the observer (See foreground and background) (1)

MINERAL LEASE - An agreement permitting use of land for exploration, and then, if mineral is discovered, giving right to take mineral either for definite term or so long as it can be produced in paying quantities upon reserved royalty (18)

MINIMUM LEVEL MANAGEMENT - The management strategy that would meet only the basic statutory requirements of administering unavoidable, nondiscretionary land uses, preventing damage to adjoining lands of other ownerships, and protecting the life, health, and safety of incidental users (11)

MINIMUM MANAGEMENT REQUIREMENTS - Constraints or activities necessary to maintain viable wildlife populations and to prevent permanent impairment of the productivity of the land (11)

MINIMUM VIABLE POPULATION - The minimum number of individuals required to maintain a stable, self-sustaining gene pool (11)

MISSION - A major, continuing national area of concern or responsibility of the Forest Service that is directed by legislation, order, or regulation The Forest Service mission is the basic reason for the existence of the Forest Service as a Federal agency and characterizes the Agency's role in solving broad, national problems (12)

MITIGATION MEASURES - Actions to avoid, minimize, reduce, eliminate, or rectify adverse impacts of management practices

MODIFICATION - See visual quality objective

MONITORING - A process for collecting significant data from defined sources to identify departures or deviations from expected plan outputs (2)

MONITORING AND EVALUATION - The periodic evaluation of Forest Plan management practices on a sample basis to determine how well objectives have been met

MONOECIOUS - Having staminate and pistillate flowers on the same plant (19)

MORTALITY - In wildlife management, the loss in a population from any cause, including hunter kill, poaching, predation, accident, and disease In forestry, trees in a stand that die of natural causes (8)

MULTIPLE-MANAGEMENT USE - The management of all the various renewable surface resources of the National Forest System so that they are utilized in the combination that will best meet the needs of the American people Making the

most judicious use for production of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions (some lands will be used to produce less than all of the resources) Harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, but not necessarily management for the combination of uses that will give the greatest dollar return or the greatest unit output (1,12) (36 CFR 219 3)

N

NATIONAL DIRECTION - Statements of missions, goals, and objectives that guide Forest Service planning (12)

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) OF 1969 - An act to declare a National policy that will encourage productive and enjoyable harmony between man and his environment, to promote efforts that will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man, to enrich the understanding of the ecological systems and natural resources important to the Nation, and to establish a Council on Environmental Quality (11)

NATIONAL FOREST LAND AND RESOURCE MANAGEMENT PLAN - A Plan that " shall provide for multiple use and sustained yield of goods and services from the National Forest System in a way that maximizes long-term net public benefits in an environmentally sound manner " (1)

NATIONAL FOREST MANAGEMENT ACT (NFMA) - A law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act requiring the preparation of Regional Guides and Forest Plans and the preparation of regulations to guide that work

NATIONAL FOREST SYSTEM BOUNDARY - A legal boundary of a National Forest, Grassland, or other administrative unit and that encloses a unit of the National Forest System as defined in section 11 of the RPA These lines have been established by Presidential Proclamation, Executive Order, Public Land Order, Secretarial Order, or Act of Congress (2)

NATIONAL FOREST SYSTEM (NFS) LAND - A Federal reservation, generally forest, range, or other wild land, that is administered by the Forest Service of the U S Department of Agriculture under a program of multiple use and sustained yield for timber, and for range, catchment, wildlife, and outdoor recreational purposes (2)

NATIONAL FOREST SYSTEMS - All National Forest lands reserved or withdrawn from the public domain of the United States, all National Forest lands acquired through purchase, exchange, donation, or other means, the National Grasslands and land utilization projects administered under Title III of the Bankhead-Jones Farm Tenant Act (50 Stat 525, 7 U S C 1010-1012), and other lands, waters, or interests therein that are administered by the Forest Service or are

designated for administration through the Forest Service as a part of the system (16 U S C 1608) (12)

NATIONAL RECREATION TRAILS (NRT) - Trails designated by the Secretary of the Interior or the Secretary of Agriculture as part of the National system of trails authorized by the National Trails System Act National Recreation Trails provide a variety of outdoor recreation uses (6)

NATIONAL REGISTER OF HISTORIC PLACES - A listing (maintained by the National Park Service) of areas that have been designated as being of historical significance The Register includes places of local and state significance as well as those of value to the Nation (6)

NATIONAL WILDERNESS PRESERVATION SYSTEM - All lands covered by the Wilderness Act and subsequent wilderness designations, irrespective of the department or agency having jurisdiction (11)

NATURAL FOREST - A forest environment, including its associated plant and animal communities, that has been produced essentially through the process of natural succession This process would include the effects of natural catastrophic occurrences (11,12)

NATURAL REGENERATION - An age class created from natural seeding, sprouting, suckering, or layering (22)

NET PUBLIC BENEFITS - An expression used to signify the overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index The maximization of net public benefits to be derived from management of units of the National Forest System is consistent with the principles of multiple use and sustained yield (12) (36 CFR 219 3)

NO-ACTION ALTERNATIVE - The 1987 Forest Plan alternative representing the condition expected to exist in the future if current management direction continued unchanged Also referred to as the Current Program (11)

NONCHARGEABLE VOLUME - All volume that is not included in the growth and yield projections for the selected management prescriptions used as a basis for calculating the allowable sale quantity (10)

NONCOMMERCIAL THINNING - A cutting made in a stand past the sapling stage for the purpose of improving its composition and character, by removing trees of less desirable species, form, and condition in the main crown canopy (11)

NONCONSUMPTIVE SPECIES - Wildlife species that are not taken (harvested) for personal consumption (11)

NONDECLINING YIELD - A timber flow constraint that ensures that harvests in each period after the first will be greater than or equal to the harvest in the preceding period (11)

NONFOREST LAND - Land never having or land incapable of having more than

10 percent of its area occupied by forest trees and land formerly and currently developed for nonforest use (6)

NONGAME SPECIES - Species of animals not managed for sport hunting (2)

NONPOINT SOURCE POLLUTION - Pollution whose source is general rather than specific in location (6)

NONPRICED OUTPUTS - Those outputs for which there is no available transaction evidence and no reasonable basis for estimating a market value commensurate with market values associated with price outputs (11)

O

OBJECTIVE - A concise statement of measurable planned results that correspond to pre-established goals and a time schedule for attainment of the planned results An objective forms the basis for further planning that defines precisely the steps to be taken and the resources to be used in achieving identified goals (1,12)

OBJECTIVE FUNCTION - The item to be maximized (or minimized) in a problem's solution (11)

OFF-ROAD VEHICLES (ORV'S) - Vehicles such as motorcycles, all-terrain vehicles, four-wheel-drive (to include off-road vehicles and trucks) vehicles, and snowmobiles (2)

OLD-GROWTH FOREST - Ecosystems characterized by old trees and related structural attributes "Old growth" refers to the later stages of stand development which typically differ from earlier stages in a variety of characteristics such as tree size, accumulation of large dead woody material, number of canopy layers, species composition, and ecosystem function (15)

OLD-GROWTH HABITAT - Wildlife habitat that is characterized by overmature coniferous and deciduous forest stands with large snags and decaying logs

OPPORTUNITY - A proposal that is considered in developing alternative activities, projects, or programs where there is a chance to invest profitably to improve or maintain a present condition (12)

OUTPUT - A good, service, or on-site use that is produced from forest and rangeland resources See FSH 1309 11 for forest and rangeland outputs codes and units of measure (12)

OUTPUT, INDUCED - A good, service, or on-site use that is produced incidentally and not as a primary objective For example, an increase in wildlife habitat acreage can be an induced output of timber harvest administration activity that produces timber as a primary output (12)

OUTPUT, MARKET - A good, service, or on-site use that can be purchased at a price (12)

OUTPUT, NONMARKET - A good, service, or on-site use not normally exchanged in a market (12)

OUTPUT, PRIMARY - A good, service, or on-site use that results from the completion of an activity, project, or program specifically designed to produce the good, service, or on-site use Examples are board feet of timber and recreation visitor day (12)

OVERGRAZING - Continued overuse (year after year) creating a deteriorated range

OVERMATURE TREES - Trees allowed to grow beyond optimum age or size, for purpose of timber production, with resulting declines in growth and vigor (because of decay) In certain species, mortality and loss in volume due to insects and disease may result when trees are retained to overmaturity (13)

OVERSTORY - Those trees that form the upper or uppermost canopy in a forest or stand having more than one story (3,19)

OVERTOPPED (Suppressed) - See crown class

P

PARTIAL RETENTION - See visual quality objectives

PERENNIAL STREAM - Stream that flows throughout the year (11)

PERMIT - A special use authorization that provides permission, without conveying an interest in land, to occupy and use National Forest System land or facilities for specified purposes, and which is both revocable and terminable (1)

PERSONS-AT-ONE-TIME (PAOT) - A recreation capacity measurement term for the number of people that can use a facility or area at one time (11)

PLANNING AREA - The area of the National Forest System covered by a Regional Guide or a Forest Plan (1,12)

PLANNING HORIZON - The overall time period considered in the planning process It spans all activities covered in the analysis or plan and all future conditions and effects of proposed actions that would influence the planning decisions (1,12)

PLANNING PERIOD - One decade Within the planning horizon, for which incremental changes in yields, costs, effects, and benefits are shown (1,12)

PLINTHITE - An iron-rich, humus-poor mixture of clay with quartz and other diluents (21)

POLICY - A guiding principle upon which a specific decision or set of decisions is bases (12)

POLICY ISSUE - An action or set of circumstances that has bearing on current or future policy (12)

PRECOMMERCIAL THINNING - A thinning that does not yield trees of commercial value, usually designed to improve crop spacing (22)

PREFERRED ALTERNATIVE - The alternative recommended for adoption as the Forest Plan (11)

PRESCRIPTION - A written direction for harvest activities and regeneration methods

PRESENT NET VALUE - The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area (1,12) (36 CFR 219 3)

PRESERVATION - See visual quality objectives

PRICE-QUANTITY RELATIONSHIP - A schedule of prices that would prevail in a market for various quantities of the output exchanged (See demand schedule and supply schedule) (12)

PRIMITIVE CAMPGROUND - A campground that has no flush toilets, tent pads, or fireplace grates, and is located in a setting that allows use by 4 to 8 people per acre at one time (11)

PRIMITIVE RECREATION - Those recreational activities associated with unroaded land, e g , hiking, backpacking, cross-country travel (6)

PRIVATE MINERAL RIGHTS - Mineral rights owned by other than the United States May be either reserved or outstanding (11)

PROGRAM - Sets of activities or projects with specific objectives, defined in terms of specific results and responsibilities for accomplishments (12)

PROGRAM BUDGET - A plan that allocates annual funds, work force ceilings, and targets among agency management units (12)

PROGRAM BUDGET LEVEL - A single, comprehensive integrated program responsive to the Chief's direction that specifies a level of production attainable from a given investment of dollars and other resources Each budget level represents a complete, full, and independent package (12)

PROGRAM ELEMENT - An individual Forest Service area of responsibility, which in combination with other elements, comprises the statutory or Executive-directed mission of the Forest Service Specific Forest Service program elements are defined in the Management Information Handbook (FSH 1309 11) (12)

PROGRAM PROPOSAL - A multiyear course of action proposed under a given set of assumptions and constraints (12)

PROJECT - An organized effort to achieve an objective identified by location, ac-

tivities, outputs, effects, and by time periods and responsibilities for execution (12)

PROJECT DESIGN - The process of developing specific information necessary to describe the location, timing, activities, outputs, effects, accountability, and control of a project (12)

PUBLIC INVOLVEMENT - A Forest Service process designed to broaden the information base upon which agency decisions are made by (1) informing the public about Forest Service activities, plans, and decisions and (2) encouraging public understanding of and participation in the planning processes that lead to final decisionmaking (10,12)

PUBLIC ISSUE - A subject or question of widespread public interest relating to management of the National Forest System (1) (12)

PUBLIC PARTICIPATION - Meetings, conferences, seminars, workshops, tours, written comments, responses to survey questionnaires, and similar activities and contributions conducted or solicited to obtain comments from the public about Forest Service planning (12)

PULPWOOD - Softwood trees that contain at least 15 feet of continuous merchantable length or three 5-foot pieces and hardwood trees that contain at least 10 feet of continuous merchantable length or two 5-foot pieces Softwood trees must be at least 5 0 inches in diameter at breast height, and hardwood trees must be at least 6 0 inches in diameter at breast height

R

RANGE CONDITION CLASS - One of a series of nonquantitative categories used to classify range condition, usually excellent, good, fair, or poor (11)

RANGE DEGENERATION (RANGE RETROGRESSION) - The process whereby different plant communities of successively lower ecological order occupy an area (11)

RANGE IMPROVEMENT - (1) Any structure or excavation built or dug to facilitate management of range or livestock (2) Any practice designed to improve range condition or facilitate more efficient utilization of the range (3) An increase in the grazing capacity of range, i e , improvement in range condition (11)

RANGELAND (RANGE) - Land on which the native vegetation is predominately grasses, grass-like plants, forbs, or shrubs suitable for grazing or browsing use Forested sites and nonforested sites providing forage and habitat for domestic and wild herbivores are included (12)

RANGELAND VEGETATION - Vegetation on all land with rangeland resource values or for which rangeland resource objectives have been established, including riparian areas Generally, the focus is on grass or grasslike plants, forbs, or shrubs (12)

RANGE MANAGEMENT - The art and science of planning and directing range utilization so as to secure sustained maximum production of livestock, milk, or cut forage or combinations of these outputs consistent with other uses and while conserving natural resources (3)

RARE II (Roadless Area Review and Evaluation II) - A comprehensive process directed by the Secretary of Agriculture to identify roadless and undeveloped land areas in the National Forest System and to determine their uses for either wilderness or other resource management and development and to determine areas for which such decisions would require further planning (2)

REAL DOLLAR VALUE - A monetary value that compensates for the effects of inflation (12) (36 CFR 219 3)

RECEIPT SHARES - The portions of receipts derived from Forest Service resource management that are distributed to State and county governments (for example, Forest Service 25-percent fund payments) (12) (36 CFR 219 3)

RECORD OF DECISION - A document separate from but associated with an Environmental Impact Statement and stating the decision, identifying all alternatives, specifying which alternatives were environmentally preferable, and stating whether all practicable means to avoid environmental harm resulting from the alternative have been adopted, and if not, why not (40 CFR 1505 2)

RECREATION EXPERIENCE LEVEL - A classification (using a 1 to 5 scale) of the level of development in camp and picnic sites and expressing the types of recreational opportunities and modifications to the environment that can be expected (11)

RECREATION INFORMATION MANAGEMENT SYSTEM (RIM) - A Forest Service system that compiles recreational visitor use information by type and intensity of use (11)

RECREATION OPPORTUNITY SPECTRUM (ROS) - Land delineations that identify a variety of recreation experience opportunities categorized into six classes on a continuum from primitive to urban Each land class is defined in terms of the degree to which it satisfies certain recreation experience needs based on the extent to which the natural environment has been modified, the type of facilities provided, the outdoor skills needed to enjoy the area, and the relative density of recreation use The six classes are primitive, semi-primitive nonmotorized, semi-primitive motorized, roaded natural, rural, and urban (2)

1. **Primitive** - Essentially unmodified natural environment where evidence of other users is low, usually 3 miles or more from roads Visitors enjoy hiking, horseback riding, nature study, and other nonmotorized uses Visitors experience isolation, independence, closeness to nature, and self-reliance in an environment offering a high degree of challenge and risk

2. **Semi-primitive nonmotorized** - The area is predominantly a natural environment generally over 1/2 mile from roads, but no further than 3 miles from all roads and visitors encounter evidences of other users Visitors enjoy nonmotorized uses, and there is a high probability that they will experience isolation, independence, and closeness

to nature Challenge and risk are generally high Resource management activities may be conducted, however, natural appearance is still maintained

3 **Semi-primitive motorized** - Settings, activities, and opportunities are within 1/2 mile of primitive roads and trails that generally provide much the same conditions as semi-primitive nonmotorized, primitive roads may be present and motorized use is permitted Settings, activities, and opportunities are affected accordingly, but there is still a moderate probability of experiencing isolation from sights and sounds of humans, and generally no closer than 1/2 mile from improved roads

4. **Roaded natural** - The appearance of natural environment Predominates, but there is moderate evidence (sights and sounds) of humans Concentration of users is moderate to low Roads of better than primitive class are usually within 1/2 mile A broad range of motorized and nonmotorized activity opportunities are available Management activities including timber harvest are present but harmonize with the natural environment

5 **Rural** - These areas are substantially modified Other persons are readily seen and heard Interaction between users is moderate to high Numerous facilities are usually present Challenge and risks are unimportant Motorized use and facilities are common Resource management activities may be common and obvious

6. **Urban** - The environment is usually highly modified and contains numerous improvements Large concentrations of humans can be expected. Experiencing the natural environment is unimportant

RECREATION VISITOR DAY (RVD) - Twelve visitor hours, which may be aggregated continuously, intermittently, or simultaneously by one or more persons (11)

RECREATIONAL OPPORTUNITY - Availability of a real choice for a user to participate in a preferred activity within a preferred setting in order to realize the satisfying experiences that are desired (11)

RED-COCKADED WOODPECKER COLONY - A group of live pine trees containing cavities excavated, maintained, and used by a clan of red-cockaded woodpeckers for nesting and roosting A buffer at least 200 feet deep must furround each colony (11)

REDUCED-SERVICE MANAGEMENT - Management of developed recreation facilities below optimum maintenance standards (11)

REFORESTATION - The natural or artificial restocking of an area with forest trees (2)

REGENERATION - A cutting method by which a new age class is created The major methods are Clearcutting, Seed Tree, Shelterwood, Selection, and Coppice (see Harvesting Method) (22)

Even-Aged Method Methods

1. **Clearcutting** - A method of regenerating an even-aged stand in which a new age class develops in a fully-exposed microclimate after removal, in a single cutting, of all trees in the previous stand Regeneration is from natural seeding, direct seeding, planted seedlings, and/or advance reproduction Harvesting may be done in groups or patches (Group or Patch Clearcutting), or in strips (Strip Clearcutting) In the Clearcutting System, the management unit or stand in which regeneration, growth, and yield are regulated consists of the individual clearcut stand (see Group Selection)

2. **Clearcutting with Reserves** - A clearcutting method in which varying numbers of reserve trees are not harvested to attain goals other than regeneration

3. **Seed Tree** - An even-aged regeneration method in which a new age class develops from seedlings that germinate fully-exposed micro-environments after removal of all the previous stand except a small number of trees left to provide seed Seed trees are removed after regeneration is established

4. **Seed Tree with Reserves** - A seed tree method in which some or all of the seed trees are retained after regeneration has become established to attain goals other than regeneration

5. **Shelterwood** - A method of regenerating an even-aged stands in which a new age class develops beneath the partially-shaded micro-environment provided by the residual trees The sequence of treatments can include three distinct types of cuttings 1) an optional preparatory harvest to enhance conditions for seed production, 2) an establishment harvest to prepare the seed bed and to create a new age class, and 3) a removal harvest to release established regeneration from competition with the overwood Harvesting may be done uniformly throughout the stand (Uniform Shelterwood), in groups or patches (Group Shelterwood), or in strips (Strip Shelterwood)

6. **Shelterwood with Reserves** - A variant of the Shelterwood Method in which some or all of the shelter trees are retained, well beyond the normal period of retention, to attain goals other than regeneration The resulting stand may be two-aged or tend towards an uneven-aged condition as a consequence of both an extended period of regeneration establishment and the retention of reserve trees that may represent one or more age classes

7. **Two-Aged Methods** - Methods designed to maintain and regenerate a stand with two age classes See Shelterwood with Reserves and Coppice with Reserves

8. **Uneven-Aged (Selection) Methods** - Methods of regenerating a forest stand, and maintaining an uneven-aged structure, by removing some trees in all size classes either singly, in small groups or in strips

9. **Group Selection** - A method of regenerating uneven-aged stands in which trees are removed, and new age classes are established, in small groups The maximum width of groups is approximately twice the height of the mature trees, with small openings providing micro-environments suitable for tolerant regeneration and the larger openings providing conditions suitable for more intolerant regeneration In the Group Selection system, the management unit or stand in which regeneration, growth, and yield are regulated consists of a landscape containing an aggregation of groups (see Clearcutting)

10. **Single Tree Selection** - A method of creating new age classes in uneven-aged stands in which individual trees of all size classes are removed more-or-less uniformly throughout the stand to achieve desired stand structural characteristics

11. **Coppice Methods** - Methods of regenerating a stand in which the majority of regeneration is from stump sprouts or root suckers

12. **Coppice** - A method of regenerating a stand in which all trees in the previous stand are harvested and the majority of regeneration is from sprouts or root suckers

13. **Coppice with Reserves** - A coppice method in which reserve trees are retained to attain goals other than regeneration The method normally creates a two-aged stand

REGENERATION CUTTING - Any removal of trees intended to assist regeneration already present or make regeneration possible (2)

REGENERATION CUTTING METHODS - Any cutting methods intended to promote or facilitate regeneration of a new stand or make regeneration of a new stand possible (11)

REGENERATION (Reproduction) PERIOD - The time between the initial regeneration cutting and the successful re-establishment of a new age class by natural means, planting, or direct seeding (22)

REGION - An area managed under the provisions of a Regional guide See FSM 1221 3 for organizational definitions (12)

REGULAR UNEVEN-AGED (Balance) STAND - A stand in which three or more distinct age classes occupy approximately equal areas and provide a balanced distribution of diameter classes (22)

RELEASE - A treatment designed to free young trees from undesirable, usually overtopping, competing vegetation Treatments include cleaning, liberation, and weeding (see Stand Improvement) (22)

RENEWABLE RESOURCES ASSESSMENT - An appraisal of the Nation's renewable resources made in recognition of their vital importance and the neces-

sity for long-term planning and associated program development The Assessment must meet the requirements of Section 3 of the Resources Planning Act and includes analyses of present and anticipated uses, demands, and supplies of the renewable resources, a description of Forest Service programs and responsibilities, and a discussion of policy considerations, laws, and regulations (12)

RENEWABLE RESOURCES PROGRAM - The program for management and administration of the National Forest System, for Research, for Cooperative State and Private Forest Service programs, and for conduct of other Forest Service activities This program is developed in accordance with the Forest and Rangeland Renewable Resources Planning Act (12)

RESEARCH NATURAL AREA (RNA) - Designated area of land, usually larger than 300 acres and having ecological characteristics that are of scientific or educational interest These areas are valuable as locations for observing and researching plant and animal succession, habitat requirements of species, insect and fungus depredations, soil microbiology, phenology, and other related subjects (2)

RESERVE TREES - Trees, pole-sized or larger, retained after the regeneration period under the Clearcutting, Seed Tree, Shelterwood, or Coppice Methods syn Standards (22)

RESOURCE - Anything beneficial or useful – animal, vegetable, or mineral, a location, a labor force, a view, an experience, and so on Resources, in the context of land use planning, thus vary from such commodities as timber and minerals to such amenities as scenery, scenic view points, and recreation opportunities (6)

RESPONSIBLE LINE OFFICER - For land management planning purposes, the Forest Service employee who has been delegated the authority to carry out a specific planning action (12)

RETENTION - See visual quality objectives

RETURNS TO COUNTIES - The portion of receipts derived from Forest Service resource management that is distributed to State and county governments (for example, Forest Service 25-percent funt payments

RIGHT-OF-WAY (ROW) - Land authorized to be used or occupied for the construction, operation, and maintenance of a project or facility passing over, upon, under, or through such land (17)

RIPARIAN - Pertaining to areas of land directly influenced by water or influencing water Riparian areas usually have visible vegetative or physical characteristics reflecting this water influence Stream sides, lake borders, and marshes are typical riparian areas (3)

RIPARIAN ECOSYSTEM - A transitional ecosystem between the aquatic ecosystem and the adjacent terrestrial ecosystem, identified by soil characteristics and distinctive vegetation communities that require free or unbound water (11)

ROAD CONSTRUCTION INVESTMENT - Investment in construction of a road to provide access where the construction adds new miles of road to the transportation system (11)

ROAD RECONSTRUCTION INVESTMENT - The investment in construction activity that results in betterment, restoration, or realignment of a road Realignment is construction activity that results in the new location of an existing road or portions thereof Betterment is construction activity that raises the traffic service level of a road or improves the road's safety or operating efficiency Restoration is construction activity required to rebuild a road to its approved traffic service level (11)

ROADED NATURAL - See Recreation Opportunity Spectrum

ROADLESS AREA - Area studied during the Roadless Area Review and Evaluation process (RARE II) and that is roadless and at least 5,000 acres in size

ROADLESS AREA REVIEW AND EVALUATION - See RARE II

ROS - See Recreation opportunity spectrum

ROTATION - The planned number of years between the formation or regeneration of a crop or stand and its final cutting at a specified stage of maturity The rotation includes a period for harvesting and reestablishment, normally about 5 years (2)

RPA (RESOURCES PLANNING ACT) - The Forest and Rangeland Renewable Resources Planning Act of 1974 Also refers to the National Assessment and Recommended Program developed to fulfill the requirements of the act

RPA PROGRAM - The recommended direction for long-range management of renewable resources of National Forest System lands

RPA RECOMMENDED PROGRAM - The 1980 updated program prepared in response to the Forest and Rangeland Renewable Resources Planning Act of 1974 (2)

RURAL - See Recreation Opportunity Spectrum

S

SALE SCHEDULE - Statement of the quantity of timber planned for sale, by time period, from an area of suitable land covered by a Forest Plan The first period, usually a decade, of the selected sale schedule provides the allowable sale quantity Sales in periods are described establish that long-term sustained yield capacity will be achieved and maintained For timber resource planning purposes, the sale schedule quantity and allowable sale quantity shall be considered synonymous for all periods or decades within the planning horizon (2,12) (36 CFR 219 3)

SALVAGE CUTTINGS - The removal of dead trees or trees being damaged or killed by injurious agents than competition, to recover value that would otherwise be lost (22)

SANITATION CUTTINGS - The removal of trees to improve stand health and to reduce actual or anticipated spread of insects and disease (see Stand Improve-

ment) (22)

SAPLING - A tree, usually young, that is larger than a seedling but smaller than a pole Size varies by region (22)

SAWTIMBER - Trees containing at least one 12-foot sawlog or two noncontiguous 8-foot logs and meeting regional specifications for freedom from defect Softwood trees must be at least 9 6 inches 37 d b h and hardwood trees 12 inches in d b h

SAWTIMBER STANDS - Forest stands at least 10-percent stocked with growing stock trees 5 inches d b h and larger, and in which the stocking of trees 9 inches in d b h and larger is at least equal to the stocking of trees 5 to 8 9 inches in d b h (11)

SCENIC AREAS - Places of outstanding or matchless beauty that require special management to preserve these qualities Such areas may be designated under 36 CFR 294 1 (6)

SCOPING PROCESS - An early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action (2)

SEDIMENT - Earth material transported, suspended, or deposited by water (6)

SEDIMENT YIELD - Amount of sediment delivered into a water course (11)

SEED-TREE CUTTING - See cutting methods

SEEDLINGS AND SAPLINGS - Live trees less than 5 inches in diameter at breast height (3)

SEISMIC EXPLORATION PERMIT -A land use authorization issued by the Forest Service the occupancy of National Forest System land for the purpose of gathering geological information, related to possible gas and oil deposits by seismic methods

SEMI-PRIMITIVE MOTORIZED (SPM) - See recreation opportunity spectrum

SEMI-PRIMITIVE NONMOTORIZED (SPNM) - See recreation opportunity spectrum

SENSITIVE SPECIES - Plant or animal species susceptible or vulnerable to activity impacts or habitat alterations Those species that have appeared in the Federal Register as proposed for classification or are under consideration for official listing as endangered or threatened species, that are on an official State list, or that are recognized by the Regional Forester as needing special management to prevent placement on Federal or State lists (2)

SENSITIVITY ANALYSIS - A determination of the consequences of varying the level of one or several factors while holding other factors constant (12)

SERAL COMMUNITY - A biotic community that is a developmental, transitory stage in an ecologic succession (6)

SHADE-INTOLERANT PLANTS - Plant species that do not germinate or grow well in shade (2)

SHADE-TOLERANT PLANTS - Plants that grow well in shade (2)

SHELTERWOOD - See regeneration

SILVICULTURE - The art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands. Silviculture entails the manipulation of forest and woodland vegetation in stands and on landscapes to meet the diverse needs and values of landowners and society on a sustainable basis (22)

SILVICULTURAL SYSTEM - A planned process whereby a stand is tended, harvested,a nd re-established. The system name is based on the number of age classes (see Even-aged, Two-aged, uneven-aged), and/or the regeneration method used (see Clearcutting, Seed Tree, Shelterwood, Selection, Coppice, Coppice with Standards) (22)

SINGLE-TREE SELECTION - See regeneration

SITE - An area considered as a physical environment, a biological environment, e g , riparian zone, a homogeneous stand of vegetation, a campground, archaeological site, etc

SITE CLASS - A classification of site quality, usually expressed in terms of ranges of dominant tree height at a given age or potential mean annual increment at culmination (22)

SITE INDEX - A measure of site class based on the height of the dominant trees in a stand at an arbitrarily chosen age (11)

SITE PREPARATION - A hand or mechanized manipulation of site designed to enhance the success of regeneration Treatments may include chopping, discing, bedding, raking, burning, and scarifying All treatments are designed to modify the soil, litter, vegetation and to create mirochmate conditions conducive to the establishment and growth of desired species (22)

SIZE CLASS - For the purposes of Forest planning, size class refers to the intervals of tree stem diameter used for classification of timber in the Forest Plan data base

seedling-sapling = less than 5-inch diameter

pole-sapling or poletimber = 5- to 9-inch diameter

sawtimber = greater than 9-inch diameter

SKIDDING - A general term for hauling loads by sliding, not on wheels, as developed originally from stump to roadside, deck, skidway, or other landing (3)

SLASH - The residue left on the ground after tree felling and tending, or accumulating there as a result of storm, fire, girdling, or poisoning, or both It includes unutilized logs, uprooted stumps, broken or uprooted stems, the heavier branchwood, etc (3)

SMALL GAME - Birds and small mammals commonly hunted or trapped (2)

SNAG - A standing dead tree (14)

SOCIAL IMPACT ASSESSMENT - An assessment of potential change in the social state, where such change may directly or indirectly result from one or more activities or activity types, or from the production of one or ore outputs (2)

SOCIOECONOMIC STATUS - The comparative position of a person or group in terms of, employment, income, and other conditions that reflect interactions of social and economic factors (2)

SOIL LOSS COEFFICIENT - A numerical factor that indicates the rate of soil movement (11)

SOIL MOISTURE - The amount of water a soil is capable of retaining (11)

SOIL SURVEYS - Systematic examinations of soils in the field and in laboratories, the description and classification of soils, the mapping of kinds of soil, the evaluation of soils according to their adaptability for production of various crops, grasses, and trees, the behavior of soils under use or treatment for plant production or for other purposes, and evaluation of the productivity of soils under different management systems (6)

SPECIAL ACRES - The component of the commercial forest land that needs specially designed timber treatments to protect or enhance resources other than timber (11)

SPECIAL INTEREST AREAS - Areas managed to make recreation opportunities available for the understanding of the earth and its geological, historical, archeological, botanical, and memorial features (6)

SPECIAL USE AUTHORIZATION - A permit, term permit, temporary permit, lease, easement, or other written instrument that grants rights or privileges of occupancy and use on National Forest System land subject to specified terms and conditions (17)

SPECIAL USE PERMIT - Authorization for use and occupancy of National Forest System land issued by the Forest Service (11)

STAND - A contiguous group of trees sufficiently uniform in age class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be distinguishable unit (see Mixed, Pure, Even-Aged,and Uneven-Aged Stands) (22)

STANDARDS AND GUIDELINES - Statements specifying conditions or levels of environmental quality to be achieved

STOCKING - An indication of growing-space occupancy relative to a pre-established standard Common indices of stocking are based on percent occupancy, basal area, Relative Density, and Crown Competition Factor (22)

STUMPAGE (STUMPAGE VALUE) - The value of timber as it stands uncut, in terms of an amount of money per unit of volume (6)

SUCCESSION - In plant ecology, the gradual supplanting of one community of plants by another, the sequence of communities being termed a sere and each intermediate state, seral, as opposed to the final climax state (2)

SUITABILITY - The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone A unit of land may be suitable for a variety of individual or combined management practices (12)
(36 CFR 219 3)

SUITABLE FOREST LAND - Land that is to be managed for timber production on a regulated basis (11)

SUPPLY - The amount of an output that producers are willing to provide at the specified price, time period, and condition of sale (12)

SUPPLY SCHEDULE (CURVE) - A schedule of amounts of an output that producers are willing to provide at a range of prices, at a given time and condition of sale (See price-quantity relationship) (12)

SUPPRESSION - The process of extinguishing or confining fire

SUSTAINED YIELD OF PRODUCTS AND SERVICES - The achievement and maintenance in perpetuity of a high level annual or regular periodic output of the various renewable resources of the National Forest System without impairment of the productivity of the land (1,6,12) (36 CFR 219 3)

T

TEMPORARY ROAD - Any short-lived road not intended to be a part of the forest development transportation system and not necessary for future resource management (11)

TENTATIVELY SUITABLE FOREST LAND - Forest land that is producing or is capable of producing crops of industrial wood and (1) that has not been withdrawn by Congress, the Secretary, or Chief, (2) for which existing technology and knowledge is available to ensure timber production without irreversible damage to soils, productivity, or watershed conditions, (3) for which there is reasonable assurance that application of existing technology and knowledge that result in

adequate restocking within 5 years after final harvest, and (4) for which adequate information is available to project responses to timber management activities (2)

TERM PERMIT - An authorization that is issued for a specified period and that is both revocable and compensable according to its terms (17)

TERRITORY - The area that an animal defends, usually during breeding season, against intruders of its own species

THINNING - A cutting made to reduce stand density of trees primarily to improve growth, enhance forest health, or to recover potential mortality (22)

THREATENED SPECIES - Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range, and that has been designated in the Federal Register by the Secretary of the Interior as a threatened species (11)

TIERING - Incorporating information contained in an EIS (Environmental Impact Statement), such as the Forest Plan EIS, by reference in subsequent environmental documents (11)

TIMBER CLASSIFICATION - Forest land classifications based on management of the timber resource under each land management alternative (2) The following classifications are (2)

1. **Nonforest land** - Land never having or that is incapable of having more than 10 percent of its area occupied by forest trees, and land formerly and currently developed for nonforest use

2. **Forest land** - Land that is at least 10 percent occupied by forest trees of any size or that formerly had such tree cover that is and not currently developed for nonforest use

3 **Suitable land** - Land managed for timber production on a regulated basis

4. **Unsuitable land** - Forest land withdrawn from timber utilization by statute or administrative regulation (for example, wilderness) or identified as not appropriate for timber production in the Forest planning process

TIMBER PRODUCTION - The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use For planning purposes, the term "timber production" does not include production of fuelwood (12) (36 CFR 219 3)

TIMBER SALE PROGRAM QUANTITY - The volume of timber that the Plan calls for selling during the first decade of the planning horizon It includes

the allowable sale quantity (chargeable volume) and any additional material (non-chargeable volume) planned for sale The timber sale program quantity is usually expressed as an annual average for the first decade (11)

TIMBER STAND IMPROVEMENT (TSI) - Measures such as thinning, pruning, release cutting, prescribed burning, girdling, weeding, or poisoning of unwanted trees aimed at improving growing conditions for the remaining trees (2)

TOLERANCE, SHADE - The relative capacity of a plant to become established and grow in the shade (22)

TOPOGRAPHY - The configuration of a surface, including its relief, its elevation, and the position of its natural and human-created features (6)

TRAFFIC SERVICE LEVEL - A road classification based on traffic and user characteristics (11)

TWO-AGED STAND - A stand composed of two distinct age classes that are separated in age by more than 20 percent of rotation (22)

U

UNDERSTORY - The trees and other woody species growing under a more-or-less continuous cover of branches and foliage formed collectively by the upper portion of adjacent trees and other woody growth (6)

UNDEVELOPED AREA - An essentially unroaded portion of a National Forest

UNEVEN-AGED MANAGEMENT - The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products Cutting is usually regulated by specifying the numbers or proportions of trees of particular sizes to retain within each area, so that a planned distribution of size classes is maintained Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection (1,12) (36 CFR 219 3)

UNEVEN-AGED STAND - A stand of trees of three or more distinct age classes, either intimately mixed or in small groups (22)

UNEVEN-AGED SYSTEM - A planned sequence of treatments designed to maintain and regenerate a stand with three or more age classes (see Single Tree Selection, Group Selection) (22)

UNSUITABLE FOREST (LAND NOT SUITED) - Forest land that is not managed for timber production because (a) the land has been withdrawn by Congress, the Secretary, or the Chief, (b) the land is not producing or capable of producing crops of industrial wood, (c) technology is not available to prevent irreversible damage to soils, productivity, or watershed conditions if timber is produced, (d) there is no reasonable assurance that the lands can be adequately

restocked within 5 years after final harvest, based on existing technology and knowledge as reflected in current research and experience, (e) there is at present a lack of adequate information about responses to timber management activities, or (f) timber management is inconsistent with or not cost efficient in meeting the management requirements and multiple-use objectives specified in the Forest Plan (11)

UTILITY AND TRANSPORTATION CORRIDOR - A strip of land designated for the transportation of energy, commodities, and communications by railroad, State highway, electrical power transmission, oil and gas and coal slurry pipelines, and telecommunication cable and electronic sites, all for interstate use (2)

UTILIZATION STANDARDS - Measurements that describe the smallest trees that will be designated for sale for various products such as sawtimber or small roundwood

V

VARIETY CLASS - In the National Visual Management System a classification of visual landscapes on the basis of degree with the most variety or diversity of visual features (11)

VEGETATION MANAGEMENT - Activities designed primarily to promote the health of the crop forest cover for multiple-use purposes

VERTICAL DIVERSITY - The diversity in a stand that results from the complexity of the aboveground structure of the vegetation, the more tiers of vegetation or the more diverse the species makeup, or both, the higher the degree of vertical diversity See also horizontal diversity (2)

VIABLE POPULATION - A population that has adequate numbers and dispersion of reproductive individuals to ensure the continued existence of the species population on the planning area (FSM 1905) (10,12)

VIBRA TILLING - A method of subsoiling with a subsoiler which moves rapidly from side to side (11)

VISUAL QUALITY OBJECTIVE (VQO'S) - Category of acceptable landscape alteration where classification is based on degree of deviation from the natural-looking landscape

1. **Preservation** - Only ecological changes occur

2. **Retention** - Human management activity or change should not be evident to the casual Forest visitor

3. **Partial Retention** - Human management activity or change may be evident but must remain subordinate to the characteristic landscape

4 **Modification** - Human management activity or change may dominate the characteristic landscape but must, follow naturally established form, line, color, and texture It should appear as a natural occurrence when viewed in foreground or middleground

5. **Maximum Modification** - Human management activity or change may dominate the characteristic landscape but should appear to be a natural occurrence when viewed as background (2)

VISUAL RESOURCE - The composite of basic terrain, geologic features, water features, vegetation patterns, and land-use effects that typify a land unit and influence the visual or scenic appeal the unit may have for visitors (2)

W

WATERSHED - The entire area that contributes water to a drainage system or stream (2)

WATER YIELD - The runoff from a watershed, including groundwater outflow (2)

WETLAND - Land where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in or on the soil (2)

WETSITE - Inundated by surface or ground water with a sufficient frequency so that vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction are prevalent or would be prevalent under normal circumstances (11)

WILD AND SCENIC RIVERS- Those rivers or sections of rivers designated as wild and scenic rivers by congressional action under the 1968 Wild and Scenic Rivers Act, as supplemented and amended, or those sections of rivers designated as wild, scenic, or recreational by an act of the legislature of the State or States through which they flow Wild and scenic rivers may be classified and administered under one or more of the following categories

1. **Wild River Areas** - Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted

2 **Scenic River Areas** - Those rivers or sections of rivers that are free of impound-

ments, with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads

3. **Recreational River Areas** - Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past (6)

WILDERNESS - In area designated by congressional action under the 1964, 1975, 1980, and 1983 Wilderness Acts Wilderness is defined as undeveloped Federal land retaining its primeval character and influence and without permanent improvements or human habitation Wildernesses are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature with the imprint of human activity substantially unnoticeable provide outstanding opportunities for solitude or a primitive and unconfined type of recreation include at least 5,000 acres or are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition and may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest (2)

WILDFIRE - Any wildland fire not designated and managed as a prescribed fire within an approved prescription (11)

WILDLIFE AND FISH USER DAY (WFUD) - Any portion of a day spent participating in an activity involving wildlife or fish (2)

WILDLIFE STRUCTURE - A site specific improvement of a wildlife or fish habitat (11)

WINTER RANGE - Habitat used by wildlife species for food and shelter during the winter months (2)

Y

YARDING - The moving of logs from the stumps where they are cut to a central concentration area or landing (2)

YIELD TABLE - A tabular statement of outputs expected to be produced under a specified set of conditions (11)

YOUTH CONSERVATION CORPS - A human resource program that, utilizes youth ages 15 to 18 to perform various Forest projects Environmental education is tied into the projects undertaken (11)

Appendix A

Scoping Process and Issue Identification

Introduction

Summary

This appendix describes the scoping process used in the Land Management Plan Revision for the National Forests and Grasslands in Texas (NFGT). Key events that occurred during scoping are included Direction for scoping is found in 40 Code of Federal Regulations (CFR) Part 1501 7 More specific public participation direction is found in 36 CFR 219 6 planning regulations

Step 1 - Initial Scoping

A *public involvement plan* was developed to guide the scoping process. This plan was included in the *final work plan* developed to guide the Revision effort. The *final work plan*, including the *public involvement plan*, were reviewed and approved by the Forest Management Team and then submitted to the Regional Forester for his review

Revision of the Forest Plan was announced by means of a Notice of Intent (NOI) in the October 23, 1990 issue of the Federal Register In this NOI, the public was asked to comment on the scope of the analysis associated with the Revision

Three thousand seven hundred and twenty copies of a newsletter inviting public comment were distributed More than 2,840 letters and 2,500 comment cards were distributed through various groups and organizations. Newsletters were sent to 121 newspapers, 94 radio and television stations, and 24 other news organizations Approximately 90 other groups and key individuals contacted personally and were invited to comment on the Revision

The comment period on the scope of the analysis ended on November 30, 1990, as the NOI in the Federal Register stated that it would The Forest Supervisor received 345 letters about the Plan revision before the NOI announcement was made Two thousand seven hundred eighty three letters were received between October 23, 1990 and November 30, 1990, and approximately 1,100 more letters were received after November 30, 1990 By April 1, the Forest had received approximately 4,300 letters In keeping with the spirit of 40 CFR 1501 7 (Scoping) which states that, "There shall be an early and open process for determining

the scope of issues to be addressed," all comments were accepted and documented

Three interested parties asked the Forest Service to extend the comment period These requests were denied for two reasons Firstly, it was doubtful whether any new substantive issues would be raised Secondly, any new substantive issues raised after the official scoping period would have to be considered as directed within the National Forest Management Act (NFMA) regulation One interested individual requested that the Forest Service consider only the comments received prior to and during the scoping period and not to consider any comments received after November 30, 1990 The Forest Service's obligation to the public is to accept and consider all comment letters received at any time

Step 2 - Issue Identification

Comments contained in letters were grouped by topic Sixty-two topics were identified The Forest Interdisciplinary (ID) and Management Teams then screened the comments to identify those that could and should be addressed in the Forest Plan Revision Fifteen such issues and 53 such subissues were identified

A scoping document that summarizes all aspects of the scoping and identification process was prepared It contains a detailed index to the scoping records filed with the planning records This index also lists scoping information received through mid-1991. However, the index does not list comment letters received after 1991 Nevertheless, all scoping letters received after 1991 are maintained in the planning records, as are the letters received prior to the official scoping period.

Step 3 - Continued Public Involvement

Forest officials met with individuals and groups throughout the scoping process to provide information and explanations of the Revision Newsletters and other planning news mailings were sent to more than 850 individuals, organizations, and agencies and were used to keep the public informed and involved in the Revision process

Decisions Within the Scope of This Revision

The Federal Register NOI of October 23, 1990 identified the following items as not being within the scope of the Revision

1 Allocations of existing wilderness areas (Texas Wilderness Act decisions)
2 Allocations of Special Management Areas and the Research Natural Area (decisions made for the 1987 Forest Plan)
3 Actions to control southern pine beetle (SPB) [decisions made for SPB Environmental Impact Statement (EIS)]

4 Management of red-cockaded woodpeckers (RCW) (Current management is as directed by the court) If responsibility for RCW management is returned to the Forest Service, regional direction would probably be applied following appropriate public participation and NEPA compliance

A new NOI was published in the Federal Register on July 23, 1992. This notice expanded the scope of the Revision, and revised the availability dates for the draft and final EIS This NOI was needed because of findings during monitoring and evaluation for the Analysis of the Management Situation (AMS) and because it was time for the required 5-Year Review of the current Forest Plan Scoping had also identified the need to reconsider existing allocations of Scenic Areas, protective corridors, and Research Natural Areas The NOI of October 23, 1990 had not identified these subjects as within the scope of the Revision

Identification of Planning Issues

Goal

The goal of scoping and public involvement is to enable the Forest Supervisor to identify major public issues, management concerns, and resource use and development opportunities that should be addressed in the planning process This is achieved through public participation and coordination with other Federal agencies, State and local governments, and Indian tribes.

1987 (Current Plan) Issues

There was much public participation in the preparation of the 1987 Forest Plan (see the Final EIS for this Forest Plan for more details) This public participation identified many issues, concerns, and opportunities, which ID Team review condensed into the following nine planning issues

1 How much soil and water maintenance and improvement is necessary to provide desirable resource outputs?
2 What is the appropriate level and method for timber resource production to meet local and national economic and commodity needs consistent with other resource outputs and diversity?
3 What is the appropriate level of the Grasslands range resource production to meet local and national economic and commodity needs consistent with other resource outputs and diversity?
4 What should be done to maintain or improve the diversity and quality of fish and wildlife habitats?
5 What allocation should be recommended for RARE II Further Planning Areas?
6 To what standards should Forest roads be constructed and maintained?

7 How should the increasing demand and use of public land for a variety of recreation experiences be met? What should be the mix between developed and dispersed recreation?
8 What steps can be taken to integrate the development and use of mineral resources with the use and conservation of all other forest resources to the extent possible under the laws governing mineral disposal?
9 How much and what types of land should the U S Forest Service acquire or exchange in land ownership adjustments?

Although citizen participation played a major role in the development of the 1987 Forest Plan, not all of the public was satisfied and the Forest Plan was appealed The appellants raised issues related to the level and method of timber production, biodiversity, wildlife, recreation, wilderness, forest pest management, and use of prescribed fire

Management Concerns

In April of 1989, more than 30 employees from the Forests and Grasslands met to discuss revision of the Forest Plan For the most part, issues identified at this meeting were those identified in the last round of planning and those raised by appellants of the 1987 Forest Plan

The Forest Supervisor then reviewed public input and management concerns to identify new issues and concerns to determine how they should be addressed in the Forest Plan Revision The document, A Summary of Scoping Process Records, lists the issues that the Forest Plan will address It also describes the public participation activities completed and lists all of the issues and concerns raised and opportunities identified

Personal Contacts

Personal contacts were made with many key persons and groups to establish a working relationship regarding the Plan The following persons and groups have been contacted during revision of the Plan.

U S Fish and Wildlife Service
U S Army Corps of Engineers
Texas Parks and Wildlife Department
Texas Forest Service
Texas Department of Agriculture
Texas Attorney General's Office
Texas State Historic Preservation Officer
County judges (15)
Local governments
Texas Forestry Association
Texas Committee on Natural Resources
Golden Triangle Group Sierra Club
Houston Group Sierra Club

Dallas Group Sierra Club
National Audubon Society
West Central Texas Chapter Audubon Society
Texas Environmental Action Coalition (TEAC)
Sierra Club Forest Watch, Houston
Regional Office, U S Forest Service, Atlanta, Georgia
Indian Governments
National Park Service
Stephen F Austin State University faculty members
Texas A&M University Forestry Department
Bureau of Land Management
Chamber's of Commerce
Landowners' associations
Texas Railroad Commission
Civic clubs
Grazing permittees
Timber Purchasers Council
State and U S. Congressmen
State and U S Senators
Texas Water Commission
Society of American Foresters

Maintaining Contact

The NFGT maintains a mailing list of all individuals who indicate an interest in participating in the planning process. These individuals and all other known interested parties, were notified by mail and were sent Planning News notices about the Revision Approximately 3,000 newsletters were mailed NFGT personnel also visited State agencies and special-interest groups from Lufkin to Austin to discuss the Forest Plan Revision As a result of these meetings, news releases, and mailings, an additional 4,000 newsletters were requested and delivered to interested parties

Analyzing the Comments

"Public comments shall be considered individually and by type of group and organization to determine common areas of concern and geographic distribution The result of this analysis should be evaluated to determine the variety and intensity of viewpoints about ongoing and proposed planning and management standards and guidelines "

The Forest Service records substantive comments instead of counting "votes" for and against particular policies Forest Service regulations make no provision for settling questions of policy by counting votes

Scoping Process Records- Identifying Issues

Step 1. Identify Substantive Comments

The planning core team read the comment letters received in response to the NOI, Newsletter Number 1, and other scoping efforts Letters about the Revision but received before and after the official scoping period were considered also The CEQ regulations require that scoping continue throughout the analysis All of these comments are listed in the scoping process records at the Supervisor's Office in Lufkin

Step 2. Incorporate Substantive Comments from Previous Scoping Efforts

The ID Team leader reviewed letters commenting on the original draft EIS for the Forest Plan and the appeals to the Forest Plan Comments contained in these letters but not obtained in scoping were noted in the list of comments

Step 3. Identify Issue Topics

Comments were then grouped by underlying issue (e g roads, biodiversity) Sixty-two issue topics were identified in this way All comments from Step 1 and 2 above that were grouped into issue topics can be found in the scoping process records

Step 4. Screen Substantive Comments

The Planning Team identified three rules for screening substantive comments. The purpose of screening was to eliminate substantive comments that could not be addressed effectively in the Revision or were not pertinent to land and resource management planning The screens were

1 *The NFGT has the capability and authority to resolve or participate* in the resolution of the issue and it is within the context and intent of the National Forest Management Act, the Multiple-Use Sustained Yield Act, and the mission of the Forest Service

2 It is within the NFGT authority but not a decision germane to NEPA or forest planning (e g personnel or other administrative decisions).

3 It is within the authority of the NFGT to resolve and subject to NEPA, but not a decision made in Forest Plans (e g project-level decisions) or is excluded from the scope of the revision

The Forest's Management Team, Planning Team, and ID Team met in January, 1991 and reviewed and screened the comments received during the official scoping period. Additional work was necessary, so a task force composed of two Rangers, two Staff Officers, one Interdisciplinary Team member, and one Planning Team member met to complete this

process The Planning Core Team then reviewed all the comments to insure that comments that could be addressed effectively were not screened from consideration The ID Team then reviewed the list again in April, 1991 and then submitted it to the Forest Management Team for final review and approval in May, 1991 Items that were addressed internally and did not appear on the final list were screened by the ID Team using the previously described criteria All issues that were raised internally and could be addressed were then blended into the final list of scoping comments The results of these screenings are presented in Chapter 2 of "A Summary of Scoping Process Records," which is a part of the process records

Step 5. Formulate Issues

The Core Planning Team reviewed the issue topics and substantive comments and identified 15 issues Associated with each issue are numerous subissues and substantive comments The Core Team tried to retain the original wording of comments to the extent practicable Similar comments were consolidated

The tentative list of issues, subissues, and comments was then reviewed and edited by the ID Team and Planning Team.

This list of issues included seven issues tentatively identified in the NOI published on October 23, 1990 These issues are

1 How much, where, and how timber management is to be practiced
2 How the natural diversity of plants and animals is to be maintained
3 How the Longleaf Ridge area is to be managed
4 What balance of commodity and noncommodity goods and services is to be provided
5 Where and how mineral exploration and development are to be conducted
6 Where and how much off-highway vehicle use is to be allowed.
7 What level of transportation system is to be implemented

Step 6. Incorporation of Management Concerns

Comments received from the Forest Management Team, the Forest ID Team, the Regional ID Team, and other Forest Service officers were analyzed to identify substantive comments The comments analyzed included those made during monitoring and evaluation of the existing Forest Plan All substantive comments were screened using the criteria described in discussion of Step 3 Those comments passing the screens were incorporated into the appropriate issues and subissues

Step 7. Review of the Issues

The Planning Team prepared drafts of a *Scoping Process Record* that included the list of comments, and proposed issues and subissues for review by the Forest Management Team and Regional ID Team The issues and subissues listed were:

Issue 1 - BIODIVERSITY
Subissue 1 Natural values of NFGT
Subissue 2 Old growth
Subissue 3 Special ecosystems
Subissue 4: Management indicators

Issue 2 - VEGETATION MANIPULATION
Subissue 1 Harvest methods and silvicultural systems
Subissue 2. Reforestation and intermediate stand management
Subissue 3 Prescribed fire
Subissue 4 Use of chemicals
Subissue 5· Pine-hardwood mixtures

Issue 3 - SPECIAL MANAGEMENT AREAS
Subissue 1 Protection of Special Management Areas
Subissue 2 Wilderness allocations
Subissue 3. Wilderness management
Subissue 4 Wild and Scenic Rivers

Issue 4 - OFF-ROAD VEHICLES (ORV'S)
Subissue 1. ORV use
Subissue 2: ORV management
Subissue 3 ORV trails in the Forest

Issue 5 - RCW MANAGEMENT
Subissue 1· Addressing RCW management in the Forest Plan Revision
Subissue 2. Management of RCW

Issue 6 - INTEGRATED PEST MANAGEMENT
Subissue 1. Addressing SPB in the Forest Plan Revision
Subissue 2 SPB control measures

Issue 7 - ROADS AND TRAILS
Subissue 1 Road access in the Forest
Subissue 2 Road and trail maintenance
Subissue 3 Nonmotorized trail access in the Forest
Subissue 4. Road and trail closures
Subissue 5 Roadside and trailside management

Issue 8 - COMMUNITY STABILITY
Subissue 1 Local economy and jobs
Subissue 2 County revenues

Issue 9 - WILDLIFE AND FISHERIES
Subissue 1 Extirpated or introduced species
Subissue 2· Fish and aquatic resource management
Subissue 3: Threatened, endangered, rare, or sensitive species (PETS) excluding RCW
Subissue 4 Wildlife management

Issue 10 - RECREATION
Subissue 1. General recreation
Subissue 2. Management of developed recreation sites
Subissue 3. Dispersed recreation management
Subissue 4: Hunting
Subissue 5 Law enforcement
Subissue 6 Cultural resources
Subissue 7: Visual quality
Subissue 8 Interpretive services

Issue 11 - RESOURCE SUSTAINABILITY
Subissue 1 Clean air
Subissue 2 Soil productivity and water quality
Subissue 3 Timber harvest
Subissue 4 Range management and Grazing
Subissue 5: Wildfire

Issue 12 - MIX OF GOODS AND SERVICES
Subissue 1: Balance of multiple uses
Subissue 2 Implementation of the Forest Plan

Issue 13 - PLANNING
Subissue 1: Adequacy of the Revision
Subissue 2 Public involvement
Subissue 3 Research needs and new ideas

Issue 14 - MINERALS
Subissue 1 Leasing, exploration, and development

Issue 15 - LANDS
Subissue 1 Landownership-acquisition and exchange
Subissue 2. Land uses
Subissue 3: Property boundary management

Step 8. Public Notification of Issues

During the last week of March and the first week of April, 1991, the NFGT mailed Newsletter Number 2 to all of the more than 4,300 parties who submitted scoping comments. The newsletter listed the comments (by topic) that had been received Readers were invited to review the list to make sure that their substantive comments were included. The 10 steps for obtaining and analyzing comments and formulating issues and subissues were described

In response to Newsletter number 2, some persons advised that their comments were not included in the list of comments These additional comments were screened by the ID Team and the Forest Management Team and were included as appropriate

Newsletter number 3 contained a list of the issues and subissues. It also contained a brief article on each issue These articles were included to let the public know how each issue was analyzed and incorporated into the Forest Plan and EIS The intent of this newsletter was to show how the Revision would be "issue driven "

Step 9. Revision of Issues

Since the public has the right to comment on the Revision throughout the planning process, all letters are analyzed for substantive comments and are screened as described in discussion of Step 3. Most of the substantive comments are reiterations of comments already received. All comment letters and new substantive comments are recorded in the process records on file in the Supervisor's Office.

Step 10. Disposition of Issues and Concerns

A 5-Year Monitoring Plan and planning for an Analysis of the Management Situation (AMS) were needed. The ID Team and Regional Office formulated a strategy for developing a draft AMS. The draft AMS included discussion of the issues and a 5-Year Review of the 1987 Plan. This document was completed in March, 1992 and is available for review at the Supervisor's office

Public Involvement

Five methods have been used to reach the public These methods are public meetings, personal letters, newsletters, meetings with individuals, and media programs

The approach has been one of listening first then explaining what has happened in the past and what alternatives may be available. The emphasis has been on identifying people's concerns and obtaining their suggestions

Public Meetings

Between 1992 and 1994, 28 public involvement meetings were held These ranged from meetings with the relatively small Forest Watch Group of the Sierra Club to a meeting with the entire Houston Sierra Club (more than 250 members) Meetings were also held with county judges, who supervise the day-to-day operations of governments in Texas Other groups have included landowners, the Texas Farm Bureau, the Texas Department of Parks and Wildlife, the U S Fish and Wildlife Service, various biology and forestry faculty and student groups at Texas A&M, Stephen F Austin, and Rice Universities, and off-road vehicle user groups

Members of more than 20 groups discussed trail management at a trails workshop held at Double Lake Campground These included horseback riders, off-road vehicle users, wildflower enthusiasts, and others who wanted to know more about trails and about the Plan's effects on their interests Attendees were given a mapping exercise that allowed them to explain how and where trails might be placed in the future

Names and addresses of participants in meetings were taken so we could advise interested individuals of and send them future mailings and more information about the planning process

Individual Meetings

Individuals sometimes meet with Forest Service officials at their homes or offices or at a district or Supervisor's Office to discuss concerns about the Revision In all cases, a summary of the meeting is taken and key points are provided to those staff, districts, and ID Team members who have a working interest in the meeting

Newsletters

The Forest has published six newsletters about the Revision during the period 1992 to 1994 Nine of these newsletters have been published since 1990 These newsletters have been used to give various individuals and groups the latest information about the planning process

In response to comments received, the Forest has included discussions of wilderness, Forest Service roads, and the Timber Sale Program Information Reporting System (TSPIRS) in the newsletters

The newsletter is also used to respond to questions or concerns raised at meetings or posed by letter writers and to announce meetings and report on previous meetings

Letters

We receive letters and telephone calls about the Revision and related matters from individuals who do not attend or request meetings We note and respond to such letters and calls

Media Visits

We have used radio and television talk shows to the public Talk shows give us opportunities to discuss the Plan in greater detail than in 30-second soundbites on the evening news

In 1993, three 60-minute radio interviews and two 30-minute television programs had the Plan Revision as their subject These programs addressed such issues as the RCW, the importance of timber to local communities, wilderness, trails, and silvicultural practices

Additional meetings with television, radio, and newspaper reporters are used to explain the Planning process and procedures These sessions are used to lay the groundwork for news media contacts that will occur when the Plan and EIS become available for public comment

Efforts Between Draft and Final

In September, 1994 upon the release of the Draft Environmental Impact Statement (DEIS) and Draft Revised Land & Resource Management Plan (hereafter referred to as "Draft Plan"), the NFGT created what could be termed a "rapid response team" to explain and answer concerns This team was responsible for contacting and in many cases meeting with 103 different organizations/individuals The 103 contacts include the Congressional delegations, state elected officials, state agencies, federal agencies, universities, river authorities, local/county organizations, professional societies, non-governmental organizations, environmental/recreational groups, the Alabama-Coushatta tribe and various internal and media groups

These contacts included 22 meetings open to the public, one of which was the second annual "Trails Workshop" which addressed concerns of hikers, bikers, off-road vehicles and equestrians

In addition to the meetings, more than 600 copies of the DEIS and Draft Plan, and 1400 copies of the DEIS Summary were sent out to libraries, agencies, news media, universities, groups and individuals

Special newsletters and news releases announcing the DEIS and Draft Plan were mailed out to news media agencies throughout Texas These newsletters and news releases explained where and how copies of the DEIS, Draft Plan and DEIS Summary could be obtained, how people

could obtain more information, how meetings could be set up and how the public could learn more

A current theme running through all these actions was informing all groups, agencies and members of the public on how to comment on the DEIS, Draft Plan and DEIS Summary Specific guidelines were provided to all NFGT employees, ensuring internal understanding of the DEIS and Plan release was obvious and consistent Several letters/newsletters were mailed out informing the public on what should go into their comments; that each letter would be read separately and informing the public the value of personal letters compared to form letters and petitions. Form letters were received but since they all read the same, their comments were only included once. The public also was informed the comment period was not a vote, and the Forest Service would NOT tally comments for or against the DEIS/Draft Plan.

As a result of these activities, more than 1,800 letters were received These letters when analyzed for specific concerns and issues, totaled 5,668 comments Of the 5,668 total, 2,537 came from individuals, while 3,131 comments were attributed to organizations

All the letters were read and discussed by an analysis team consisting of NFGT planning and subject matter experts These letters were coded according to the issues and subjects they addressed After coding each comment was sent to the Interdisciplinary Team for review, comparison to DEIS and Plan information, and response to the comment was drafted These responses were reviewed by another team (the comment review team) to insure accuracy and uniformity This process, the comments and responses can be reviewed in EIS Appendix K

Appendix B

Description of the Analysis Process

This appendix discusses the analysis process and computer models used in the Revision planning effort It focuses on quantitative methods and documents the analysis. The information provided in this appendix is a summary of the quantitative analysis that decision makers and the public use to determine which alternatives provide what "enumerated" goods, services, and land allocations

Information presented in this chapter supplements the broader and less technical descriptions included in the body of the EIS. Additional information and documents used in the analysis process are contained in the planning records. The results from the modeling process are estimates of what can be expected if alternatives are implemented and facilitate comparison of alternatives

APPENDIX B DESCRIPTION OF THE ANALYSIS PROCESS

Appendix B

Description of the Analysis Process

I. Introduction

Appendix B presents a technical discussion of the analysis process and computer models used in the Revision planning effort The appendix focuses on the quantitative methods used to perform the analysis and documents how the analysis was done

The Forest's major planning goal is to provide enough information to help decision makers and the public determine which combination of goods, services, and land allocations will maximize Net Public Benefits (NPB) The regulations (36 CFR 219) developed under the National Forest Management Act (NFMA) provide the analytical framework within which these decisions are made

The NFMA and its regulations also state that the requirements of the National Environmental Policy Act (NEPA) and its regulations (40 CFR 1500-1508) must be applied in this analytic process The NEPA regulations require that the environmental effects of a proposed action and alternatives to that proposed action must be disclosed in an Environmental Impact Statement (EIS)

Information presented in this chapter supplements the broader and less technical descriptions included in the body of the EIS This discussion includes basic assumptions, modeling components and inputs, rules, methods, and constraints Additional information and documents used in the analysis process are contained in the planning records The planning record in its entirety is incorporated here by reference The results from the modeling process are estimates of what can be expected if alternatives are implemented and facilitate comparison of alternatives

1. Overview of the Forest Planning Problem

One of the primary responsibilities of the Forest Service is to determine how to manage the National Forest lands to produce goods and services in a mix that best meets the needs of the public Not only must the needs of present generations be satisfied, but the needs of future generations must be considered In some cases, the commitment of Forest Service lands and their associated resources will result in the exclusion of one or possibly several uses In cases such as these, decisions have been based on sound analysis that considered the resource tradeoffs involved, the public that are to be effected and the economic consequences of the action

National Forest lands provide a variety of goods and services that are valuable to a very diverse set of people and/or publics. Timber, minerals, water, forage, wildlife and recreation are the primary goods and services provided by the lands within the National Forests and Grasslands in Texas Production of one good or service is often accomplished at the expense of another For example, the production of timber precludes the production of wilderness recreation Unfortunately, there is not a sufficient number of Forest Service acres to satisfy the needs or desires of all of the people and publics In the scoping process the Forest Service received over 4400 letters suggesting items to be addressed in the Forest Plan revision Comments were analyzed and grouped into 15 issues and 53 sub-issues Therefore it was necessary to determine how to allocate the lands within the National Forests and Grasslands in Texas that will address these issues and maximize the benefits to the users of the Forest Service lands and the goods and services they provide This is the purpose of the Land Management Planning process

In addition to identifying a strategy for management that maximizes net public benefits (overall long-term value to the nation inputs, outputs and effects - ***see glossary***), the purpose of the FEIS is to (1) resolve public issues and concerns and (2) analyze the forest's contribution to RPA related goals Decisions made in the Plan and FEIS become increasingly significant in terms of their economic and social consequences

In reviewing the fifteen issues and concerns raised by the public and agency employees, it became evident to the IDT that the nature of the issues raised during the revision were similar to the issues defined during the initial 1987 planning effort During the 1980's, planners defined issues primarily in terms of the goods and services which could be produced in an economically efficient manner. During the 1990's, the issues were the same but the emphasis shifted from the production of goods and services to concern over the management philosophy ('stewardship') The forest had dealt with these concerns through initiatives such as new perspectives and ecosystem management on a project level basis, but this Plan and FEIS is an effort to develop a more programmatic strategy for these concerns

During the entire revision process, and particularly during the formulation of alternatives, the IDT was sensitive to the fact that the concerns of some groups and individuals involve the quantities of goods and services produced while the concerns of others involve a more aesthetic and ecologically based land stewardship concern

Due to magnitude (7 million acres) and complexity (11 Land Use designations - i e. Management Areas), several analytical models were used

1 A Version II FORPLAN computer model was used to simulate land allocations and provide information on outputs and costs

2 A PC computer Data Base and Spreadsheet also were used to simulate allocations and provide information on outputs and costs.

3 An IMPLAN model was used to analyze how those outputs and costs affected the local economy

4 Maps were used to define management area prescription options based on the goals and objectives of the alternatives and resource inventories

2. The Planning Process

Land and resource management planning requires that processes formerly used to make individual resource decisions be combined into integrated management decisions It also requires that mathematical modeling techniques be used to identify the most economically efficient solution to meet the goals and objectives of any alternative

The 10-step process defined in the NFMA regulations was followed This appendix is concerned with describing the analysis phase of this process which are steps 3, 4, 5 and 6 Steps 1, 2, 7, and 8 are described in Chapters 1 and 2 and Appendix A of this EIS Plan implementation and monitoring, steps 9 and 10, are discussed in Chapters 4 and 5 of the Revised Forest Plan A brief discussion of this process follows

Identification of purpose and need Issues, Concerns, and Opportunities (Step 1) - The Forest IDT assessed changes in public issues, management concerns, and resource use and development opportunities since the Plan was initially developed and subsequently amended Appendix A of this EIS documents this step

Planning Criteria (Step 2) - Criteria are designed to guide the collection and use of inventory data and information, the analysis of the management situation; and the design, formulation, and evaluation of alternatives This step establishes guidelines for accomplishing the next five steps The Work Plan, 5 year review/AMS, and other process records document and describe this step

Inventory Data And Information Collection (Step 3) - The kind of data and information needed is determined in Step 2 based on the issues, concerns, and opportunities identified and the resulting assessment of the management situation and determination of what needs to change Data collection is part of normal forest operations Existing data is used whenever possible and supplemented with new data, when practicable, if new data will contribute to more responsive analysis Data accuracy is continually evaluated Much of this data and background documentation is on file in the Planning (or Process) Records on file in the Supervisor's Office

Analysis of the Management Situation (Step 4) - This step consists of assessing the existing situation on the forest and determining opportunities for resolving issues and concerns This information provides the basis for formulating an appropriate range of reasonable alternatives

This analysis brings existing information together, puts it into a total forest perspective, and examines the range of possible situations to resource issues It examines supply potentials and market assessments for goods and services, and determines suitability and feasibility for meeting needs

Other objectives of the analysis of the management situation include.

- assessing current direction including an estimate of goods and services most likely to be provided if current direction is continued.

- assessing demand for goods and services from National Forest lands

- determining if there is a need to change current management direction

Formulation of Alternatives (Step 5) - A reasonable range of alternatives is formulated according to NEPA procedures. Alternatives are formulated to assist in identifying one that comes nearest to maximizing net public benefits (NPB) They provide for the resolution of significant issues and concerns identified in Step 1.

The alternatives reflect a range of resource management programs. Each identified major public issue and management concern is addressed in different ways in the alternatives. The programs and land allocations in each alternative represent the most cost-efficient way of attaining the goals and objectives for that alternative Both priced and non-priced goods and services (outputs) are considered in formulating each alternative This entire step is discussed in this appendix.

Estimated Effects of Alternatives (Step 6) - The physical, biological, economic and social effects of implementing each alternative are considered in detail to respond to the issues and need for change.

The FORPLAN model estimates many, but not all, of the economic and physical effects Other effects examined outside the model include ecological and social considerations Specifically, the analysis determines: 1) direct effects, 2) indirect effects, 3) conflict with other Federal, State, and local land use plans, 4) other environmental effects, 5) socio-economic effects within the Planning Area, 6) tradeoffs associated with various resource production levels and land allocations, and 7) mitigation measures (standards) for resource protection

The effects of the alternatives are displayed in Chapters 2 and 3 of this FEIS

Evaluation of Alternatives (Step 7) - Significant physical, biological, economic and social effects of implementing alternatives are used to evaluate each alternative and compare them with one another Typically, each alternative can be judged on how it addresses the significant issues, and sub-issues identified in Chapter 1 and Appendix A of the FEIS. Also, the alternatives are evaluated for consistency with the recommended 1990 RPA philosophy Chapter 2 of the FEIS summarizes the comparisons of the alternatives with the issues and sub-issues

Preferred Alternative (Step 8) - The Forest Supervisor reviews the IDT evaluation of each alternative and the public issues and concerns The Forest Supervisor then recommends apreferred alternative to the Regional Forester The Regional Forester either selects the Forest Supervisor's recommendation, another alternative, or modifies the alternative recommended by the Forest Supervisor This alternative was described as the Preferred Alternative in the DEIS and was displayed as the Proposed Draft Revised Forest Plan Public comments were solicited and considered in the finalizing of the Revised Forest Plan and EIS

Plan Approval and Implementation (Step 9) - The IDT reviewed public comments and incorporated any necessary changes into the DEIS and Revised Forest Plan Selection of the Final "Selected" alternative occurred after public response on the Draft Revised Plan and DEIS were fully analyzed This alternative was different than the "Preferred" alternative in the Draft Plan and EIS The Forest Supervisor recommended the alternative for the FEIS, considering the criteria and public comments received The Regional Forester then reviews and approves the Revised Forest Plan and Final Environmental Impact Statement, **A Record of Decision documents this step.**

Monitoring and Evaluation (Step 10) - The Revised Forest Plan establishes a system of measuring, on a sample basis, actual activities and their effects, and compares these results with projections contained in the Revised Forest Plan Monitoring and evaluation comprises an essential feedback mechanism to ensure the Revised Forest Plan is dynamic and responsive to change The Revised Forest Plan describes the Monitoring and Evaluation process in Chapter 5

II. Inventory Data for Information Collection

The collection of resource data is the first step in the analysis phase of the planning process The amount and level of detail of the data collected depended upon the public issues and management concerns to be addressed in the Forest Plan The National Forests and Grasslands in Texas has existing data available from past planning efforts,

1. Resource Data Concepts

studies and administrative programs This existing data was used, updated and supplemented when necessary from information gathered from secondary sources or from studies conducted through the Regional Office The revised model information or data was entered into Region 8's CISC II data base and transferred to a "Paradox" data base Some information was mapped to describe spatially how the various components of the model related to one another (soils, vegetation, ecological units etc)

Two basic types of information were needed to facilitate the analysis and development of alternatives The first consisted of information (1) related to the classification of land into categories with unique properties This data generally described physical, biological or social attributes, and was generally associated with readily identifiable areas and issues. The second type of information (2) is not directly reflected in the base data, issues or attributes, but is generally an estimation of how land will respond to certain management activities These data are generally in the form of coefficients that could change between alternatives These estimates of "outputs or results" are sometimes referred to as the production coefficients.

A. Delineation of Capability Areas

Capability is defined in 36 CFR 219 3 as follows

The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at a given level of management intensity Capability depends upon current conditions and site conditions such as climate, slope, landform, soils and geology, as well as the application of management practices

Capability areas would then be recognizable units of land that are homogeneous with respect to their ability to respond to management as stated above Capability areas on the National Forests and Grasslands in Texas were defined for individual resources

Timber Capability Area - Existing data concerning timber type, condition class, age, site index and productivity class, and land class was used to identify timber capability areas Data was obtained from the Continuous Inventory of Stand Conditions II (CISC II) data base

Recreation Capability Areas - Visual quality objectives (VQO's) and recreation opportunity spectrum (ROS) classification defined recreation capability

Wildlife Capability Area - Existing timber resource data and habitat capability index information was used to determine the capability of the land to best provide a diversity of wildlife habitats. Data was again obtained from CISC II data base

Range Capability Area - Range capability areas were defined in the basis of cover type/management type and their associated understory species Data was obtained from CISC II data base. On the Grasslands, capability is a function of the existing ground cover and the potential cover Data was obtained from Resource Action Plans.

Wilderness Capability Area - Wilderness capability was based on existing areas as established by Congressional action as well as known or proposed roadless areas identified during the scoping process

B. Analysis Area Stratification

Information from the issues and concerns process and from the definition of capability areas was used to stratify the Forests into analysis areas in the FORPLAN Version II model Analysis areas are an aggregation of capability areas, not necessarily contiguous, which can be considered homogeneous with respect to responses to treatment in terms of yields, costs and values. Data used to define capability areas was also used to define analysis areas

C. Determination of Production Coefficients

Production coefficients are needed in order to show the effects or results of alternative approaches to management The coefficients in the FORPLAN Version II model were developed to reflect differences in site productivity, land class, including administrative designation and existing vegetation. The coefficients were also designed to reflect changes in management intensity within a given management prescription and on a given analysis area This type of information comes from many sources Regional procedure handbooks, professional research studies, University and other Academic information The most up-to-date and verifiable information was utilized for this revision.

D. Database Development

In 1991, a computerized data base was completed forest wide for the forest. Region 8's continuous inventory of Stand Conditions II (CISC II) data base was used adding the soils, visual quality objective and recreation opportunity spectrum data This information was transferred to a Paradox data base

E. Updating the Visual Quality Inventory and Recreation Opportunity Spectrum Inventory

The first Visual Quality Objective (VQO) and the Recreation Opportunity Spectrum Inventory were completed for the Forest Plan in 1984. In 1990 and 1991 the forest completed an extensive and detailed review of all factors involved in the derivation of these inventories The inventories were completely updated to reflect the most current situation. This has been accurately translated into the CICS II data base for analysis and display.

F. Lands Tentatively Suitable for Timber Production

Land classifications from the CISC II data base were used to identify lands tentatively suitable for application of different timber management practices The initial steps for defining tentative suitability are outlined in steps 1-7 of the suitability tables at the end of this document. These steps first remove lands that are not forest land (roads, water etc), those legally designated or established for other purposes (wilderness, recreation areas etc), and other lands that are not physically capable or that too little information is known to make a determination on timber suitability Following these broad removals, the areas tentatively suitable for timber production can be clearly mapped and identified

G. Development of Allocation and Scheduling Alternatives

The development of allocation and scheduling alternatives was based on information collected during the definition of analysis areas, production coefficients, and tentatively suitable lands. Land class identifiers were initially used to identify the allocation choices for analysis areas For example, a land class designation of existing red-cockaded woodpecker colonies precluded the allocation of that analysis area to timber production If an area was not administratively or legally designated to a specific allocation, such as woodpecker colonies, capability information was used to identify allocation choices available to each area.

Within a given allocation, a variety of scheduling choices were analyzed. These scheduling choices consisted of management practices that could be applied to a given analysis area Possible choices were based on biological, technical and economic considerations For example, within a timber management allocation, potential scheduling alternatives were tested as to whether they were silviculturally sound, whether the technology existed or could reasonably be expected to exist within the near future, and whether they were economically efficient Existing (current) scheduling choices were used as the initial starting point in all cases. From there, scheduling choices representing more intensive and less intensive management were considered for inclusion in the analysis process.

H. Implementation of Monitoring

Monitoring requirements were based on the goals and objectives defined for each alternative and quantified during the analytical phase In the analytical phase, output levels for timber, forage, water and developed, dispersed recreation and other goals and objectives were all projected into the future Consequently, output levels for these desired conditions and objectives will be monitored after Plan approval and implementation

2. Sources of Data

The major data sources used in the planning process are the Geographical Information System (GIS) data base, CISC II data base and studies conducted to determine output values and cost coefficients All coefficients and assumptions made in the modeling process have been developed from the following information sources

A. General

1) Codes and definitions for many of the activities, outputs, and effects came directly from the National Activity Structure Handbook (FSH 1309 16)

2) The Department of Labor (state and federal) and the Forest Service IMPLAN Model were used to estimate future regional employment and income by resource

B. Timber

1) The Continuous Inventory of Stand Conditions version two (CISC II) is the standard timber data base for the Southern Region Forest Service Handbook (FSH) 2409 26d displays information and coding structure for CISC CISC provided specific timber information for each land unit or stand on the forest CISC was used in the analysis area (AA) identification process, and for determining land tentatively suited for timber production CISC II will continue to be used during implementation and monitoring

2) Historical timber sales data from the years 1987 to 1991 was taken from 2400-17 forms and from sales contracts and adjusted to current average sale values (1992-93) Data used in the analysis included data on stumpage prices (statistical high bid), volume per acre, number of bidders, product sold, operable acres, site preparation method and cost, and reforestation costs Sales contracts provided cruise data specifying volume per acre. Cruise data on yields was used in conjunction with documented research to formulate yield tables for use in the FORPLAN model Economic data used in the model included average statistical high bid and per-acre costs for site preparation and reforestation

3) Timber prices were determined using timber appraisal summaries for the forest The mid-market timber values were calculated using the quarterly Cut and Sold Reports for the forest

4) The costs attributed to harvesting timber have been calculated using actual cost expenditure reports averaged from several years

5) Timber yields were based on the timber type and standing volume from continuous forest re-inventories

6) Yields for regenerated timber stands were derived from permanent study plots and published research

C. Road Construction and Reconstruction Activities

1) Road construction and reconstruction costs are based on actual road expenditures

2) Inventory work on the transportation system indicates that (State, County, and Forest Service routes) a transportation system now exists that meets access into most areas The current inventory contains all arterial and collector roads needed for administration of the National Forests and Grasslands in Texas However, some of these roads exist at a standard lower than needed to meet safety requirements and access needs of the National Forest and our rural and urban neighbors. The local road system is still being developed in response to various resource needs including timber harvest, minerals management, and recreation development

Estimate road reconstruction miles are based on a statistically significant sampling of forest transportation needs currently developed to respond to resource needs

D. Soil and Water

1) Background water yields for the forest were calculated using records from USGS gauging stations on, or near, the forest, and from coefficients from data developed by the RO

2) Increases in water yields were developed using procedures in the Region 8 Procedure for Preparing Soil Loss, Sediment Yield, and Water Yield Estimates for Forest Plans (1981)

3) Soil loss and sediment rates from both natural sources and management activities were developed according to procedures in the above Region 8 paper (1981), using coefficients from Predicted Erosion Rates for Forest Management Activities in Texas (Knight, R W , J W. Spillman, R. J Caffey, H A Pearson, A T. Weichert, W H Blackburn and J. C Wood, 1992) Coefficients were applied to the Universal Soil Loss

Equation, as outlined in An Approach to Water Resources Evaluation of Non-Point Silvicultural Sources (USDA Forest Service, 1980)

4) Erosion rates for roads were derived from research (Ursic and Douglass, 1978; Kochenderfer and Wendel, 1980), as adapted for forest conditions

E. Recreation

1) Developed recreation data in the FORPLAN model are based on capacity Capacity data were taken from information contained in the Forest Recreation Information Management (RIM) system RIM data was also used to assess the use of developed and dispersed recreation capacity and the relationship of use to capacity estimated demand

2) *Recreation values were the same as 1990 Final RPA Values*

3) The cost of providing and maintaining recreation opportunities on the forest have been calculated using actual Forest Service cost information

4) Recreation capacity figures were estimated using the procedures outlined in the Recreation Opportunity Spectrum Users Guide (ROS) (Forest Service Handbook (FSH) 2309 13)

5) Recreation use information and RPA indices were used to calculate future recreation demand by ROS.

F. Wildlife and Fish

1) National Forest Hunting and Fishing use was developed as described in the AMS (1992)

2) *Hunting harvest figures for big game and small game as supplied by* Texas Parks & Wildlife Department

3) Wildlife capacity coefficients were calculated through the use of Habitat Capability Models (developed by interagency task forces) for some of the management indicator species

4) Benefits derived from wildlife are the same as the 1990 RPA Values.

3. Summary of Data Sources Used in Data Collection

Data sources are listed by resource where appropriate

A. Timber

1. Baldwin, V C and Feduccia, D P. 1987 *Loblolly Pine Growth & Yield Prediction for Managed West Gulf Plantations.* USDA-FS-SOFES, Research Paper SO-236 27 pp

2 Belcher, D and K Stoneking 1986 *SINGLE· Single Tree Selection Growth and Yield Program* USDA Forest Service, Southern Region 17 pp

3 Cost Efficiency - TSPIRS Analysis, Region 8 May 6, 1992

4 Dale, M E 1972 *Growth and Yield Predictions for Upland Oak Stands* U.S Department of Agriculture, U S Forest Service, Research Paper NE-241

5 Farrar, Robert M 1985 *Volume and Growth Predictions for Thinned Even-Aged Natural Longleaf Pine Stands in the East Gulf Area* USDA-FS-Sofes Research Paper SP-220 172 pp.

6 Hepp, Todd E 1981 *A Users Manual for YIELD Timber Yield Forecasting and Planning Tool Version 2.1* Tennesee Valley Authority. 28 pp

7 Historical timber sales data from sales on the National Forests in Texas including data on volume per acre, product sold, operable acres, site preparation method and cost and reforestation costs This information was taken from 2400-17 forms and from sales contracts which included cruise data specifying volume per acre.

8 Murphy, P A and R C Beltz. 1981 *Growth and Yield of Shortleaf Pine In the West Gulf Region* USDA Forest Service, Research Paper SO-169.

9 Murphy, Paul A. and Robert M Farrar 1982 *Interim Models for Basal Area and Volume Projection of Uneven-aged Loblolly-Shortleaf Pine Stands.* Southern Journal of Applied Forestry Volume 6, No 2 May 1982

10 Schnur, G.L. 1937 *Yield, Stand, and Volume Tables for Even-aged Upland Oak Forest.* U S Department of Agriculture, Tech Bul. No 560

11. Schumacher, F X and T.S.Coile. 1960 *Growth and Yield of Natural Stands of the Southern Pines.* T S Coile, Inc , Durham, NC.

12. USDA, Forest Service. 1929, revised 1976 Miscellaneous publication No 50. *Volume, Yield, and Stand Tables for Second-Growth Southern Pines*

13 Williams, D.L. and William C Hopkins. 1968. *Converting Factors for Southern Pine Products.* Louisiana State University in cooperation with Southern Forest Experiment Station Bulletin No 626

B. Water and Sediment

1. Beasley, R S. 1979 *Intensive Site-preparation and Sediment Losses on Steep Watersheds in the Gulf Coastal Plains*

2 Blackburn, Wilbert H and M.G Dehaven 1980 *Assessment of Stormflow and Water Quality from an Undisturbed Watershed*

3 Dissmeyer, G E and G R Foster 1984 *A Guide for Predicting Sheet and Rill Erosion on Forest Land* Technical Publication R8-TP6 USFS Southern Region Atlanta, GA 40 pp

C. Recreation

1 Litton and McDonald. 1979. *Silviculture and Visual Resources*

2 Texas Parks and Wildlife 1990 Texas Outdoor Recreation Plan

3 USDA Forest Service 1977 Recreation Information Management (RIM)

4 USDA Forest Service ROS Users Guide

5 USDA Forest Service - Southern Region. Recreation Coefficients of Forest Land Management Plan Chattahoochee National Forest, Georgia

6 USDA Forest Service - Southern Region Visual Management System - FSM 2380

7 USDA Forest Service, National Forests and Grasslands in Texas 1992 Five Year Review/AMS

D. Wildlife

1 Texas Parks and Wildlife Department July 1, 1983. *Performance Report:* Texas *Big Game Investigations, Job No* 4 *Big Game Harvest Regulations* (White-tailed *Deer Harvest Surveys)* Federal Aid Project No W-109-R6 Austin, Texas

2. USDA Forest Service - Southern Region *FSH 2609 23R, Wildlife Habitat Management Handbook*

3 USDA Forest Service - Region 8 *A Process for Obtaining Habitat Capability and WFUD'S*

E. Archeology

1 Ippolito, John E 1983 *Cultural Resource Overview of the National Forests in Texas* USDA Forest Service, Southern Region, Lufkin, Texas

2 Jurney, David H , Frank Winchell, and Randall W Moir 1989. *Cultural Resources Overview of the National Grasslands in North Texas, Studies in Predictive Archaeological Modeling for the Caddo and LBJ Grasslands* Report submitted to the USDA Forest Service by the Archaeology Research Program, Southern Methodist University, Dallas

3. Keller, John E 1974 *Subsistence Paleoecology of the Middle Neches Region of Eastern Texas.* Ph D Dissertation University of Texas at Austin

4 McClurkan, Burney B et al 1968 *Livingston Reservoir, 1965-1966: Late Archaic and Neo-American Occupation* Texas Archeological Salvage Project Papers Austin, Texas

5 Newcomb, W W Jr 1961 *The Indians of Texas* University of Texas Press. Austin, Texas

6 Shafer, Harry J 1974 *Archeology and Indians of Southeast Texas The Big Thicket· Participants Handbook for the Contemporary Science Seminar* Spring, 1974 Houston Museum of Natural Science and the University of Houston

7 Shafer, Harry S 1975 *Notes on the Woodlands Cultures of Eastern Texas* Bull of the Texas Archeology Society Volume 46 Austin, Texas

8 Sjorberg, Andree F 1951 *The Bidai Indians of Southeastern Texas* Southwestern Journal of Anthropology Volume 7(4) pp 391-400

9 Fields, Ross 1979a *Report on the 1977 University of Texas Field School Archeological Survey in Houston County*, Texas Report submitted to the U S Forest Service by the Department of Anthropology, University of Texas at Austin

10 Fields, Ross 1979b *Cultural Resources of the Davy Crockett, Sam Houston, Angelina, and Sabine National Forests of Texas* Report submitted to U S Forest Service by the Texas Archeological Research Laboratory, University of Texas at Austin

11. Martin, W A , T Pertulla, and J.Bruseth 1994 *Cultural Management Planning for the National Forests and Grasslands in Texas.* Department of Antiquities Protection, Tx Historical Comm , Austin.

F. Other

1. *An Assessment of the Forest and Rangeland Situation in the U S* RPA 1980

2 USDA Forest Service - Southern Region. 1975. Final *Environmental Impact Statement and Unit Plan for Caddo National Grassland in Texas*

3. USDA Forest Service - Southern Region 1975. Final *Environmental Impact Statement and Unit Plan for Lyndon B Johnson National Grassland in Texas*

4 USDA Forest Service - Southern Region 1977 Final *Environmental Impact Statement and Land Management Plan for Sabine National Forest in Texas-*

5. USDA Forest Service - Southern Region 1978 Final *Environmental Impact Statement and Land Management Plan for Sam Houston National Forest in Texas.*

6. USDA Forest Service - Southern Region 1980 Final *Environmental Impact Statement and Timber Management Plan for Davy Crockett National Forest in Texas*

7 USDA Forest Service - Southern Region 1978. Final *Environmental Impact Statement and Timber Management Plan for the Angelina National Forest in Texas.*

III. The Forest Planning Model (FORPLAN Version II)

1. Overview of FORPLAN

A computerized model called FORPLAN Version II has been developed by the Forest Service to help each National Forest analyze the management situation, formulate management alternatives and estimate effects of management alternatives The computer programs which comprise FORPLAN Version II are the same for all forests; however, each forest is responsible for defining the way FORPLAN Version II features will be used (i e , the structure of the model) and for estimating the outputs or costs per acre which are stored in yield tables These outputs/costs per acre are commonly referred to as production coefficients and have been developed and verified by the IDT The basic elements of the FORPLAN Version II structure are outputs and costs, analysis areas, prescriptions, time periods, constraints and objective functions These elements are discussed in summary fashion in this introduction and are treated in more detail in the following pages.

Outputs (yields) are those goods and services which are produced either purposely or incidentally as a result of management of the Forest Selection of outputs to be used in FORPLAN Version II has a major

bearing on the structure of the model and on the results of the analysis Outputs to be entered in the model are important factors in decisions regarding management of the Forest Outputs represent those goods and services which are delivered to various users of the Forest who derive value from these goods and services Such yields include thousands of board feet (MBF) of timber and visitor days (RVD's) of recreation The model "tracked" 84 separate costs (activities) and 46 separate outputs as shown in Table B-2

The different types and localities of land which are modeled in FORPLAN Version II are called analysis areas In FORPLAN Version II, there are six hierarchical categories available to describe analysis areas Level 1, Level 2, Level 3, Level 4, Level 5 and Level 6 Within these various levels, land areas are characterized in terms of those resource characteristics which are important either in responding to issues and concerns raised in the planning process, or in determining levels of cost or yields in the model Selection of the resource characteristics used to define analysis areas follow closely with the selection of yields to be tracked in FORPLAN Version II as discussed above and with prescriptions to be modeled as discussed below Because analysis areas (except for Level 6 identifier management area) are defined by homogeneity of resource characteristics rather than geographic locators, one analysis area may consist of many parcels of land scattered over the Forest This is a key concept in understanding the allocation results from FORPLAN

Prescriptions are another important element of the FORPLAN Version II structure A narrative list of management prescriptions is contained in Section C4, of this chapter. Each prescription is a mix of integrated management activities which are intended to accomplish specific objectives. These prescriptions were developed by the IDT to address public issues and management concerns and are a major element of the Forest Plan

A broad range of management prescriptions were considered from the minimum management prescription to intensive management prescriptions The IDT constructed prescriptions to represent the most cost effective means of meeting the prescription's objectives while providing a broad enough range to assure the meeting of multiple resource requirements By utilizing the Maximize PNV objective function, the FORPLAN model selected prescriptions which represent to the extent practicable the most cost efficient combinations of management prescriptions that can meet the objectives established in each alternative and benchmark

For the National Forests in Texas model, analysis areas had from one to as many as 40 prescriptions available for selection There were 416 analysis areas delineated in this model The characteristics of the hierarchical categories are given in Section C3 of this chapter

A fifth component of the FORPLAN Version II structure is constraints Constraints are the means by which prescriptions are further characterized in FORPLAN Version II and by which alternatives are represented to the model It is through the use of constraints that legal and policy requirements, as well as management objectives, are represented in the model

The last element of the model discussed here is the objective function. The objective function feature allows specification of an overall objective to be met in a given run of the model while all constraints otherwise specified are also met For example, one run of FORPLAN Version II might be set up to obtain a specified number of cubic feet of timber per year and a specified number of RVD's of dispersed recreation per year, and at the same time minimize government costs The objective function in this case would be minimized government cost

The model is based on the premise that any given parcel of land (analysis area) will respond (cost and yields) to management (prescriptions) in a predictable way (yield coefficients) Through the application of prescriptions to analysis areas, per-acre output/cost coefficients can be developed for possible prescription or analysis area combinations Once these data are loaded into the computer in the FORPLAN Version II format, the total Forest-wide results (yields and costs) of the application of various prescriptions on various land areas can be calculated Because the cause-effect relationship between prescriptions applied to analysis areas and yields/costs is symmetrical, the model can also calculate which prescriptions would need to be applied to specific analysis areas to produce desired levels (constraints) of yields.

Carrying this further, once all assumptions and yield coefficients are built into the FORPLAN Version II model and verified, a "what if" game can be played specifying different levels of yields to be attained under different management objectives By this means, different strategies for managing the Forest (alternatives) can be portrayed and analyzed Model results consist of predictions of levels of yields and costs of various alternatives as well as specific allocations of prescription acres to analysis areas These allocations of prescriptions combine with direction contained in written management prescriptions to become, the primary basis of management alternatives In turn, one of these management alternatives was selected to become the Forest Plan

2. The Analysis Process and the Analytical Tools Used

A. Prior to FORPLAN Version II

Preliminary analysis prior to formulation of the forest's FORPLAN Version II model began with the analysis of identified issues and concerns Issues influenced the identification of analysis areas, capability areas and prescriptions needed Formulation of the cost and yield coefficients by resource specialists and the IDT required separate analysis to –

- match management practices within prescriptions,

- reflect opportunities for addressing issues and concerns, ascertain that coefficients used in the FORPLAN Version II model were indeed correct

Because this was a Revised Plan only selected benchmarks were made using the FORPLAN Version II Model One run was for the maximization of Timber in response to issues raised. Also a number of PNV runs were made, Maximum PNV, Maximum PNV Market Only, and a Minimum Level Management Benchmark PNV

Also a Current No Action was run to check for errors in economic tables and yield files Adjustments were made to reflect opportunities indicated by the management practices within prescriptions

The IDT was also able to analyze the use of constraints in the model As a result, additional constraints were placed on certain analysis areas to ensure "reasonableness" in potential on-the-ground application

Other specific analyses accomplished prior to modeling were

1 A socioeconomic overview of the forest

2 An update of the Landownership Adjustment Plan maps

3 Updating ROS inventory and mapping

4 Updating Visual quality (VQO) objective inventory and mapping

5 Minerals availability and mapping

6 Recommendation for management indicators

B. Using FORPLAN Version II

Alternatives are generated by applying constraints to produce or to allow a specified range of goods and services, or to only allow a specified set of management prescriptions to be assigned to specific analysis areas Constraints are designed to reflect the goals and objectives of the alternatives Conditions set by the constraints are satisfied before the objective function is optimized The analysis of all alternatives had the same objective function maximize present net value In other words, after meeting all constraints, the FORPLAN Version II model allocated the remaining opportunities in a way that produced the most economically efficient solution

C. Subsequent to FORPLAN Version II

Each of the alternatives was examined by the Forest IDT for reasonableness and practicality This was accomplished, in part, by examining the prescription assignment to analysis areas Professional judgment and experience were used extensively during this phase of the process

Additional analysis conducted subsequent to the FORPLAN analysis included the use of IMPLAN to examine the effects of the various alternatives on population, employment and income Adjustments to the FORPLAN Version II present net value calculations were also made in order to include additional fixed benefits from minerals and fixed costs not included in the management prescriptions in the model

D. Cost Efficiency of Prescriptions

A broad range of management prescriptions were included in each alternative. By maximizing PNV, FORPLAN Version II selected the most efficient set of prescriptions subject to constraints and the objectives of the alternative In order to assure that the most economically efficient set of prescriptions is considered in accordance with 36 CFR 219 14(b), each AA was offered a minimum level prescription No forested lands were identified that "accepted" this minimum level prescription If any land was identified as going to a MINLVL prescription, it would be established as not suitable for timber production in accordance with 36 CFR 219 14(c)

All economic tables were developed by resource managers and reviewed by the IDT FORPLAN Version II runs for maximization and other benchmarks were analyzed and evaluated to compare costs and yields relative to prescription application on analysis areas. Resource managers analyzed the data to ensure cost effectiveness of the prescription and applicability to meeting alternative (benchmark) goals

3. The FORPLAN Version II Model: Components and Rationale Behind Development

In the following sections, the individual components of the FORPLAN Version II model are discussed in general terms A description of how these components were developed and structured in the Texas model is also included for analysis areas, management prescriptions and resource yield tables

A. Objective Function

The objective function drives the allocation and scheduling process and defines the purpose of the run It specifies output(s) to be maximized or minimized For example, an objective function could specify the maximization of timber volume or present net value (PNV) Allocation and scheduling choices within the model are then made in accordance with the purpose stated in the objective function

For the Texas model, the objective function of maximize PNV is used to evaluate all alternatives. Intermediate runs may have objective functions to maximize or minimize a particular output such as timber volume These intermediate runs are used to explore and define resource capabilities under various assumptions Once resource capabilities are defined, however, they are locked in via constraints, and the maximum PNV objective is assigned to determine the most economically efficient means of achieving the resource goals

B. Constraints

As the term indicates, constraints are conditions or restrictions that determine which courses of action can and cannot be adopted In a linear programming problem, conditions or restrictions defined by constraints are satisfied prior to optimization of the problem in the manner specified by the objective function If a course of action that satisfies all of the constraints does not exist, the problem is infeasible In this case, the constraints must either be relaxed or reformulated or the problem redefined to allow an optimal solution to be found

In the FORPLAN Version II model, constraints are imposed for several reasons Constraints were imposed to satisfy legal and policy related requirements Examples of these are the nondeclining yield constraint (policy) and constraints to provide habitat for threatened and endangered species such as the red-cockaded woodpecker (legal) There can also be discretionary constraints imposed in order to achieve the objectives that define an overall management philosophy or alternative For example, in the CURRENT "No Action" alternative, there are timber harvest constraints imposed to reflect the current intensity of timber management These constraints prevent the linear program from simulating timber harvest constraints greater than the amount current management will produce. This then is a discretionary constraint that is imposed in order to reflect an overall approach to management

There are three types of constraints that can be used in the FORPLAN Version II model to control outputs and activities They are 1) absolute constraints, 2) timber harvest and flow constraints and 3) general relational constraints Absolute, flow and general relational constraints can be specified by analysis area, treatment type, output and/or activity from one to all (15) periods

Absolute constraints are used to specify minimum and/or maximum output levels or objectives for outputs such as numbers of pileated woodpeckers, tons of sediment and cubic feet of timber produced per period

Flow constraints in the Texas model were used to limit periodic increases in timber harvested, to distribute the total harvest across the ranger districts and to put a ceiling on total timber volume produced

The timber harvest and growth constraints include nondeclining yield, long-term sustained yield and ending inventory

The general relational constraints were used to specify constraints as percentages or as a proportionate relationship For example, a certain percentage of Management Area 2 (RCW Habitat Management Area) to be in the 0-10 age group

C. Analysis Areas

Analysis areas are defined as parcels of land, not necessarily contiguous, which are for all practical purposes, homogeneous with respect to their response to the application of various management practices

In FORPLAN Version II, analysis areas are defined by using combinations of six identifiers available to the user.

For the National Forests in Texas, the analysis area identifiers were defined in such a way as to take full advantage of existing resource and land based data This included timber and wildlife data in the CISC data base, recreation data in the RIM data base and other sources The data contained in these data bases, particularly the CISC data base was considered very reliable and also provided the information in detail that was sufficient to perform the analysis required.

The analysis areas were also defined in such a way as to allow the model to be used to address issues and concerns Following is a listing of the analysis area identifiers as they are used in FORPLAN on the National Forests in Texas and the spreadsheet model for Caddo and LBJ National Grasslands

I National Forest (FORPLAN)
  Level 1. Land Class and Fixed AA
    1 Angelina NF Fixed AA
    2 Davy Crockett NF Fixed AA
    3 Sabine NF Fixed AA
    4 Sam Houston NF Fixed AA
    5 National Forest Fixed AA
    6 Non Suited Fixed AA
    7 Hardwood & Pine HDWD Fixed AA

8 National Grassland Fixed AA
9 Water Area
10 Public Park and Cemeteries
11 Transmission Lines
12 Road & Railroad R O W
13 Wildlife Openings
14 Reserved
15 Wilderness
16 Deferred
17 General Forest
18 Special Land Timber Production Secondary
19 Restocking Cannot Be Assured
20 Irreversible Damage Likely to Occur
21 Rare and Endangered Plant Areas
22 Red Cockaded Woodpecker Area
23. Experimental Forest
24 Minimum Level Management
25. Developed Recreation Site
26 Undeveloped Recreation Site
27 Trails
28 Administrative Site
29 Unproductive Site
30 Not Applicable Land

Level 2 Forest Types
1. Bottomland and Upland Hardwoods
2 Loblolly Pine
3 Longleaf Pine
4 Slash Pine
5 Pine/Hardwood Mix
6 Shortleaf Pine
7 Non Applicable

Level 3 Visual Quality Objective and Recreation Opportunity Spectrum
1 Semi Primitive (ROS)
2 Roaded Natural (ROS)
3. Modification (VQO)
4 Retention (VQO)
5 Preservation (VQO)
6 Non Applicable

Level 4 Soils
1 Floodplains
2 Streams
3 Sandy/Loamy Soils <15% Slope
4. Clayey Soils
5 Vertisoils
6 Critical Soils/Wetlands
7. Deep Sandy Soils >15% Slope
8 Non Applicable

Level 5· Age

1. 0-4 Years old
2 5-14 Years old
3 15-24 Years old
4. 24-44 Years old
5 45-64 Years old
6 65-84 Years old
7. 85-104 Years old
8 105+ Years old
9 Non Applicable

Level 6 RCW Zone/Management Area
1 Mixed Forest MA
2 Longleaf MA
3 RCW HMA Mixed Forest MA
4 RCW HMA Longleaf Forest MA
5 Riparian/Streamside Zone MA
6 Wilderness/Roadless MA
7 Special Management Area
8. Developed Recreation
9 Administrative/Non Forest
10. Experimental Forest
11 Grasslands
12 Acquatic Ecosystems (water)

II National Grasslands (SPREADSHEET)

Level 1 Geographic Area
1 Ladonia
2. LBJ
3 Bois D'Arc
4 Lake Fannin

Level 2 Land Class
1 Cross Timber RNA
2 Ball Knob Hill TXNH
3 Center Point Prairie TXNH
4 Gober Prairie TXNH
5. Lake Crockett Flatwoods TXNH
6 Lake Fannin Ravines TXNH
7 Pecan Creek Mesa TXNH
8 Post Oak Ridge TXNH
9. Pringle Creek TXNH
10 Spoonamore Prairie TXNH
11. Lake Crocket Recreation Area
12 Black Creek Recreation Area
13 Coffee Mill Lake Prairie TXNH
14 Coffee Mill Recreation Area
15 Water
16 Roads
17 Administration Sites
18 Well Sites
19 Fixed AA

Level 3· Soil Type
1. Fine
2 Medium Coarse
3. Floodplain
4 Critical

Level 4 Range Condition
1. Excellent Range
2 Good Imporving Range
3 Good Range
4 Fair Improving Range
5 Fair Range
6. Poor Improving Range
7. Poor Range
8 No range Condition

Level 5 Cover
1 Grass
2 Woodlands
3 Bottomland Hardwood

Level 6 ROS Class
1. Roaded Natural
2. Semi Primitive

Every acre on the National Forests and Grasslands in Texas is defined through some combination of these identifiers Again, all lands within a given analysis area are homogeneous with respect to how they will respond to applied management At the same time, the acres with an analysis area might not be contiguous. However, there are some management areas which are contiguous and non-homogenous, for example, 2 wilderness management areas.

Several factors were involved in the definition of the analysis areas in addition to those discussed earlier Not only were the identifiers used to take advantage of existing data and to address issues, but they were also used to reflect significant differences in outputs and values For example, the breakdown of pine type into loblolly, shortleaf and long- leaf was done to allow for differences in the yields and management characteristics associated with these management types Each National Forest was identified as a separate unit for reporting of outputs by administrative unit and geographical area This was especially important given the physical distance that separates the units The six identifiers available in FORPLAN Version II were sufficient in defining the analysis areas in the National Forests in Texas.

4. Management Prescriptions

Allocation and scheduling choices for an analysis area are offered through management prescriptions which are composed of a management emphasis (allocation) and a management intensity (schedule of activities) The National Forest Management Act (NFMA) regulations define management prescriptions as "management practices selected and scheduled for application on a specific area to attain multiple use

and other goals and objectives " One of the key components of this definition is the concept of multiple use This concept was instrumental in the development of management prescriptions on the National Forests in Texas

A broad range of management prescriptions was developed to provide a basis for meeting alternative resource objectives while providing for multiple resource management

A. Management Emphases

The management emphases developed for use in the Texas model are as follows

1 Minimum level
2 Timber
3 Dispersed Recreation
4 Wildlife
5 Range
6 Red-cockaded woodpecker clusters (colonies) and recruitment stands (thinning only harvest)
7 Wilderness
8 Current (Non-timber)
9 Developed Recreation

Each of these management emphases has a goal(s) associated with it These goals are as follows

Minimum Level: The level of costs, outputs and benefits from a forest or other unit, assuming no investments are made This is a level that reflects the absolute minimum, unavoidable activities relating to public land management necessary to (1) Protect life, health and safety of the incidental users, (2) Prevent environmental damage to lands in other ownership and (3) Administer fundamental land uses such as utility corridors, private land access, etc

Timber: Timber management is emphasized This includes the growing, tending, harvesting and regeneration of regulated crops of industrial wood

Dispersed Recreation: Dispersed recreation is emphasized Other resource management is modified to enhance dispersed recreation opportunities This emphasis is applied to relatively large areas where concentration of use varies but is generally less than that under the developed recreation emphasis

Wildlife: Management is directed toward enhancement of the wildlife resource at the expense of or in conjunction with other resource uses

Range: Range Management of the range resource is emphasized This emphasis is applied to designated areas of land available for livestock grazing upon which a specified number and kind of livestock may be grazed under a range allotment management plan

RCW Clusters - Recruitment: This emphasis is applied to red-cockaded woodpecker (clusters) colony sites and recruitment stands A thinning only prescription was used in these areas

Wilderness: Wilderness recreation is emphasized Management is applied to areas where the earth and its community of life must be untrammeled by man, where man himself is a visitor who does not remain

Current - Non-standard Acres (Other than Management Areas 1 and 2: This emphasis is applied to the non-standard acres in the current alternative to reflect current activity and budget levels This includes developed recreation activities.

Developed Recreation: Management of the developed recreation resource is emphasized The management of other resources is modified and, in some cases, prohibited to enhance the developed recreation experience This emphasis is applied to relatively small, distinctly defined areas where facilities are often provided for concentrated public use

Management Activities

The Management Information Handbook (MIH) output codes found in the 1986-1990 Management Information Handbook (FSH 1309.11a) were used to develop a preliminary list of management practices and outputs for each of the management emphases This list was modified by the IDT members to include only those activities and outputs appropriate to the emphasis

Once the list of outputs/activities for each emphasis was completed, a list of management intensities was defined The initial intensities were designed to show differences in costs and levels of output and, in turn, to reflect different objectives

B. Management Intensities (FORPLAN)

The end result of this process was a series of management intensities within each of the management emphases Within the developed recreation emphasis, a total of five management intensities were developed

1 Current
2 Current with Improved Quality
3 RPA
4 Maximum

5 Minimum Level

The dispersed recreation emphasis contained a total of four intensities

1 Current
2 Current with Improved Quality
3 RPA
4 Maximum

There is a single management intensity within the wilderness emphasis In this case, an area considered for a wilderness study designation is either allocated in total to wilderness or is allocated to some other emphasis.

The wildlife emphasis includes two intensities a hardwood intensity with a 120-year rotation and a intensity (all types) with a 90-year rotation

Timber - Longleaf, Shortleaf, and Loblolly Pine (FORPLAN)

The timber emphasis includes a total of seven intensities for all pine types, with an additional 4 intensities for longleaf pine The intensities used in the 1987 Plan were fully evaluated for applicability in this Revision. These intensities with extended rotations were again used as described in the 1987 Plan and EIS The longer rotations in this revision created a slightly different scenario than in the 1987 Plan and EIS analysis. The IDT determined this analysis to be appropriate with consideration for intensities as follows.

1 40-year rotation,High
2. 50-year rotation
3 60-year rotation
4 70-year rotation
5 80-year rotation
6 90-year rotation
7 100-year rotation
8 110-year rotation,longleaf pine only
9 120-year rotation,longleaf pine only
10. 130-year rotation,longleaf pine only
11 140-year rotation,longleaf pine only, low

The thinning pattern associated with each rotation changes when the rotation age increases. The thinning patterns for shortleaf and loblolly pine (40-100) and longleaf pine (40-140) were established based on existing stand age Thinnings were prescribed according to the following table.

Rotation	Age of Thinnings
40	20,30
50	20,30
60	20,40
70	20,30,50
80	20,30,40,60
90	20,30,50,70
100	20,30,40,60,80
110	20,30,50,70,90
120	20,30,40,60,80
130	20,30,50,70,90
140	20,30,40,60,80

Additional thins were included for all stands carried beyond rotation age up to age 90, no thinnings were calculated for stands over age 90 as IDT determined that mortality would approximately equal any potential growth

Timber - Bottomland and Upland Hardwoods (FORPLAN)

The Bottomland and Upland hardwood types had 9 intensities. These forest groups were described as the hardwood type with the following timber emphasis or management intensities:

120-year rotation (high)
130-year rotation
140-year rotation
150-year rotation
160-year rotation
170-year rotation
180-year rotation
190-year rotation
200-year rotation (low)

The harvest patterns associated with each rotation length for both bottomland and upland hardwoods assumed no harvest prior to 110 years and assumed same thinning procedure as pine types, these thinnings were carried through age 100 rather than 90 as in pine types.

Hardwood types were evaluated outside the FORPLAN model using a personnel computer spreadsheet program with the results of cost and benefits included in the FORPLAN model as a fixed cost for financial evaluation between the alternatives. The analysis was performed within a spreadsheet because there is a large supply in comparison to demand Thus the model would try to convert to pine because of the PNV objective unless constraint Thus with all the constraints set up by the ID team to insure very limited harvesting the decisions were actually made outside the FORPLAN model.

Range

Within the range emphasis, rotation lengths (intensities) are considered, (40 years to 120 years) This analysis was accomplished in FORPLAN for forested areas in order to provide increasing range forage, with maximum production at 0-10 age class

The primary difference between the range and timber management prescriptions of equal rotations involves the basal area removed during thinnings In general, more of the existing basal area is removed under a range prescription than under a timber prescription This serves to maximize understory forage production while maintaining satisfactory timber stocking levels

The range emphasis for the Grassland units was performed in the spreadsheet model. Range emphasis areas had greater production with frequent fire and cultural activities that were not emphasized in priority wildlife/recreation allocations

The remaining emphases, minimum level, current (non-timber), and no harvest all include one intensity

C. Prescription Standards and Guidelines

After defining the management intensities that were to be included in the FORPLAN Version II model, a list of prescription standards and guidelines was developed to further define the prescriptions The standards and guidelines developed for each management emphasis/intensity combination are presented below in condensed form. In some cases, such as with the minimum level prescription, the standards and guidelines vary according to which management area it applies to For this reason, the standards and guidelines are presented by management area

After development of the alternatives and initial analysis, the IDT determined that developing different standards for Longleaf Forest Ecosystems, and Mixed Forest Ecosystems was impractical In either Management Area or ecosystem allocation, the possibility existed for stands of either type [such as a longleaf stand(s) within the Mixed Forest Ecosystem Management Area] to occur The prescriptions for each area emphasis was very similar (such as 1a=2a and 1b=2b etc) Subsequently the final management area descriptions grouped Longleaf and Mixed Forest Ecosystems into MA-1 (timber management emphasis), and moved Forested Ecosystems-RCW emphasis from MA-6 to MA-2. Description of the initial management areas and the emphasis prescriptions are as follows

5. MANAGEMENT AREA DESCRIPTION & PRESCRIPTION EMPHASIS

Management Areas Considered in Alternatives

1. LONGLEAF DOMINATED ECOSYSTEMS

A Longleaf Dominated Ecosystems, Current Direction
* even-age management (all methods) emphasis
* middle (75-90 year) rotation age for LLP
* ORVs allowed
* pesticides allowed

B Longleaf Dominated Ecosystems, Commodity Emphasis With Even-Age Management
* even-age management (all methods) emphasis
* young (50-60 year) rotation age on LLP
* ORVs allowed
* pesticides allowed

C Longleaf Dominated Ecosystems, Non-Motorized Recreation/Wildlife Emphasis
* shelterwood (group selection allowed) emphasis
* older (80-100 year) rotation age
* maintain high visual quality
* pesticides allowed
* develop large old trees
* no ORVs

D Longleaf Dominated Ecosystems, Non-Commodity Emphasis
* uneven-age management emphasis
* no pesticides or prescribed fire allowed
* no ORVs

E Longleaf Dominated Ecosystems, Non-Commodity Emphasis
* uneven-age management emphasis
* pesticides and herbicides allowed
* prescribed fire promoted
* no ORVs

2. MIXED FOREST ECOSYSTEMS

A Mixed Forest Ecosystems, Current Direction
* even-age management (all methods) emphasis
* 70 year rotation age on LBP, 80 years for SL, 120 years on hardwoods
* no pine-hardwood management types
* ORVs allowed
* pesticides allowed

B Mixed Forest Ecosystems, Commodity Emphasis With Even-Age Management
* even-age management (most ST and SW, little CC) emphasis
* 50 year rotation for pine, 120 years for hardwoods
* no pine-hardwood management types
* ORVs allowed
* pesticides allowed

C Mixed Forest Ecosystems, Commodity Emphasis With Uneven-age Management
* uneven-age management emphasis (except type conversions)
* no ORVs
* pesticides allowed

D Mixed Forest Ecosystems, Recreation/Wildlife Emphasis - No ORVs
* even-age management emphasis (no CCs except type conversions)
* 70 year rotation LBP, 80 year rotation SLP, 120 year rotation HW
* maintain high visual quality
* pesticides allowed
* no ORVs

E Mixed Forest Ecosystems, Non-Commodity Emphasis
* uneven-age management emphasis
* no pesticides allowed
* no ORVs

3. GRASSLAND ECOSYSTEMS

A Grassland Ecosystems, Current Direction With Commodity Emphasis
* keep existing non-natives, no new non-native pastures
* pesticides allowed
* no ORVs
* fair or Better Range Condition

B Grassland Ecosystems, Current Direction With Recreation Emphasis
* allow non-natives to revert to native species
* pesticides allowed
* no ORVs
* good or better range condition
* retain semi-primitive ROS opportunities

C Grassland Ecosystems, Motorized Recreation Emphasis
* allow non-natives to revert to native species
* pesticides allowed
* ORVs allowed
* good or better range condition
* provide semi-primitive motorized and roaded natural ROS opportunities

D Grassland Ecosystems, Low-Impact Management
* eliminate non-natives pastures
* no pesticides
* no ORVs
* good or better range condition
* retain semi-primitive ROS opportunities

4. STREAMSIDE ZONE ECOSYSTEMS

A Streamside Zone Ecosystems, Current Direction
* exceed State BMPs, minimum zone is 66 feet from intermittent and 100 feet from perennial
* unsuited for timber production
* timber harvest allowed for other resource management

B Streamside Zone Ecosystems, Commodity Production Allowed
* meet State BMPs, minimum zone is 50 feet from intermittent and 100 feet from perennial water
* suited for timber production allowing selection management

C Streamside Zone Ecosystems, Minimum Level Management
* greatly exceed State BMPs, minimum zone is 132 feet from ephemeral, 200 feet from intermittent, 300 feet from perennial water
* no touch zones except for SPB control using wilderness criteria

5. AQUATIC ECOSYSTEMS

A Major Aquatic Ecosystems
* large reservoirs (Sam Rayburn, Toledo Bend and Lake Conroe)
* large Lakes not encompassed in 1 DFC (Coffee Mill, Lake Crockett, Black Creek, Cottonwood Creek, Lake Fannin)
* about 15,682 acres included
* separates requirements where authority is limiting on reservoirs

SPECIAL MANAGEMENT SITUATIONS

6. RED-COCKADED WOODPECKER MANAGEMENT

A RCW, Interim Guides
* 1200 meter, circular habitat strategy
* limited regeneration

B RCW, Long Term Strategy
* area management concept
* provide for commodity production to maximum extent compatible

C RCW, Long-Term Strategy - Recreation Emphasis
* area management concept
* provide for recreation to maximum extent compatible

7. WILDERNESS/ROADLESS AREA MANAGEMENT

A Wilderness/Roadless Area, Current Direction
* no prescribed fire

B Wilderness/Roadless Area, Semi-Primitive Emphasis
* prescribed fire used

8. SPECIAL AREA MANAGEMENT

A Research Natural Areas
* essentially pristine, natural, unmodified condition
* baseline management, let nature take its course

B Wild and Scenic Rivers
* Scenic Rivers - maintain in near natural condition
* not suited for timber or forage production
* limited recreation developments acceptable
* Neches plus consider any other eligible streams/rivers

C Scenic Areas
* consider for 5 existing plus 2 new proposals

D Botanical Areas
* certain TNHP proposals and RNA proposals
* low intensity management

E Special Management Areas
* other TNHP, RNA or botanical proposals
* low intensity or minimum level management

F Recreation, Historic and Conservation Area
* Lake Fannin Historic Area (about 60 acres)
* Longleaf Ridge as proposed during scoping
* very low or minimum level management
* other areas identified for special management

9. RECREATION AREA MANAGEMENT

A Developed Recreation Sites
* campgrounds and picnic sites
* convenience facilities provided
* shooting ranges

B Specialized Recreation Sites
* boat ramps, hunter camps, parking lots, trail heads, etc
* no or few convenience facilities

10 ADMINISTRATIVE AND SPECIAL USE SITE MANAGEMENT

A Administrative Sites
* Fire, Administrative and Other Sites (FAO)
* about 129 acres of sites

B Special Use Areas
* special use sites
* right-of-ways

11. EXPERIMENTAL FOREST MANAGEMENT

A Stephen F Austin Experimental Forest

RELATIONSHIP BETWEEN MANAGEMENT AREAS IN THE 1987 FOREST PLAN AND THOSE DEVELOPED FOR THE REVISION

1987 LMP MANAGEMENT AREAS		PRE-DRAFT LMP MANAGEMENT AREAS	
1	Wilderness	7A	Wilderness/Roadless Areas, Current Direction
2	RCW Colonies	6A	RCW, Interim Guides
3	RCW Recruitment/Replacement		(included in MA 6A - RCW, Interim Guides)
4	*Developed Recreation*	9A	*Developed Recreation Sites*
5	General Forest	1A	Longleaf Dominated Ecosystems, Current Direction
		2A	Mixed Forest Ecosystems, Current Direction
6	Non-Forest	10A	Administrative Sites
		10B	Special Use Areas
7	Research Natural Area	8A	Research Natural Areas
8	LBJ	3A	Grassland Ecosystems, Current Direction with Commodity Emphasis
		3B	Grassland Ecosystems, Current Direction with Recreation Emphasis
9	Ladonia		(see FLMP MA #8)
10	Bois d' Arc		(see FLMP MA #8)
11	Lake Fannin		(see FLMP MA #8)
12	SFA Experimental Forest	11A	Stephen F Austin Experimental Forest
13	Water	5A	Major Aquatic Ecosystems
14	Special Interest Areas	8B	Wild and Scenic Rivers
		8C	Scenic Areas
15	Stringers	4A	Streamside Zone Ecosystems, Current Direction

DRAFT LMP MANAGEMENT AREAS		FINAL LMP MANAGEMENT AREAS	
7	Wilderness, Current Direction	7	Wilderness
6	Excluded	6	Longleaf Ridge
9A&B	Developed Recreation Sites	9	Developed Recreation Sites
1	Upland Forest Ecosystems	1	Upland Forest Ecosystems
2	RCW Emphasis	2	RCW Emphasis
10A	Administrative Sites	10A	Administrative Sites
10B	Special Use Areas	10B	Special Use Areas
8A	Research Natural Areas	8A	Research Natural Areas
3	Grassland Ecosystems, Recreation/Grazing Emphasis	3	Grassland Ecosystems, Current Direction Recreation/Grazing Emphasis
11	Stephen F Austin Experimental Forest	11	Stephen F Austin Experimental Forest
5	Major Aquatic Ecosystems	5	Major Aquatic Ecosystems
8B	Candidate Scenic Rivers & Recreational Corridors	8B	Candidate Scenic Rivers & Recreational Corridors
8C	Scenic Areas	8C	Scenic Areas
8D	Botanical Areas	8D	Botanical Areas
8E	*Special Riparian and Wildlife Areas*	8E	*Special Riparian and Wildlife Areas*
8F	Archeological and Historical Areas	8F	Archeological and Historical Areas
4	Streamside Management Zones	4	Streamside Zone Ecosystems, Current Direction

6. COST EFFICIENCY DISCUSSION

To provide for cost efficiency, management activities that were not considered essential to the goals and objectives of the prescription were not included Also, activities that were included were funded at the level necessary to accomplish the objectives of the prescription Additional criteria for the inclusion of activities in a prescription include 1) the activity was necessary to protect the multiple use values of the land and 2) the activity was necessary to protect the productive potential of the land By including only those activities necessary to produce the desired outputs and by funding them at the appropriate level, cost efficiency was assured

7. RESOURCE YIELD TABLES

The resource yield tables in the FORPLAN model contain the yield coefficients for the outputs and effects used in the model These yield tables are accessed by management prescriptions as they are allocated to analysis areas The outputs tracked in the FORPLAN model include millions of cubic feet of timber, recreation visitor days, animal unit months, acre feet of water, tons of sediment, erosion rates, wildlife and fish user days, numbers of animals (by management indicator species), miles of road construction, reconstruction and maintenance, and minerals outputs. Following is a brief discussion of the processes used to develop the yield coefficients in FORPLAN Version II

A. RECREATION

A(1) DEVELOPED RECREATION

All developed recreation sites are assumed to be in the rural (R) Recreation Opportunity Spectrum (ROS) class Yields are based upon current use as taken from the Recreation Information Management (RIM) reports The Recreation Visitor Day (RVD) outputs would vary over time based upon the particular management level selected, i e. current, recreation emphasis, RPA, etc , with maximum use or capacity calculated at 40 percent theoretical design capacity

The estimated costs to the Forest for recreation management were calculated based on current expenditures. The Resources Planning Act (RPA) has established the value per unit output (RVD) for the Forest.

A(2) DISPERSED RECREATION

Coefficients for calculating the carrying capacity (PAOT's) of the land in each analysis area are taken from the ROS users guide based on the following classification Primitive, Semi-primitive Non-motorized, Semi-primitive Motorized, Road Natural, Rural and Urban Areas

There are only three classifications on the National Forests in Texas semi-primitive non-motorized, semi-primitive motorized and roaded natural Dispersed recreation in Texas is compatible, to some degree, with all timber management activities As reflected in the yield tables,

recreation use capacity is assumed to increase as the timber gets older Yield capacity also varies according to the timber type (i e. Pine, Bottomland Hardwood), and the ROS class of the particular area The coefficient is in RVD/acre/year The Resources Planning Act has established the value for all forms of dispersed recreation use, including hunting and fishing, per RVD output

All costs and outputs for all alternatives were evaluated by comparing with current and past use and protected according to the R-8 Regional Guide, RPA and professional judgment

B. WILDLIFE

B(1) BIG GAME HABITAT CAPABILITY

The U.S Forest Service (USFS - Region 8) document entitled A *Process for Obtaining Habitat Capability and* WFUD's describes a process for obtaining wildlife habitat capability and wildlife and fish user days (WFUD's) based on the assumption that a management activity that alters a wildlife species habitat will have an effect, positive or negative, on the carrying capacity of that habitat Coefficients can be developed that express the value of certain management activities to fish, waterfowl, white-tailed deer, turkey and small game habitats.

Management activities for which coefficients can be developed include timber harvest, such as regeneration and thinning, since timber operations probably have more effect on the forest habitat than any other activity Other coefficients can be developed for direct habitat improvements such as wildlife stand improvement, prescribed burning and permanent opening development. These coefficients applied to the appropriate activities will estimate the effects of the activities to the total wildlife population WFUD's are dependent upon the number of animals which can be harvested from the total population.

This document was used as a basis for developing the big game habitat capability and WFUD yield coefficients for the National Forests in Texas FORPLAN Version II model Since white-tailed deer are the major big game species on the National Forests in Texas, the changes in their numbers were used to express changes in big game habitat capability due to various intensities of management activities Yield coefficients were developed for timber regeneration and thinning, prescribed burning, wildlife stand improvement (WSI) and permanent opening development

B(2) SMALL GAME HABITAT CAPABILITY

Squirrels, both fox and gray squirrels, are the major small game species of the National Forests in Texas Changes in squirrel numbers due to changes in the carrying capacity of squirrel habitat were used to express the effects of management activities Squirrels are dependent on hard mast. Up to a point, older age classes of timber produce relatively larger quantities of mast and, therefore, have a higher carrying capacity Each age class of timber, by timber management type, was given a squirrel density coefficient, expressed as numbers of squirrels per acre The density coefficients were based on the mast production potential of the various age classes The number of acres in each age class multiplied by the density coefficients determines the small game habitat capability The effects of management activities that affect the relative proportion of age classes by timber management type are expressed by changes in squirrel numbers.

Bobwhite quail is the major small game species of the National Grasslands Quail density coefficients, based on the carrying capacity of the various vegetation types and range condition classes, were developed to determine the effects of management activities on the Grasslands Quail habitat in association with management prescriptions for red-cockaded woodpecker (MA-2) was derived for forest areas

The Process Record for Developing Wildlife Yield Coefficients for FORLAN Version II is on file in the Supervisor's Office in Lufkin.

C. RANGE

Forage and AUM/acre yield coefficients were developed by timber types, age classes and response to cultural treatments

The basis for developing the coefficients is the allotment analysis on file They reflect forage production in various stand types and conditions as well as the effect that harvesting, thinning, prescribed burning etc have had on forage production

Based on current range environmental analysis, models and charts were developed to reflect projected forage production and AUM's/acre

Activities were identified to estimate the cost required to obtain, develop, manage and administer the expected outputs

D. TIMBER COEFFICIENTS

Timber yield coefficients developed for the 1987 Forest Plan were verified by the following growth and yield models

Shortleaf - Murphy and Beltz (1981)
Loblolly - P-LOB
Longleaf - Farrar (1985)
Hardwood - Yield Plus
Uneven-aged Stands - Belcher and Stoneking (1986)

Estimated harvest yields were further verified with recent timber sale volumes.

E. SOIL AND WATER

E(1) INCREASED WATER YIELDS

Increased Water yields are based on the types of timber cuts and the number of acres harvested The average annual water yield, which is the total yield of water based on undisturbed watershed condition, for the National Forests in Texas is 0 8 acre feet per acre Coefficients for increased water yields were developed by adding the vegetative manipulation factor to the average annual yield Regeneration cuts produced the greatest increase in water yield

E(2) SEDIMENT

Sedimentation coefficients were developed by establishing sediment delivery rates from soil erosion rates which were developed through use of the universal soil loss equation Sediment delivery rate is approximately 23 percent of the soil erosion rate except on the Grasslands where it varies according to management.

E(3) EROSION RATES

Erosion rates were developed through use of studies conducted by Texas A&M University on sediment and erosion outputs from silviculture and grazing practices in East Texas Also, data from the National Forests in Texas, State and Private and Forest Service Research was used to develop erosion and sediment coefficients Erosion rates for various types of management practices were developed and compared to each soil unit to assure practices did not exceed soil loss tolerance levels

F. ROADS

In the original planning effort, all Forest lands were color-coded based on access class using the process and criteria described in the white paper prepared as input for the AMS Those areas falling into the inaccessible category were stratified based on age class and timber type Using a statistically significant sample of each forest, road densities/1000 acres of Forest Service land were then developed and an average figure as described in the white paper was developed. This average road density of 4 6 miles/1000 acres was then applied to the different forests

and a road mileage needed for construction was developed by age class and timber type These road mileages were then divided by the total acres by forest in those age classes and timber types to produce a set of coefficients for inclusion in the models to be applied to existing acres in the harvest schedules As the model selects existing stands for harvest, the appropriate coefficients (construction/recreation costs of $11-60,000/miles depending on level of road) are applied on a per acre basis producing the road construction mileage needed to harvest that area Mapping of existing woods roads has concluded that a transportation system exists with no construction required in all areas Thus for all alternatives coefficients reflect reconstruction only in response to resource entries

G. MINERALS

All estimates of activity levels are based on historical trends without regard to fluctuations due to short-term economic conditions Economic outputs, BBTU's and dollars are estimated based on existing and predicted activity levels British Thermal Units in Billions (BBTU's) result from average well production, and the dollar income estimates represent returns from sales of product or charge for leasing and exploration activities. An important consideration is that economic, legal and social factors beyond the control of the Forest manager will greatly influence accuracy, or lack of accuracy in estimates of this nature.

The figures representing activity levels and outputs are the result of estimations as described above Activity costs are based on actual costs at the time the estimates were made

H. LANDS

In conjunction with the planning team, various alternative levels of purchase and exchange were planned and distributed among the National Forests and Grasslands The act of distribution is merely to indicate an approximation of what may happen on each area within a given alternative For the Final Plan, only the total acres for Texas are significant Actual distribution in operations will be on an as-needed or opportunity basis with priorities as provided by the selected alternative. The range of activities was considered for exchange and acquisition. All cost figures were derived from actual costs as summarized from historical records and represent averages for use in the model.

IV. ECONOMIC EFFICIENCY ANALYSIS

1. PRESENT NET VALUE

Net public benefits (NPB) is an expression used to specify the overall long-term value to the nation of all outputs and positive effects (benefits), less all associated outputs and negative effects (costs) whether they can be quantitatively valued or not NPBs are measured by both quantitative and qualitative criteria rather than a single measure or index, such as present net value (PNV)

Conceptually, NPBs can be viewed as PNV, plus the value of non-priced outputs Non-priced outputs include items such as threatened and endangered species maintenance or enhancement, natural or scenic areas, cultural site protection, visual quality in excess of minimum management requirements and increased plant or animal diversity

There are other benefits or effects which are related to NPBs and the concern for National Forest policy and management. These include local income, jobs, economic development, impacts on taxpayers, price effects on consumers of forest products and other producers of forest-related products, 25 percent returns to counties and distribution of benefits to specific users of National Forest outputs. All of these are distributive welfare effects of National Forest production All the foregoing distributive effects and impacts have been the object of national policy issues and discussion in both the Administration and the Congress. Since they are distributive effects, they are essentially questions of equity rather than efficiency. They involve questions of whom should get benefits and who pays the costs They cannot be assessed in the context of the efficiency criteria associated with PNV

PNV is the difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the area (36 CFR 219 3) These outputs include all recreation visitor days including those for wildlife, fishing and wilderness experiences, the stumpage value of timber, the value of any increased waterflow quantities and the in-the-ground analyzed value of minerals as they are extracted.

PNV is one important component of NPBs because it provides a useful means of structuring a definition of the ways in which alternatives differ Alternatives are designed to achieve their goals and objectives for priced outputs in a manner that maximizes the present net benefit (PNB) minus the present value of costs (PVC) while meeting all specific constraints and objectives from non-priced outputs.

Alternatives are designed to achieve priced outputs in an efficient manner and meet constraints to produce non-priced outputs at the least cost Thus, the PNV of each alternative is a measure of the efficiency of the priced portion of present net benefits The discounted return indicated by PNV will not be entirely in the form of cash. The major reason is that the dollar values used in calculating PNV are defined as the prices consumers would pay for forest outputs if a market existed. But, such prices are not actually collected by the National Forests At present, it is national policy to provide most forest outputs either at no charge to consumers, as in the case of water, or for a fee which is less than the willingness-to-pay price, as in the case of recreation The monetary values used for market and non-market outputs represent one

measure of the positive effects or benefits associated with the production of a substantive part of the forest's benefits to society See Table 3 Appendix B for comparison of PNV by benchmarks and alternatives

2. **MODEL PARAMETERS**

The economic analysis is conducted using a 4 0 percent discount factor for the 150-year planning horizon

The base year for costs and benefits is 1992 Real increases in major cost items were incremented at the rate of one-half of one percent per year. All budgets were adjusted to reflect 1992 values

3. VALUES

The Forest has an extensive data base of timber values from which timber valuation was calculated Timber values were derived from data formulated using transaction appraisal All other resource values are those assigned in the 1990 RPA Program, which also includes price value trends The Regional targets in the RPA program correspond very closely with the demand trends established in the assessment for all resource element outputs in Region 8 The distribution of these targets in the Regional Guide was generally accepted as the best estimate of quantity demanded at the RPA values A horizontal demand for this quantity was further assumed over the planning horizon

Mineral values used in the model were based on recent oil and gas production income to the NFGT and historical information

For some outputs, this Forest contributes only a small part of total production in the region and our influences on prices are minimal These outputs include timber and range where a horizontal demand was assumed to apply over a plus or minus 50 percent range For developed and dispersed recreation, wilderness, water, wildlife and fish outputs, our contribution is significant enough to influence prices with substantial changes in output flows In these cases, a plus or minus 25 percent range was assumed to be appropriate These limits were placed on the benchmark runs These limits were not necessary for each alternative because the specific alternative constraints determined by the ID team were more constraining than the benchmark constraints.

4. **VALUES & COSTS**

Costs in FORPLAN Version II are termed "activities" and reflect the "cost of doing business " Generally, the ID Team chose FY 1992 to begin their cost preparation This allowed for ease of calculation of per acre/per year cost coefficients by NIRP code Where adequate cost data was not available, the IDT selected an average of several fiscal years or relied on their professional judgment

Costs were calculated in FORPLAN Version II with minor adjustments made when necessary

The majority of the cost coefficients are "trended" in the model at a real rate of increase of one-half of one percent per year to the midpoint of each decade of the RPA horizon

Documentation of cost development is on file in the Supervisor's Office

5. SUPPLY AND DEMAND

The management and harvest of timber is the major commodity related area of NFGT activity Timber harvest has an impact on local economies in the east Texas area through timber industry related jobs and USFS harvest receipts which are returned to counties at a rate of 25 percent Though NFGT comprise a relatively small part of the east Texas timber market (3-5 percent), the quality of NFGT market product (primarily sawtimber) accounts for a substantial 20-25 percent of the total Texas sawtimber production

In general timberland acreage affects the supply of timber Although acreage loss in east Texas since 1975 has been insignificant, changes in the species composition and economic value of forests have occurred The more productive forest types have declined while the least productive forest types have expanded The net change in timberland acreage is the result of forest land diverting to agricultural use or to urban development as well as the reversion of agricultural land to timberland

Acreage in the productive pine and oak-pine forest types declined by 8 percent or 613,000 acres Bottomland hardwood types, valuable for both high quality timber and wildlife habitat, declined by 210,000 acres, most of the loss of these stands is related to urbanization and development of water impoundments Upland hardwood types, least productive of the forest types, expanded by 28 percent, primarily as a result of a shift in the species composition of timber stands The loss of pine acreage was most dramatic on nonindustrial private timberlands due to selective cutting and lack of adequate regeneration

Ownership affects supply because landowners have different objectives The majority of east Texas timberland is owned by nonindustrial private forest owners who have diverse goals and objectives Nearly all timberland in east Texas (93 percent) is privately owned Nonindustrial private timberland owners control the largest share of timberland (60 percent of the total, or 5 6 million acres) The size of the nonindustrial private timberland base has been essentially unchanged since 1977

One-third of east Texas' timberland is owned by forest industries (3 8 million acres) which occupy the more productive sites found in the southeastern part of east Texas. There has been no significant change in the overall size of the industrial timber base since 1975 but, timberland exchanges and mergers have concentrated the ownership among a smaller number of owners

Public ownership accounts for 7 percent (763 0 thousand acres) of the timberland in east Texas. Nearly all of the publicly owned acreage (80 percent) occurs on National Forests, which account for roughly 5 percent of the total timberland acreage in east Texas. The distribution of National Forest lands is higher in the southern portion of east Texas where National Forests make up 8 percent of the total timberland acreage Total National Forest acreage is approximately 635,800 acres

A. TIMBER SUPPLY SUMMARY

A review of the supply capabilities from all ownerships, within the market area of the National Forest and Grasslands in Texas, show growth-to-removal ratios of 1 0 1.0 When individual ownerships are examined, removals exceed growth only on forest industry land. While long term timber supplies will likely be supplied by industry owned lands (as ingrowth from extensive areas of young pine stands on industry land should cause growing stock levels to rise rapidly over the next 10 to 15 years), short term future supplies will be needed from nonindustrial or public lands

Nonindustrial private timberland owners account for 60 58 percent of all timberland within the east Texas market area and growth currently exceeds removals on these lands (growth-to-removal ratio is currently 1 0.0.8). NFGT has historically supplied roughly 3 percent of the supply mix, a very small percentage of total supply from the east Texas market area, however the NFGT have accounted for a much larger percentage of all sawtimber produced in east Texas

The limitation to timber supply and production on the NFGT over the past several years has been management for red cockaded woodpecker, an endangered species The Threatened and Endangered Species Act of 1973 contains provisions for protection of habitat for species listed as threatened or endangered. According to the 1989 RPA Assessment, the number of plant and animal species listed is growing and this will have implications for timber harvest in areas that contain the species habitat

Average production on NFGT since 1990 has been approximately 72 MMBF (green sales) and 20-30 MMBF (salvage sales), for a total of 90-100 MMBF per year from NFGT.

B. TIMBER DEMAND SUMMARY

Demand is defined as a relationship between price and quantity The most important thing to recognize about demand is that it is not a set or fixed quantity but a relationship between price and quantity. If demand is greater than supply, at a certain price, then price will rise until an equilibrium state is reached

Demand for stumpage is not direct, but derived from the sale or expected sale of lumber, plywood, paper and all the hundreds of items into which wood products are fabricated Demand for stumpage is a derived demand and is heavily determined by demand for housing Demand for housing is determined by another set of factors which includes population growth

Nationwide projections for future timber supply and demand indicate an increasing role for nonindustrial timberlands while supplies from National Forest lands will decrease The 1989 RPA Assessment stated, "Opportunities to increase productivity exist on all ownership, but the greatest potential is on private ownerships, Decisions on future management of private timberlands tend to be less constrained by institutional factors and freer to respond to economic opportunities than management choices for public lands." Demand for quality pine sawtimber is high and the National Forest could sell all high quality timber offered at competitive prices.

Projected demand for timber (*Albers 1990 - NFGT Volume information projections and conversion estimates*) from the NFGT is as follows

Projections for National Forest in Texas Volumes Using Indexes of Projections of Softwood and Hardwood Lumber Production in the South Central Region 2000-2040

Year	Softwoods (MBF)	Hardwoods (MBF)	Total (MBF)	Total (MCF)
2000	140,075	3,769	143,844	18,699
2010	128,918	3,940	132,858	17,271
2020	168,585	3,940	172,525	22,428
2030	223,128	4,111	227,239	29,541
2040	271,472	4,283	275,755	35,848

6. Values and Cost Summary

A. Timber

Timber values used in the FORPLAN model are based on competitive bids actually received from current advertised sales. A linear regression analysis was done for each product sold. There was a clear linear relationship for pine sawtimber, pine small roundwood and hardwood small roundwood. Pine sawtimber "stumpage values" were $1085.90, pine roundwood "stumpage values" were $121 00, and hardwood roundwood "stumpage values" were $11 00 (all in Thousand Cubic Feet - MCF measure) No linear relationship existed for hardwood sawtimber ($261 88 per MCF) A weighted average of bid prices received adjusted for inflation, was used for this product

Price projections include a real value increase for pine products A multiplier of 1 296 for period 1, 1 637 for period 2, 2.078 for period

3, 2.376 for period 4 and 2 540 for periods 5 through 10 was used to reflect actual values for east Texas These real value increases were developed based on demand analysis process papers for the 1987 Plan No real value increase was projected for hardwood products due to the large supply compared to demand Sensitivity analysis was performed on the use of increasing price trends that were developed for Texas by IDT specialists using information obtained between 1985-1987 These were adjusted for applicability using 1992 estimates Trending in the sensitivity analysis did not indicate a change to minimum level management or a below cost situation Removing price trend increases did not change the timber harvest outputs significantly, adding approximately 5 mmbf for the first 2 periods (20 years) and a loss of 5 mmbf for the 3-5 periods (30-50 years) Therefore, it was determined to use the price trends as described

Timber costs or timber sale administrative costs used in FORPLAN were $41 55 per MCF multi-aged and $36 85 per MCF single-aged

These stumpage prices were then weighted by species composition for stands in each analysis area Details of these methods are available at the Forest Supervisor's Office

B. Minerals

Mineral values used were calculated outside of FORPLAN in the spreadsheet model. Mineral (energy related) values were $1 40 per acre trending upwards to $2 00 per acre after 30 years

Costs for mineral activities were $1200 00 per lease per year and $736 00 per year for each case

C. Recreation

Recreation values are based on the RPA assigned 1990 values for developed and dispersed recreation and wilderness use on the National Forests in Texas. These values were used in the economic analysis while the actual fees charged were used to develop projected returns to the treasury and the returns to counties (25 percent fund) Camping, picnicking and swimming values used $10.14; mechanized travel was $7.73, hiking, horseback, and water travel was $4 00, wilderness $23 60, and other recreation (dispersed) was $61 43, all per RVD

D. Range

The grazing value of $4 09 on the National Forests and $7 26 on the National Grasslands per AUM is based on calculations by the USDA Agriculture Research Service and local data Again, this is "on-site" value

E. Wildlife

Wildlife values used are the RPA values for big game hunting (deer) and small game hunting (squirrel and quail) The value for both was $33 00 per WFUD The RPA value for fish is $65 19 per WFUD This value was considered to be high by the core team So they looked at the values derived from the USFWS survey of hunting and fishing use in the U S (1985) These values indicated that fresh water fishing was approximately half the value of saltwater fishing (23 00/freshwater and $47 00/saltwater using 1985 estimates) The core team felt that half the $65 19 would be more appropriate Therefore the $33.00 value for hunting (which was approximately half the value for fishing in Southeast, and which has a high rate of saltwater activity) would be more reasonable Therefore we used the hunting WFUD value $33 00 for fishing

F. Water

RPA water value is $33 41 per acre-foot based on "100 miles off-Forest " All benefits were calculated in FORPLAN Version II

7. DEMAND CUT-OFF

Horizontal demand cut-off assumptions were used for timber MCFs, grazing AUMs and water acre-foot, developed and dispersed recreation RVD'S, wilderness RVD's and wildlife WFUD'S Except for timber and grazing, any supply greater than 25 percent above the RPA demand levels was not valued For timber or grazing supply demand cut-offs were not needed For both timber and grazing (range) cut-offs would have been assigned if projected harvests exceeded 50 percent of demand Only on one benchmark (maximum PNV) did timber slightly exceed demand, but only by 8-10 percent Therefore, no demand limits were exercised for timber or grazing Thus, any potential supply above these levels did not contribute to PNV This constraint limits the effects of these resources on prescription allocation beyond their cut-offs by giving no value to those outputs that exceed the cut-offs

V. SOCIAL IMPACT ANALYSIS

Social and economic impact analysis estimates the impact that National Forest activities may have on people Of primary concern are the impacts within a 10-year span, however, consideration is given to longer term impacts in the area of influence

1. *OVERVIEW OF PROCESS*

The determination of "Issues and Concerns" in the early stages of National Forest land and resource management planning identified potential situations where social and economic analysis can provide useful understanding Chapter 1 and Appendix A of the Environmental Impact Statement (EIS) describe issues and sub-issues. Resource flows (i e. timber, recreation, etc) and especially a change in established

output can have socioeconomic effects on people in the immediate areas of influence These changes are best understood in the context of issues Planning alternatives were constructed to be responsive to past issues as well as potential issues implied by socio-economic trends

Management can directly impact employment, income and direct return of revenues to localities These economic considerations are related to the social well-being of people in the areas of influence. Socio-cultural impacts related to forest management activities include population, beliefs, lifestyles, values, attitude and social organization

In the early stages of Plan development, information was gathered on the existing socio-economic conditions in the area of influence and incorporated in a Socio-economic Overview (Albers 1991) Primary Areas of Influence generally include the counties containing National Forest and National Grasslands, secondary Areas of Influence generally include counties adjacent to primary counties

2. ECONOMIC IMPACT MODEL

Social and economic impact analysis of Plan alternatives for managing the National Forests and Grasslands in Texas utilized the economic input-output model, IMPLAN This computer-based system uses non-survey data to develop input-output models The interdisciplinary models can then be applied to the evaluation of alternative management programs in economy (i e , impact analysis area). Direct, indirect, induced and total impacts are calculated.

Input-output (I-O) analysis is a procedure for describing the interdependencies of production and consumption sectors within the impact area Industries purchase inputs from primary (i e., natural resource producers) sources and other industries for use in the production of outputs Outputs, in turn, are sold either to other industries or to final consumers. The resulting I-O accounts or interdependencies can be thought of as a "picture" of an impact area's economic structure

Flows of industrial inputs can be traced through the I-O accounts to illustrate linkages between industries composing the impact area economy Prediction of economic effects (employment, income, etc) resulting from changes in Forest outputs and activities are available with account transformations

A. DATA BASE FOR IMPLAN

The model data base consists of two major parts (1) a national level technology matrix and (2) a county level file of estimated activity levels for total gross output, six components of final demand, three components of final payments and employment for 428 industrial/business sectors

The national level technology matrix is based on a 1972 Commerce Department I-O model and corrected to an "industry by industry" configuration and updated to 1977, 1982,1985, and 1990 specific data, using the RAS procedure (Stone and Brown, Behavioral and Technical Change in Economic Models Papers of the Second Congress of the International Economic Association, Vienna).

B. NATIONAL DATA BASE REDUCTION TO LOCAL IMPACT AREA

The national level technology matrix and control totals for the multicounty impact area are used through a data reduction procedure to develop a regional I-O table

IMPLAN consists of several computer programs designed to· access the data base, construct an I-O model for any county or group of counties that the user designates, and construct an analysis of the interface between land management planning alternatives and the projections of their economic impacts. Within these programs a number of concerns were considered and included to assess analytically the effects on these various social concerns Some of the social concerns included Indian Tribes, special interest groups, local communities, and others considered with some dependency on NFGT resources.

3. SOCIAL VARIABLES

The National Forests and Grasslands in Texas provide a significant portion of these resources in the form of timber, recreation, wildlife, grazing and wilderness In order to assess the social or economic effects of various resource management decisions, resource as well as socioeconomic variables are being evaluated The following are considered the most significant social variables

A. LIFESTYLES AND JOB DEPENDENCE

Indicators of social organization are reflected in changing demand for forest related aspects of community life, such as municipal watersheds, recreation facilities, transmission corridors, energy sources, or scenic attractions. Direct National Forests and Grassland in Texas (NFGT) contributions to local communities (through the 25 percent fund returns) are also a major influence in forest related considerations. Other changes may also be noted by the degree of support or cooperativeness within the communities over forestry related issues USFS and NFGT employee participation, cooperative agreements, and other services may also impact a communities social organization. Analysis of these variables will include both direct measures of change, as in the case of county returns and other more subjective measures, such as cooperative activities between NFGT and local groups

B. ECONOMIC DIVERSITY AND DEPENDENCY ASSESSMENT

Economists in the Regional Program Development and Economic Analysis Group have prepared a paper "Economic Diversity and Dependency Assessment " The purpose of this paper was to describe the structure of the local economy and its relationship with the forest resource They found the local economy to be relatively diverse with no particular industry dominating the economy. They reached the following conclusion in this paper.

Given the concentration of forest resource-related sectors found in the analysis, and the role of the National Forest System lands to the total forest resource base, changes in the National Forest resource outputs are not expected to cause heavy impacts on the local economy The economy's relationship with the forest resource does suggest, however, some direct impacts would be expected

4. SOCIAL AND ECONOMIC IMPACT ANALYSIS

IMPLAN was used to estimate income and employment effects on the economic impact area on the Forest Calendar year 1990 data were used This estimate was derived in the form of response coefficients for timber, recreation, wildlife, expenditures, and county returns The response coefficients were multiplied by resource outputs by alternative to estimate the income and employment effects

A. IMPLAN RESPONSE COEFFICIENTS

The following table describes the coefficients for jobs and income

IMPLAN Response Coefficients

Activity	Units	Jobs	Income (MM$)
Timber			
Sawtimber	MMBF	20 23	0 58500
Roundwood	MMBF	19 20	1 03100
Timber Expend	MM$	22 08	0.73410
25% Fund			
Roads	MM$	40 61	1 22250
Education	MM$	68 17	1 53760
Recreation			
DEV Other	MRVD	1 03	0 02889
DEV Water	MRVD	0 76	0 02193
DSP Other	MRVD	0 74	0 02113
DSP Wilderness	MRVD	0 74	0 02113
DSP Hunt&Fish	MRVD	0 84	0.02464
Purchaser Credit	MM$	40 61	1 22250

The timber response coefficients include the effects of selling stumpage from the NFGT on income and employment within sectors 133, 134, 135, 139, 142, 145, 161, 162 and 163 in the IMPLAN model These sectors are identified as follows

133 - Logging Camps and Logging Contractors
134 - Sawmills and Planing Mills, General
135 - Hardwood Dimension and Flooring Mills
139 - Veneer and Plywood
142 - Wood Pallets and Skids
145 - Wood Preserving
161 - Sawmills and Planing Mills, General
162 - Hardwood Dimension and Flooring
163 - Special Product Sawmills, N E C

Returns to the US Treasury were calculated for each decade These returns were the sum of Timber returns calculated as stumpage value of timber, developed recreation returns collected from campgrounds, special special use returns based on money collected from oil and gas leases, and money collected from range allotment permittees

Returns to the counties were calculated as 25 percent of the returns to Treasury except for the oil and gas leases which was 25 percent of the 12 5 percent that the forest service receives

B. JOBS AND INCOME

The following five pages are the analysis and show the estimated annual jobs and income for the first period

		Part 1. Timber Processing			Part 2. NFGT Timber Expenditure		
		VOL MMBF	Jobs	Income MM$	MM$	Jobs	Income MM$
ALT 1	Sawtimber	82 80	1675	48 438	4 812	106	3 532
	Roundwood	29 15	560	30 054			
	Total	111 95	2235	78 492		106	3 532
ALT 2	Sawtimber	98 28	1988	57 494	5 719	126	4 198
	Roundwood	37 79	726	38 961			
	Total	136 07	2714	96 455		126	4 198
ALT 3	Sawtimber	92 84	1878	54 311	5 867	130	4 306
	Roundwood	37 55	721	38 714			
	Total	130 39	2599	93 025		130	4 306
ALT 4	Sawtimber	74 78	1513	43 746	5 352	118	3 928
	Roundwood	18 98	364	19 568			
	Total	93 76	1877	63 315		118	3 928
ALT 4A	Sawtimber	84 93	1718	49 684	6 117	135	4 490
	Roundwood	25 66	493	26 455			
	Total	110 59	2211	76 140		135	4 490
ALT 4B	Sawtimber	82 67	1672	48 362	5 819	128	4 271
	Roundwood	18 96	364	19 548			
	Total	101 63	2036	67 910		128	4 271
ALT 5	Sawtimber	66 63	1348	38 979	4 399	97	3 229
	Roundwood	23 26	447	23 981			
	Total	89 89	1795	62 960		97	3 229
ALT 6	Sawtimber	44 21	894	25 863	3 041	67	2 232
	Roundwood	18 70	359	19 280			
	Total	62 91	1253	45 143		67	2 232
ALT 7	Sawtimber	57 68	1167	33 743	4 727	104	3 469
	Roundwood	10 92	210	11 259			
	Total	68 60	1377	45 001		104	3 469
ALT 8	Sawtimber	89 49	1810	52 352	5 664	125	4 158
	Roundwood	25 96	498	26 765			
	Total	115 45	2308	79 117		125	4 158

		Revenue	25% Fund	Jobs(#)		Income(MM$)	
		MM$	MM$	Roads	Educa	Roads	Educa
ALT 1	Timber	21 780	5 445				
	Recreation	0 125	0 031				
	Minerals	1 391	0 043				
	Range	0 247	0 062				
			5 581	113	190	3 412	4 291
ALT 2	Timber	25 933	6 483				
	Recreation	0 165	0 041				
	Minerals	1 391	0 043				
	Range	0 234	0 058				
			6 626	135	226	4 050	5 094
ALT 3	Timber	24 601	6 150				
	Recreation	0 165	0 041				
	Minerals	1 391	0 043				
	Range	0 240	0 060				
			6 295	128	215	3 848	4 840
ALT 4	Timber	19 533	4 883				
	Recreation	0 225	0 056				
	Minerals	1 336	0 042				
	Range	0 241	0 060				
			5 042	102	172	3 082	3 876
ALT 4A	Timber	22 271	5 568				
	Recreation	0 225	0 056				
	Minerals	1 391	0 043				
	Range	0 242	0 061				
			5 728	116	195	3 501	4 404
ALT 4B	Timber	21 516	5 379				
	Recreation	0 225	0 056				
	Minerals	1 358	0 042				
	Range	0 240	0 060				
			5 538	112	189	3 385	4 257
ALT 5	Timber	17 571	4 393				
	Recreation	0 165	0 041				
	Minerals	1 358	0 042				
	Range	0 243	0 061				
			4 537	92	155	2 773	3 488
ALT 6	Timber	11 757	2 939				
	Recreation	0 165	0 041				
	Minerals	1 295	0 040				
	Range	0 231	0 058				
			3 079	63	105	1 882	2 367
ALT 7	Timber	14 960	3 740				
	Recreation	0 125	0 031				
	Minerals	0 968	0 030				
	Range	0 242	0 061				
			3 862	78	132	2 361	2 969

PART 3 25% FUND

		Revenue MM$	25% Fund MM$	Jobs(#) Roads	Jobs(#) Educa	Income(MM$) Roads	Income(MM$) Educa
ALT 8	Timber	22 923	5 731				
	Recreation	0 225	0 056				
	Minerals	1 358	0 042				
	Range	0 237	0 059				
			5 888	120	201	3 599	4 527

PART 4 RECREATION

		M Rvds	Jobs	Income MM$
ALT 1	Dev Other	355 753	366	10 278
	Dev Water	12 140	9	0 266
	Dsp Other	1033 112	765	21 830
	Dsp Wild	1 050	1	0 022
	Dsp Hunt&Fish	1134 200	953	27 947
			2094	60 342
ALT 2	Dev Other	390 753	402	11 289
	Dev Water	12 140	9	0 266
	Dsp Other	1033 112	765	21 830
	Dsp Wild	1 050	1	0 022
	Dsp Hunt&Fish	1134 200	953	27 947
			2130	61 354
ALT 3	Dev Other	390 753	402	11 289
	Dev Water	12 140	9	0 266
	Dsp Other	1033 112	765	21 830
	Dsp Wild	1 050	1	0 022
	Dsp Hunt&Fish	1134 200	953	27 947
			2130	61 354
ALT 4	Dev Other	430 753	444	12 444
	Dev Water	12 140	9	0 266
	Dsp Other	1033 112	765	21 830
	Dsp Wild	1 050	1	0 022
	Dsp Hunt&Fish	1134 200	953	27 947
			2171	62 509
ALT 4A	Dev Other	430 753	444	12 444
	Dev Water	12 140	9	0 266
	Dsp Other	1033 112	765	21 830
	Dsp Wild	1 050	1	0 022
	Dsp Hunt&Fish	1134 200	953	27 947
			2171	62 509
ALT 4B	Dev Other	430 753	444	12 444
	Dev Water	12 140	9	0 266
	Dsp Other	1033 112	765	21 830
	Dsp Wild	1 050	1	0 022
	Dsp Hunt&Fish	1134 200	953	27 947
			2171	62 509

PART 5 PURCHASER CREDIT ROADS

	MM$	Jobs	Income MM$
ALT 1	0 659	27	0 806
ALT 2	0 764	31	0 934
ALT 3	0 806	33	0 985
ALT 4	1 150	47	1 406
ALT 4A	1 149	47	1 405
ALT 4B	1 072	44	1 311

PART 4 RECREATION					PART 5 PURCHASER CREDIT ROADS		
		M Rvds	Jobs	Income MM$	MM$	Jobs	Income MM$
ALT 5	Dev Other	370 753	382	10 711	0 833	34	1 018
	Dev Water	12 140	9	0 266			
	Dsp Other	1020 634	755	21 566			
	Dsp Wild	1 200	1	0 025			
	Dsp Hunt&Fish	1134 200	953	27 947			
			2100	60 515		34	1 018
ALT 6	Dev Other	370 753	382	10 711	0 784	32	0 958
	Dev Water	12 140	9	0 266			
	Dsp Other	1020 634	755	21 566			
	Dsp Wild	2 750	2	0 058			
	Dsp Hunt&Fish	1134 200	953	27 947			
			2101	60 548		32	0 958
ALT 7	Dev Other	370 753	382	10 711	0 617	25	0 754
	Dev Water	12 140	9	0 266			
	Dsp Other	1020 634	755	21 566			
	Dsp Wild	2 000	1	0 042			
	Dsp Hunt&Fish	1134 200	953	27 947			
			2101	60 532		25	0 754
ALT 8	Dev Other	430 753	444	12 444	1 010	41	1 235
	Dev Water	12 140	9	0 266			
	Dsp Other	1033 112	765	21 830			
	Dsp Wild	1 050	1	0 022			
	Dsp Hunt&Fish	1134 200	953	27 947			
			2171	62 509		41	1 235

SUMMARY OF JOBS AND INCOME BY ALTERNATIVE

		Jobs	Income MM$		Jobs	Income MM$
Tmb Process	ALT 1	2235	78 492	ALT 2	2714	96 455
Tmb Expend		106	3 532		126	4 198
25% Fund		304	7 703		360	9 145
Recreation		2094	60 342		2130	61 354
Purch Credit		27	0 806		31	0 934
Total		**4765**	**150 874**		**5361**	**172 085**
Tmb Process	ALT 3	2599	93 025	ALT 4	1877	63 315
Tmb Expend		130	4 306		118	3 928
25% Fund		342	8 687		274	6 958
Recreation		2130	61 354		2171	62 509
Purch Credit		33	0 985		47	1 406
Total		**5234**	**168 357**		**4488**	**138 116**
Tmb Process	ALT 4A	2211	76 140	ALT 4B	2036	67 910
Tmb Expend		135	4 490		128	4 271
25% Fund		312	7 905		301	7 642
Recreation		2171	62 509		2171	62 509
Purch Credit		47	1 405		44	1 311
Total		**4875**	**152 448**		**4681**	**143 644**

SUMMARY OF JOBS AND INCOME BY ALTERNATIVE

		Jobs	Income MM$		Jobs	Income MM$
Tmb Process	ALT 5	1795	62 960	ALT 6	1253	45 143
Tmb Expend		97	3 229		67	2 232
25% Fund		247	6 261		167	4 249
Recreation		2100	60 515		2101	60 548
Purch Credit		34	1 018		32	0 958
Total		**4272**	**133 983**		**3621**	**113.128**
Tmb Process	ALT 7	1377	45 001	ALT 8	2308	79 117
Tmb Expend		104	3 469		125	4 158
25% Fund		210	5 330		321	8 126
Recreation		2101	60 532		2171	62 509
Purch Credit		25	0 754		41	1 235
Total		**3817**	**115.087**		**4966**	**155.145**

DIFFERENCE FROM ALTERNATIVE 1 (NO ACTION THEME)

	ALT 2	ALT 3	ALT 4	ALT 4A	ALT 4B	ALT 5	ALT 6	ALT 7	ALT 8
Jobs	596	469	-277	110	-84	-493	-1144	-948	201
Income (MM$)	21 211	17 483	-12 758	1 574	-7 230	-16 891	-37 747	-35 787	4 271

VI. Suitability Analysis

The Forest was analyzed for its ability to produce timber on a sustained yield basis in what is called a timber suitability analysis The suitability analysis has a number of stages which are

1 Determination of lands tentatively suited for timber production

2 Examination of the financial and economic efficiency of tentatively suited timber lands

3 Determination of lands suited for production by alternative

Stage 1. *Determination of Lands Tentatively Suited for Timber Production*

Table B - Comparison of Stage 1 Suitability with Alternatives

Category of Land		Forest Plan Acres	Revision Acres
1	Total National Forest and National Grassland Land	673,021	675,572
2	Non-forest Land	51,106	56,749
3	Forest Land	621,915	618,823
4	Forest Land Withdrawn From Timber Production	37,736	37,162
5	Forest Land not Capable of Producing Crops of Industrial Wood	3,949	5,080
6	Forest Land Physically Unsuitable Irreversible Damage Likely to Occur	0	216
7	Forest Land - Inadequate Information	3,690	3,631
8	Tentatively Suit Forest Lan	572,734	572,734

The disparity between these two sets of acreage has arisen for two reasons. (1) a net increase in National Forest acreage including some adjustments through land exchange and (2) areas that have been reinventoried since the completion of the Forest Plan.

Stage 2. *Examination of Financial Efficiency of Lands Tentatively Suitable* for Timber Production

The financial analysis reveals the present net value (PNV) for different analysis areas For the purpose of this financial analysis, PNV is a measure of discounted timber benefits less discounted timber management costs. The actual PNV analysis consisted of a FORPLAN run which examined all the management intensities for all analysis ares This analysis revealed information for each option of analysis areas This portion of the financial analysis concentrates the relative profitability of different timber management intensities on analysis areas

1 To limit analyses for comparison purposes, only those analysis areas with a pine management type were analyzed in FORPLAN The majority of the lands fell in these analysis areas The relative ranking of timber management intensities was consistent for all analysis areas This ranged from 480,629 to 382,000 acres (alternatives 1 and 6 respectively) or 80-65 percent of total forest area

2 The remaining analysis areas or (20-35 percent) of forested and were analyzed with the use of a spreadsheet program These acres modeled in the spreadsheet were primarily tentatively unsuitable acres that were removed in the respective alternative due to special area designation

Based on this financial analysis, the Interdisciplinary Team (IDT) was able to arrive at the following conclusion

1 Clearcutting with natural regeneration has the highest PNV of all types with shortleaf types the highest

2 Shelterwood with natural regeneration has a positive PNV for all types

3 Clearcutting with site preparation and planting has a positive PNV for all types

4 Group selection and individual tree selection also had a positive PNV for all types

5 Thinnings had a positive PNV for all types

The results were used to identify the relative advantage of different emphasis and intensities on the forest

The "fixed" costs of the Timber Program were included in Stage II analysis but these are not fixed in a classic economic sense Rather, they contain costs which vary according to the relative size of timber volume offered and costs of administering any timber program

Stage 3. *Identification of Suitable Timber Lands*

The results of Stage III (amount of suitable timber land) vary by alternative and are located in the alternative formulation section for each alternative

VII. Development of Management Requirements

Management requirements (MR's) are directed toward producing a viable level of resources for both the short and long-term The requirements stem from the National Forest Management Act as interpreted by the implementing regulations (36 CFR 219 27). The following areas of 219 27 contain the basic direction for MR's

1. Resource Protection
2 Vegetative Manipulation
3 Silvicultural Practices
4 Even-Aged Management
5 Riparian Areas
6 Soil and Water
7. Diversity

All but a few MR's are accomplished through the use of standards which are incorporated into applicable management area prescriptions (refer to the process paper Forest-Wide Standards) MR's which aren't incorporated into management area prescriptions are analyzed in FORPLAN. The process paper Methods to Attain Management Requirements explains how the IDT met each of these legal requirements

For the purpose of simplifying the discussion of the portions included in the FORPLAN model, other requirements of the NFMA Regulations incorporated into the FORPLAN model are discussed below

Nondeclining Yield & Sustained-Yield Link: (36 CFR 219 16) The Forest is currently selling timber based on a policy of nondeclining even-flow This constraint in the FORPLAN model is designed to ensure that the harvest levels in each decade are equal to, or greater than, the harvest in the previous decade The harvest level in the last decade of the planning horizon must be less than, or equal to, the long term sustained-yield calculated for the alternative

Ending Inventory Constraint (36 CFR 219 16) This constraint attempts to ensure the total inventory volume left at the conclusion of the harvest scheduling planning horizon (150 years) is sufficient to maintain the harvest pattern established for the given alternative

Rotations at CMAI (36 CFR 219 16) This constraint is intended to control the minimum age at which a timber stand can be regenerated The minimum is determined by calculating the age at which the stand achieves 95 percent culmination of mean annual increment of timber

volume growth The constraint is applied through the individual prescription data as input to the FORPLAN model No prescription that would violate this constraint was considered (CMAI is approximately 35, minimum rotation offered was 40 years for FORPLAN runs)

Dispersion: (36 CFR 219 27 lb) and (d)) These constraints insure that individual cuts created by application of even-aged silviculture will conform to the Regional direction on dispersion of openings.

The percentages of openings or harvest used in the model are less than or equal to Regional constraints. Maximum openings permitted in MA-2 are 12 5 percent (loblolly) or 8 5 percent (longleaf and shortleaf), IDT constraints used were 7 and 5 percent respectively to ensure this with expectation of additional percent from natural causes such as southern pine beetle (SPB), storm damage, and other unplanned openings The model is limited to harvesting only a portion of any vegetation type within a single decade. The portion is based on the appropriate management area prescription, the rate of growth of the given timber species, and the applicable standards The constraints also help most resource protective requirements related to water and soil.

Wildlife and Fish (36 CFR 219 27 (a)) Some indicator species were evaluated for habitat requirements estimated to be necessary to maintain populations These species were primarily game species that had a fully developed range of evaluated coefficients to accurately assess changes by alternative Other indicator species were evaluated strictly upon the acreage of forest types or working groups that would develop in each alternative A management requirement constraint was used to provide habitat for the red-cockaded woodpecker. The constraint was applied so that in HMA's (MA-2) restricted openings, rotations and management as per standards outlined in MA-2 were followed.

Soil and Water (36 CFR 219 27 (a)) Costs associated with soil and water protection were included in all prescriptions The timber harvest dispersion constraints are also used to prevent excessive sediment production Additionally, forest-wide soil and water standards (See Forest Plan, Chapter IV) give direction which ensures the Forest will meet management requirements

VIII. Benchmarks

Benchmarks approximate maximum economic and biological resource production opportunities, are useful in evaluating the compatibilities and conflicts between individual resource objectives, and help define the range within which integrated alternatives can be developed The following benchmarks were thus developed

CUR - Current Level Benchmark.

This benchmark provides for management using the current plan, adjusted to incorporate changes necessary to meet current management

direction The benchmark estimates the capability of the planning area to provide for a wide range of goods, services and other uses from the present land allocation This benchmark is the same as Alternative 1 and meets all requirements specified in the regulations (36 CFR, Part 219)

TMB - Maximum Timber Benchmark.

This benchmark was used to defined the maximum timber output possible for the first decade subject to the following specifications:

1 The objective function maximizes timber in the first decade with a rollover to maximize present value

2 Apply management requirements, including those for RCW

3. Apply nondeclining yield

4 Includes all tentatively suitable land.

MKT - Maximum Present Net Value with Market Values Only Benchmark.

The purpose of this benchmark was to estimate the mix of resource uses and determine a schedule of outputs and costs that would maximize the present net value of those outputs that have an established market price These outputs include market prices for timber, range, minerals, and developed recreation. The following specifications were applied.

1 The objective function maximizes present net value where only market outputs are valued

2 Apply management requirements, including those for RCW

3 Apply nondeclining yield

4 Includes all tentatively suitable land

PNV - Maximum Present Net Value with Assigned Values Benchmark.

The purpose of establishing this benchmark was to estimate the mix of resource uses and a schedule of outputs and costs that would maximize the present net value of outputs assigned a monetary value The following specifications were applied

1 The objective function maximizes present net value where both market and nonmarket outputs were valued

2 Apply management requirements, including those for RCW

3 Apply nondeclining yield

4 Includes all tentatively suitable land

MIN - Minimum Level Management Benchmark.

This benchmark represents the minimum level of management needed to maintain and protect the unit as part of the National Forest System The following specifications were applied

1 The objective function maximizes present net value where both market and nonmarket outputs were valued.

2 Minimum level was the only prescription applied to all acres except thinning RX for protection of RCW in the HMA area

WLO - Max Wilderness Benchmark.

The purpose of this benchmark was to evaluate the impacts of maximum wilderness requested during the scoping It was decided to develop Alternative 6 as this benchmark Alternative 6 was determined to contain the maximum acreage "legally" allowable (pending USFWS opinion and Court Order) and available for wilderness, this benchmark included

1 The objective function maximizes present net value where both market and nonmarket outputs were valued

2 Apply management requirements, including those for RCW

3 Apply nondeclining yield

4 All roadless and wilderness study areas have wilderness prescriptions where it did not conflict with other predetermined prescriptions.

It was determined that Other Resource Benchmarks were not necessary, in that the results from Plan Benchmarks were adequate for alternative development and analysis

GROUPING SUMMARY BY BENCHMARK AND PERIOD

ACTIVITY/ OUTPUT	UNIT OF MEASURE	PERIOD	CUR	MAX PNV	PNV MKT	MAX TMB	MINLVL	MAX WLD
AT22	MILE	1	195	211	211	211	0	195
TRAIL CONST		2	124	0	0	0	0	150
		3	0	0	0	0	0	0
		4	0	0	0	0	0	0
		5	0	0	0	0	0	0
RECREATION	RVD	1	25457055	25807055	25807055	25807055	25807055	25630273
DEV AND DISP		2	28977653	29275653	29275653	29275653	24746077	29263479
		3	32319146	32245146	32245146	32245146	23693298	32724940
		4	35364140	35290140	35290140	35290140	22696309	35771974
		5	38817906	38663906	38663906	38663906	21752343	39141257
FIRE	ACRES	1	354734	867395	868955	974147	109497	109497
		2	358932	871522	872807	972349	109497	111990
		3	363131	871609	872894	977364	109497	112025
		4	375958	871775	873060	972602	109497	112135
		5	375383	891153	891238	974356	109497	112135
CTSI	STRUCT	1	2520	2520	2520	2520	0	2520
T&E STRUC IMP		2	2170	2170	2170	2170	0	2170
		3	1890	1890	1890	1890	0	1890
		4	1540	1540	1540	1540	0	1540
		5	1260	1260	1260	1260	0	1260
CW23	ACRES	1	15596	15596	15596	15596	15022	15596
WLDLF HAB IMP MAIN		2	15520	15520	15520	15520	15022	15520
		3	15456	15456	15456	15456	15022	15456
		4	15380	15380	15380	15380	15022	15380
		5	15318	15318	15318	15318	15022	15318
W/L SMALL (GRASS)	WFUD	1	51113	51113	51113	51113	51113	51113
SMALL GAME USER DAYS		2	54230	54230	54230	54230	48557	54230
		3	57471	57471	57471	57471	46129	57471
		4	63488	63488	63488	63488	43823	63488
		5	70127	70127	70127	70127	41632	70127
W/L BIG (GRASS)	WFUD	1	98279	98279	98279	98279	98279	98279
BIG GAME USER DAYS		2	108697	108697	108697	108697	93365	108697
		3	122088	122088	122088	122088	88697	122088
		4	134870	134870	134870	134870	84262	134870
		5	148974	148974	148974	148974	80049	148974
W/L FISH (GRASS)	WFUD	1	104816	104816	104816	104816	104816	104816
FISH USER DAYS		2	115784	115784	115784	115784	99575	115784
		3	127886	127886	127886	127886	94596	127886
		4	141269	141269	141269	141269	89867	141269
		5	156859	156859	156859	156859	85373	156859

GROUPING SUMMARY BY BENCHMARK AND PERIOD.

ACTIVITY/ OUTPUT	UNIT OF MEASURE	PERIOD	CUR	MAX PNV	PNV MKT	MAX TMB	MINLVL	MAX WLD
BIG GAME	WFUD	1	457413	468364	468404	474134	461974	459973
		2	457479	469196	469286	474896	457286	458722
		3	457435	472268	472288	473158	462438	458734
		4	457655	471528	471578	474138	458388	457564
		5	457674	472597	472677	474357	459997	457650
W44	WFUD	1	22965	324204	324204	320724	192294	290751
SG USER DAY		2	19964	346310	345780	347830	229260	322025
		3	22615	322944	322754	362144	245714	359640
		4	23004	332609	332449	378279	297769	380188
		5	23447	320576	320126	387006	326396	400126
ET24P	ACRES	1	56538	20093	20913	36137	0	11826
PLANTING		2	58612	24287	24287	24287	0	1326
		3	60289	40639	40955	31289	0	1534
		4	65218	42558	42501	18536	0	1585
		5	64701	43881	43556	30095	0	2015
LF 125	DAMS	1	320	320	320	320	320	320
DAMS ADMIN		2	320	320	320	320	320	320
		3	320	320	320	320	320	320
		4	320	320	320	320	320	320
		5	320	320	320	320	320	320
LF 22	STRUCT	1	1	2	2	2	0	3
FACILITY CONST		2	2	4	4	4	0	3
		3	3	2	2	2	0	2
		4	3	1	1	1	0	1
		5	1	1	1	1	0	1
ROAD MAINTENANCE	MILES	1	23800	23800	23800	23800	23800	21750
		2	23800	23800	23800	23800	23800	21750
		3	23800	23800	23800	23800	23800	21750
		4	23800	23800	23800	23800	23800	21750
		5	23800	23800	23800	23800	23800	21750
LT223	MILES	1	671	877	868	954	647	639
ROAD RECONST		2	381	366	371	328	99	244
		3	12	18	18	18	71	15
		4	12	18	18	18	114	196
		5	12	18	18	18	19	15
JL 23	MILES	1	3000	3000	3000	3000	3000	3000
LANDLINE MAINT		2	2800	2800	2800	2800	2800	2800
		3	2600	2600	2600	2600	2600	2600
		4	2510	2510	2510	2510	2510	2510
		5	2420	2420	2420	2420	2420	2420
JL 24	MILES	1	250	250	250	250	250	250
LANDLINE LOCAT		2	150	150	150	150	150	150
		3	150	150	150	150	150	150
		4	150	150	150	150	150	150
		5	150	150	150	150	150	150

GROUPING SUMMARY BY BENCHMARK AND PERIOD

ACTIVITY/ OUTPUT	UNIT OF MEASURE	PERIOD	CUR	MAX PNV	PNV MKT	MAX TMB	MINLVL	MAX WLD
JL261	ACRES	1	8160	8160	8160	8160	0	8160
LAND ADJ 1ST 100		2	8160	8160	8160	8160	0	8160
		3	8160	8160	8160	8160	0	8160
		4	8160	8160	8160	8160	0	8160
		5	8160	8160	8160	8160	0	8160
JL263	ACRES	1	16000	16000	16000	16000	16000	16000
LAND EXCHANGE		2	8000	8000	8000	8000	8000	8000
		3	4750	4750	4750	4750	4750	4750
		4	2500	2500	2500	2500	2500	2500
		5	2500	2500	2500	2500	2500	2500
NFML	LEASES	1	710	666	666	666	647	647
MIN/GEO LEASES		2	900	788	788	788	610	610
		3	960	841	841	841	569	569
		4	960	841	841	841	523	523
		5	960	841	841	841	482	482
NFCA	CASES	1	3800	3631	3631	3631	3558	3558
MIN/GEO CASES		2	3800	3428	3428	3428	3100	3100
		3	3800	3408	3408	3408	2764	2764
		4	3800	3408	3408	3408	2588	2588
		5	3800	3408	3408	3408	2429	2429
NFMC	CASES	1	60	56	56	56	54	54
MIN/GEO COMVAR		2	60	52	52	52	49	49
		3	60	52	52	52	44	44
		4	60	52	52	52	39	39
		5	60	52	52	52	35	35
SPEC USE INC	PERMITS	1	9650	9650	9650	9650	9650	9650
		2	10400	10219	10219	10219	10219	10400
		3	11400	11003	11003	11003	11003	11400
		4	11400	10805	10805	10805	10805	11400
		5	12400	11537	11537	11537	11537	12400
ERO	TONS	1	1072741	2169674	2459454	2975924	3017614	1744679
EROSION RATE		2	1080141	2598422	2594012	2927062	1199732	1252847
		3	1035782	3536319	3571209	2676989	3093228	1155222
		4	1034759	3893577	3854327	2487377	1587618	1077382
		5	1009528	3132761	3139011	2587911	2172045	1159095
SED	TONS	1	231880	533665	558085	620475	647475	436006
SEDIMENT DELIIVERY		2	233174	529894	554164	665454	265149	419341
		3	218708	653286	668776	568546	658243	394743
		4	227532	687147	692287	652657	338872	404650
		5	226066	643403	647373	577953	467830	410901
RCWP	ACRES	1	288960	335901	337864	262160	0	200357
RCW WP ACRES		2	244095	276369	276214	163465	302822	169322
		3	302233	276783	275944	151353	377485	196266
		4	276360	291041	281329	278161	399838	331732
		5	260396	234521	222480	285671	427480	399351

GROUPING SUMMARY BY BENCHMARK AND PERIOD

ACTIVITY/ OUTPUT	UNIT OF MEASURE	PERIOD	CUR	MAX PNV	PNV MKT	MAX TMB	MINLVL	MAX WLD
PIWP	ACRES	1	59643	86913	89731	50571	50571	67061
PILEATED WP ACRES		2	150135	114178	112617	68960	159721	109404
		3	130901	111911	110350	66693	184813	131705
		4	165476	175005	181616	227080	252082	273181
		5	137699	154837	153580	238754	263756	362582
GRSQ	ACRES	1	45317	45108	45108	45108	45108	43377
GRAY SQUIRREL AC		2	44073	45050	45050	45050	45050	43345
		3	48271	51322	51322	51322	51322	49392
		4	49464	53948	53948	53948	53948	52276
		5	49592	55484	55484	55484	55484	54033
W67 (FOR)	AUM	1	135552	116320	116448	119005	111960	113455
GRAZING USE		2	128045	134915	135269	141145	127930	118707
		3	114918	125254	125236	119981	122291	101454
		4	104078	126502	126755	119796	119676	100398
		5	95874	128200	128223	119069	120687	100025
W67 (GRASS)	AUM	1	247393	247393	247393	247393	247393	247393
GRAZING USE		2	266655	266655	266655	266655	266655	266655
		3	276233	276233	276233	276233	276233	276233
		4	276233	276233	276233	276233	276233	276233
		5	276233	276233	276233	276233	276233	276233
LTSY	MCF/PER	15	274647	361365	361365	0	0	157922
LONG-TERM YIELD AS OF FINAL PERIOD (AFTER CONVERSION)	MMBF/YR	15	152	200	200	2254	0	87
TIMBER	MCF/PER	1	202093	251565	252541	306854	96996	113551
		2	205675	260537	261515	315826	29461	113681
		3	219338	407220	407736	328941	127222	113681
		4	258627	429038	429556	350760	41231	113681
		5	253928	430080	430597	351801	64667	113811
	MMBF/YR	1	112 0	139 4	139 9	170 0	53 7	62 9
		2	113 9	144 3	144 9	175 0	16 3	63 0
		3	121 5	225 6	225 9	182 2	70 5	63 0
		4	143 3	237 7	238 0	194 3	22 8	63 0
		5	140 7	238 3	238 6	194 9	35 8	63 1
X11	CORDS	1	3299	0	0	0	0	0
FUELWOOD		2	5813	0	0	0	0	0
		3	2494	0	0	0	0	0
		4	3680	0	0	0	0	0
		5	8586	0	0	0	0	0
X80/81	ACRE/FT	1	925079	0	0	0	0	0
INC H2O YIELD		2	912680	0	0	0	0	0
		3	940320	0	0	0	0	0
		4	939901	0	0	0	0	0
		5	940583	0	0	0	0	0
Present Net Value 4% Discount Rate-100 yrs	MM$	10	1989	2188	561	2065	1847	1542

IX. Formulation of Alternatives

Alternatives within this EIS represent alternative "Forest Plans" for managing the Forest for the next 10 to 15 years Technically, an alternative is a mix of management area prescriptions applied in specific amounts and locations to achieve the overall desired management emphasis as expressed in goals and objectives

1. OVERVIEW OF PROCESS

The IDT followed a four step process to formulate a broad range of reasonable alternatives

A. Development of Alternative "Themes"

The Plan and EIS for the NFGT was developed with an emphasis on the "need to change" concept The basis for change was due to monitoring and evaluation, changes in legal requirements, litigation, and public demands During the scoping phase of the Revision, and during development of the Analysis of the Management Situation (AMS), a number of possible alternative scenarios or themes were heard internally as well as externally The NFGT planning team communicated with a wide audience of publics, as well as our internal NFGT family, to identify their vision for the Forests and Grasslands We asked people what they wanted and didn't want the NFGT to be. We also looked at what can be provided. After full review of our AMS with the Regional Forester and Regional Office IDT, six themes were developed that appeared to provide a range of alternatives that responded to the public's vision for the future for the NFGT

The initial six themes for management were developed during the Spring of 1992 They represented the first attempt to meet the public's varying, and often conflicting wants and needs, while the USFS remains responsible stewards of the land. These themes were the basis for Alternatives 1, 2, 3, 4, 5, and 6

Three new alternatives were developed based on the Management Team's recommendations. Alternative 7 was developed with the same land allocations as Alternative 6 However, the use of herbicides was allowed Alternative 7 would also allow greater management flexibility and promote fire in longleaf and shortleaf ecosystems

Alternative 4 was developed to provide a wider range in land allocations and activities, as directed in implementing management from the RCW EIS It was developed with most upland forest acres managed as directed in the RCW EIS This management direction is described as Habitat Management Areas (HMAs) for RCW and associated plant and animal species, requiring forest characteristics as described in the RCW EIS

Alternative 4a was developed with the same land allocations for streamside zone management, special areas, and recreation (but with the minimum HMAs) Alternative 4b mirrored most aspects of management

in 4 and 4a, but included corridors between RCW habitat that linked isolated sub-populations

Between Draft and Final Alternative 8 - which is a reflection to responses and to changes needed - was added It contained adjustments from a modeling standpoint in 5 areas

1 Adjustments in MA-1, MA-2 and MA-6 (HMA Corridors)
2 Apply uneven-aged management to VQOs that are not modified or max modified
3 LTA identifiers were used to determine management type and restoration capability
4 Constraint to develop approximately 500 acres of regeneration and/or restoration per year for each forest
5 Constraint added to insure that the average single-age harvesting of 35 to 40 acres is speciallyspellible to address concerns regarding fragmentation

B. Initial Management Area or Management Area Prescription Allocation

The implementing regulations for the National Environmental Policy Act (NEPA) require a "No Action" alternative and a reasonable range of alternatives to address issues identified during scoping. During scoping for the Forest Plan Revision in 1990, over 4,400 comment letters were received From these comments, 15 issues and 53 sub-issues were identified (See EIS Appendix A)

All issues raised during scoping have been considered in the planning process These issues are addressed in the EIS and/or in the Plan standards and guidelines, management area prescriptions, and monitoring requirements

The IDT, in response to the requirement for a "No Action" alternative, prepared an initial allocation of different portions of the forest to management areas and prescriptions that best correspond to current management Personnel from each Ranger District and the IDT then prepared additional alternatives that responded to the issues, goals, objectives, and desired future conditions associated with desired themes.

2. FORPLAN ANALYSIS

A Management Area prescription was coded in the CISC data base for each stand and for each alternative Thus, one stand could vary from being considered for wilderness in one alternative, to being intensively management for timber in another

Since each stand in CISC also had an analysis area associated with it, the acres by management area were summed across each analysis area designation for each alternative The aggregate of these stands were used for the analysis areas in the FORPLAN model

FORPLAN was used to estimate the goods and services that could be produced by each alternative Cost efficiency of the alternative was assured by the use of FORPLAN, and with the "Maximum PNV" objective function Although limits were placed on the prescriptions available for each management area, FORPLAN was still given the option of selecting a management emphasis which ranged from intensive timber management to minimum level management *See PNV and Summary Tables at end of this appendix for alternative comparison.*

3. MAPPING THE ALTERNATIVES

Maps were prepared using working maps prepared by the District personnel and adjustments by the IDT These maps were drafted on compartment administrative maps and then transferred to a computerized geographical data base

4. CONSTRAINTS COMMON TO ALL ALTERNATIVES

Constraints identified as "Management Requirements" were applied to all alternatives Additional constraints common to all alternatives were applied to ensure an implementable solution

CONSTRAINT: Ensure that the timber harvest volume does not decline from period to period Ensure in the last decade of the planning horizon that the timber harvest level is less than or equal to long run sustained yield calculated for the alternative

Purpose: To comply with Federal regulations

Rationale: Without these constraints, harvest levels could rise and fall erratically allowing industry to expand greatly one decade, only to be put out of business the next Nondeclining yield constraint prevents these erratic shifts

CONSTRAINT: Ensure the total forested inventory volume left at the end of the planning horizon (150 years) is sufficient to maintain the harvest pattern established for a given alternative

Purpose: To comply with Federal regulations

Rationale: In the absence of this constraint, the FORPLAN model would have no incentive to leave enough inventory of trees at the end of 150 years to sustain timber harvest levels into perpetuity

CONSTRAINT: Provide no timber harvests at or above culmination of mean annual increment (CMAI)

Purpose: To assure timber is not harvested when growing at its maximum rate

Rationale: Maintain high productivity of stands and abide by Forest Service policy and the NFMA

5. CONSTRAINTS COMMON TO ALL ALTERNATIVES EXCEPT THE "NO ACTION"

CONSTRAINT: Within MA-2 (HMA), no more than 8 3 percent of longleaf, shortleaf or slash acres within the 0 to 10 age class To ensure this, a constraint of 5 percent limit was modeled with expectation of additional 3 3 percent from natural causes such as southern pine beetle (SPB), storm damage, and other unplanned openings This percentage reduction is based on historical record of occurrence of opening from Natural Causes Analysis for this estimate of mortality due to weather, SPB, etc is on file in the process records in Supervisor's Office NFGT

Purpose: To implement direction found within the FEIS for Management of RCW in the Southern Region.

Rationale: Minimum Management requirement for RCW

CONSTRAINT: Within MA-2 (HMA), no more than 12 5 percent of loblolly acres can be within the 0 to 10 age class To ensure this, a constraint of 7 5 percent was modeled with an expectation of an additional 5 percent from natural causes such as SPB, storm damage, and other unplanned openings, based on IDT estimates as discussed in previous constraint.

Purpose: To implement direction found within the FEIS for Management of RCW in the Southern Region

Rationale: Minimum management requirement for RCW.

CONSTRAINT: Within MA-2 (HMA), 50 percent of acres designated for harvest would use a multi-stage cutting process (uneven-aged, two-aged, and shelterwood with reserves)

Purpose: To implement direction found within the FEIS for Management of RCW in the Southern Region.

Rationale: Minimum management requirement for RCW

CONSTRAINT: Within MA-2 (HMA), no more than 12 5 percent of loblolly acres can be within the 0 to 10 age class. To ensure this, a constraint of 7 5 percent was modeled with an expectation of an additional 5 percent from natural causes such as SPB, storm damage, and other unplanned openings This percentage reduction is based on historical record of occurrence of opening from natural causes Analysis for this estimate of mortality due to weather, SPB, etc is on file in the process records in Supervisor's Office of NFGT

Purpose: To implement direction found within the FEIS for Management of RCW in the Southern Region

Rationale Minimum management requirement for RCW

CONSTRAINT: Within MA-2 (HMA), 50 percent of acres designated for harvest would use a multi-stage cutting process (uneven-aged, two-aged, and shelterwood with reserves)

Purpose: To implement direction found within the FEIS for Management of RCW in the Southern Region.

Rational: Minimum management requirement for RCW

Note: This was modified for Alt 8 to reflect 50% of minimum HMA because of an additional 25,000 acres added to only thinning Rx

CONSTRAINT: Within MA-2 (HMA), no regeneration within one-fourth (1/4) mile of RCW clusters Only thinning or minimum level type prescriptions can be applied

Purpose: To implement direction found within the FEIS for Management of RCW in the Southern Region

Rationale: Minimum management requirement for RCW

Note: This was modified for Alt 8 to reflect 50% of minimum HMA because of an additional 25,000 acres added to only thinning prescription

Other constraints were imposed to represent the general theme of a particular alternative These are typically referred to as discretionary constraints By adding these constraints, the PNV that results is typically reduced naturally from what it would have been if they had not been applied.

X. Development of Alternatives

Each alternative's purpose is described in Chapter II of the EIS

Alternative 1 - "No Action" The court ordered management for 1,200-meter zones for active and inactive RCW clusters The remaining 82 percent of the land is managed under the 1987 Forest Plan and additional direction set forth by the Chief of the Forest Service.

In addition to the previously mentioned constraints that were common to alternatives, the following constraints were necessary to represent the theme of this alternative

CONSTRAINT: Current timber volume proposed in 1987 Plan, less Chief's adjustment for court ordered 1,200 meters. (Approximately 119 MMBF)

Purpose and Rationale: To simulate existing activities and display future outputs of management actions, if Alternative 1 is implemented.

CONSTRAINT: No management for mixed stands. Existing mixed stands converted to pine or hardwood, based on soil type.

Purpose: To reflect current management

Rationale: Provide an accurate depiction of the likely effect of continuing current management

CONSTRAINT: Rotation age: loblolly 70 years; longleaf and shortleaf 80 years, and hardwoods 120 years. Harvest no existing stand until within 10 years of rotation age.

Purpose: To reflect current management and to adjust age classes.

Rationale: Provide an accurate depiction of likely effects of continuing current management.

CONSTRAINT: Limit ASQ harvesting to 119 mmbf

Purpose: To comply with existing ASQ

Rationale: To ensure accurate assessment of future outputs in this alternative

CONSTRAINT: Limit uneven-aged management to no more than 10 percent of MA-1

Purpose and Rationale To meet prescriptions developed by the IDT for this alternative

Alternative 2 - High level of market commodities and recovery of the RCW. The forest is managed to produce a high level of market commodities and for recovery of RCW. This alternative emphasizes commodity production with less emphasis on amenity values, yet amenities are protected as required by law or policy. In this alternative, RCW would be managed under the standards and guidelines of the RCW FEIS.

The Grasslands are managed similar to the 1987 Plan, but with more emphasis on higher levels of market commodities, primarily grazing and minerals This theme emphasizes commodity production, with less emphasis on amenity values Amenities are minimal, but are protected as required by law or policy

The constraints are in addition to those that are common to all alternatives They include the following.

CONSTRAINT Rotation age loblolly 70 years, longleaf and shortleaf 80 years, and hardwoods 120 years based on IDT and Management Team review

Purpose: To reflect commodity oriented management and to adjust age classes

Rationale: Provide an accurate depiction of likely effects of continuing current management

CONSTRAINT: To limit ASQ to MA-1, MA-2, and MA-6

Purpose: Ensure harvest for ASQ harvest was in suitable acres

Rationale: To limit harvest to general forest areas.

CONSTRAINT: Limit uneven-aged management to no more than 10 percent of MA-1

Purpose and Rationale To meet prescriptions developed by the IDT for this alternative.

Alternative 3 - Moderate to high level of market commodities and recovery of the RCW with minimum HMA area. The Forest is managed for recovery of the RCW, while producing a moderate to high level of market commodities and a low to moderate level of amenity levels Amenity values are protected as required by law and enhanced where this could be done without major impacts to production of market commodities

Areas of the Forests and Grasslands in close proximity to major urban centers are managed recognizing the predominately urban user's needs and values In addition to existing special areas such as wilderness and scenic areas, a few additional areas of the forest are managed to preserve their special characteristics In this alternative, RCW is managed with the standards and guidelines of the RCW FEIS

The Grasslands area managed similar to the 1987 Plan, but more emphasis is directed at higher levels of market commodities, primarily

grazing and minerals. This alternative emphasizes commodity production with less emphasis on amenity values Although amenities are minimal, they are protected as required by law or policy

The constraints are in addition to those that are common to all alternatives They include the following

CONSTRAINT: Rotation ages loblolly 70 years, shortleaf 80 years, and longleaf 90 years

Purpose: To reflect management emphasis of Alternative 3

Rationale: To meet objective of alternative

CONSTRAINT: Additional acres in special areas and recreation.

Purpose: To ensure certain additional acres are assigned the special and recreation designations

Rationale: To address public issue for recreation and special areas

CONSTRAINT: Limit ASQ to MA-1, MA-2, and MA-6

Purpose: ASQ harvest to suitable acres

Rationale: To limit harvest to general forest areas

CONSTRAINT: Limit uneven-aged management to no more than 25 percent of MA-1

Purpose and Rationale. To meet prescriptions developed by the IDT for this alternative

Alternative 4 - Moderate level of market commodities and recovery of RCW with maximum HMA area. The forest is managed to provide for recovery of the RCW and to yield moderate levels of market commodities and amenity values Areas of the forest in close proximity to major urban centers are managed recognizing the predominately urban user's needs and values In addition to existing special areas, some portions of the forest are managed to preserve their special characteristics RCW is managed with the standards and guidelines of the RCW FEIS

The Grasslands are managed to provide an equal output of market commodities and amenity values The LBJ unit, which is in close proximity to Dallas - Fort Worth, is managed recognizing the predominately urban user's needs and values Several Natural Heritage sites on the

Caddo and LBJ, in addition to the Cross Timbers Research Natural Area (RNA), are managed to preserve their special characteristics.

The constraints are in addition to those that are common to all alternatives. They include the following:

CONSTRAINT: Rotation ages· loblolly 70 years; shortleaf 80 years, and longleaf 100 years

Purpose: To reflect management emphasis of Alternative 4.

Rationale: To meet objective of alternative

CONSTRAINT: Additional acres constrained for special areas and recreational areas.

Purpose: Ensure certain issues related to desire for additional acres assigned to special and recreation designations.

Rationale: To address public issue for recreation and special areas.

CONSTRAINT: Limit ASQ to MA-1, MA-2, and MA-6

Purpose: ASQ harvest to suitable acres

Rationale: To limit harvest to general forest areas

CONSTRAINT: Limit uneven-aged management to no more than 50 percent of MA-1

Purpose and Rationale To meet prescriptions developed by the IDT for this alternative.

Alternative 4a - moderate level of market commodities and recovery of RCW with minimum HMA area. This alternative is the same as Alternative 4 except the HMA is held for to a minimum HMA area

Additional constraints are the same as shown for Alternative 4.

Alternative 4b - Moderate level of market commodities and recovery of RCW with minimum HMA area, plus corridors. This alternative has the same special areas and management perscriptions as Alternative 4a except each HMA has the minimum amount for that HMA, connected by corridors between the subpopulations Acreage in MA-2 is between Alternative 4 and 4a

Additional constraints are the same as shown for Alternative 4

Alternative 5 - RCW recovery with emphasis on non-market amenities. The Forest is managed for recovery of the RCW while maintaining tall forest cover over most of the Forest. Some commodities are produced, but production of recreation, wildlife, and other amenity values are emphasized Areas of the Forests and Grasslands in close proximity to major urban centers are managed recognizing the predominately urban user's needs and values In addition to existing special areas, several parts of the forest are managed to preserve their special characteristics. RCW is managed with the standards and guidelines of the RCW FEIS

The Grasslands are managed to provide an equal output of market commodities and amenity values The LBJ unit, which is in close proximity to Dallas - Fort Worth, is managed recognizing the predominately urban user's needs and values. Several Natural Heritage sites on the Caddo and LBJ, in addition to the Cross Timbers RNA, are managed to preserve their special characteristics.

CONSTRAINT: Rotation ages loblolly 80 years, shortleaf 100 years, mixed and longleaf 120 years' and hardwoods 200 years

Purpose: To provide older mature forest for dispersed recreation opportunities

Rationale: To meet objectives of the alternative, to meet the demand for dispersed recreation

CONSTRAINT: Additional wilderness acres

Purpose: To ensure that certain additional areas were assigned the wilderness classification

Rationale: To address public issues for more wilderness areas

CONSTRAINT: Limit ASQ to the suitable acres

Purpose: To limit ASQ to MA-1, MA-2 and MA-6

Rationale: To limit harvest to general forest areas

CONSTRAINT: Limit uneven-aged management to no more than 45 percent of MA-1

Purpose and Rationale To meet prescriptions developed by the IDT for this alternative.

Alternative 6 - Recovery of RCW while retaining tall forest cover with primarily uneven-aged silvicultural methods, without use of fire or herbicides. The forest is managed to produce an

environment for recovery of the RCW while retaining tall forest cover Preservation of unique areas and low impact management are emphasized Primarily uneven-aged silvicultural methods are used Forest and Grasslands areas in close proximity to major urban centers are managed recognizing the predominately urban user's needs and values RCW is managed with the standards and guidelines of the RCW FEIS

The Grasslands are managed to provide an equal output of market commodities and amenity values The LBJ unit, which is in close proximity to Dallas - Fort Worth, is managed recognizing the predominately urban user's needs and values Several Natural Heritage sites on the Caddo and LBJ, in addition to the Cross Timbers RNA, are managed to preserve their special characteristics

Prescribed burning is seldom used and the use of herbicides is not permitted

CONSTRAINT: Maximum wilderness acres

Purpose: To ensure maximum wilderness acres are assigned

Rationale: To address public issues for more wilderness

CONSTRAINT: 50 percent of acreage within HMA and 75 percent of acreage outside the HMA managed with an uneven-aged silvicultural method The objective during the development of this alternative and number 7 was to have 90 percent of the acreage in MA-1 assigned to unevenage prescription However, the FORPLAN model with constraints for maintaining NDY, LTSY, and not allowing timber to fall 50 percent below demand limit would cause this to go infeasible So through a number of sensitivity runs to determine the maximum amount of uneven-aged prescription, a figure of 75 percent was determined

Purpose: To ensure that a large percentage of acres are considered for this silvicultural method

Rationale: To address public issues for more uneven-aged silvicultural management

CONSTRAINT: Limit ASQ to MA-1, MA-2 and MA-6

Purpose: Limit ASQ to the suitable acres

Rationale: To limit harvest to general forest areas

Alternative 7 - Recovery of RCW while retaining tall cover with primary uneven-aged silvicultural method with use of fire and herbicides.

This alternative is the same as Alternative 6, except that the use of fire and herbicides is permitted and prescribed This alternative also shifts some of the wilderness areas in Alternative 6 to special areas This alternative provides a mix of wilderness and special area designations that meet other demands for recreation and resource management

CONSTRAINT: Increase in wilderness acres over Alternatives 1 through 5

Purpose: To ensure more wilderness acres are assigned

Rationale: To address issues related to maximization of wilderness

CONSTRAINT: Maximize special area designations

Purpose: To ensure maximum special acres are assigned

Rationale: To address issues related to maximization of wilderness

CONSTRAINT: Fifty percent of acreage within HMA and at least 75 percent of acreage outside HMA is managed with uneven-aged silvicultural methods (Attempted 90 percent uneven-aged prescription = FORPLAN infeasable, see previous alternative)

Purpose: To ensure that a large percentage of acres are considered for this silvicultural method

Rationale: To address public issues for more uneven-aged silvicultural management

CONSTRAINT: Limit ASQ to the suitable acres

Purpose: *To limit ASQ to MA-1, MA-2 and MA-6*

Rationale: To limit harvest to general forest areas

Alternative 8 - Moderate level of market commmodities and recovery of RCW with minimum HMA area plus modification of acreage set up for corridor.

CONSTRAINT: Restric harvest method to non clearcut within MA-2 (HMA), all acres with a VQO that are not designated modified or maximum modified that are harvestable plus 5% (five percent) (approximately 106,000 acres) This is equal to approximately 40 percent of the minimum HMA suitable harvestable acres

[Number of acres was reduced from 50 to 40 percent to reflect the increase of acres for thin only for the new RCW sites within HMA Minimum 24,600 acres for existing RCW increased to 50,000 acres. Suitable forest acres within MA-2 and HMA part of MA-6 is 263,308 (see suitable acre calculation for Alternative 8, following section Appendix B) times 50% less acreage increase for thinning]

$$\frac{263308}{2} = 131654 - 25400 = 106,254 acres$$

Purpose: To implement direction found within the EIS for Management of RCW in the Southern Region

Rationale: Management required for RCW

CONSTRAINT: Within MA-2 and MA-6, no regeneration within one-fourth (1/4) mile of RCW clusters. Only thinning or minimum type prescriptions can be applied To this existing 24,600 acres an additional 25,400 acres was included (50,000 acres).

Purpose: To implement direction found within the FEIS for Management of RCW in the Southern Region

Rationale: Mangement requirement for RCW

CONSTRAINT Within MA-1 limit unevenaged management to acres with VQO that is not modified or maximum modified as a minimum and an additional 5 percent for maximum (approximately 30 percent of the suitable acres)

Purpose and Rationale: To meet prescription developed by the IDT for this alternative

CONSTRAINT: Within MA-1 limited 0-20 age class acreage to 22 2 percent

Purpose: To insure that Alternative would be implementable on a spatial bases with an average 35 to 40 acres cut

Rationale: To provide an accurate depiction of implementation of harvesting.

CONSTRAINT: Acres within each forest type within age group 0 to 10

Purpose: To ensure approximately 500 acres per year of harvesting by Forest.

Rationale: To meet objective of alternative

CONSTRAINT: Limit ASQ to suitable acres Suitable acres = 486,072

Purpose: To limit ASQ to MA-1, MA-2, MA-6

Rationale: To limit harvest to general forest area

CONSTRAINT: Rotation ages loblolly 70 years, shortleaf 80 years and longleaf 100 years

Purpose: To reflect management emphasis of Alternative 8

Rationale: To meet objective of the alternative

CONSTRAINT: Additional acres constrained for special management and recreation areas

Purpose: Ensure certain issues related to desire for additional acres assigned to special and recreation designations

Rationale: To address public issue for recreation and special areas.

CONSTRAINT: Maximax timber 1st period rollover followed by the "Maximum PNV" objective function

Purpose: To maximax net public benefit

Rationale: To get a timber target that is close to the maximum that can be sustained, given the objectives for other resources. The PNV calculation is used simply to ensure that the ASQ target is produced as efficiently as possible.

ALTERNATIVE #1 CURRENT NO ACTION

PHYSICAL SUITABILITY STAGE 1 Classification from NFMA Regulations at CFR 219.14(a)				Alt 1
1.	**Non-Forest Land (includes water)**		**56749**	
	~ Water (Lakes and Ponds greater than 1 Acre)		[16312]	MA#5
	~ Pasture & Natural Grassland		[31802]	MA#3,#8,#
	RNA, 345 acres, Lake Fannin Special Area, 200 acres, Recreation Area, 240 acres, other Grassland, 31017 acres			
	~Roads,ROWs,Well Sites,etc		[8635]	MA#9,#10
	Wells, 96 acres, rec roads, 65 acres, other roads and ROWs, 8474 acres			
2.	**Forest Land**		**618823**	
3.	**Forest Land Withdrawn From Timber Production**		**37162**	
	~ Wilderness		[37162]	MA#7
4.	**Forest Land Not Capable of Producing Crops of Industrial Wood** (note, this includes 35 Ac of RNA , 19 Ac of Rec Area of NG, 834 Ac of other forest, and 4125 Ac of grassland-woods)		**5080**	MA#3,#8,#
5.	**Forest Land Physically Unsuitable**		**216**	MA#10
	~ Irreversible Damage Likely		[203]	
	~ Not Restockable Within 5 Years		[13]	
6.	**Forest Land - Inadequate Information**		**3631**	
7.	**Tentatively Suitable Forest Land**		**572734**	

FINANCIAL ANALYSIS STAGE 2 Classification from NFMA Regulations at CFR 219 14(b)

STAGE 2 TIMBER RESOURCE LAND SUITABILITY is a financial analysis designed to explore the financial attractiveness of different timber intensities on lands identified as "tentatively suitable for timber production" Results from the FORPLAN Analysis showed all these acres having a positive PNV these results were used to identify the relative advantages of different timber intensities on different parts of the Forest

IDENTIFICATION OF SUITABLE ACRES STAGE 3
Classification from NFMA Regulations at CFR 219.14(c)

8.	**Forest Land Not Appropriate For Timber Production**		**62782**	
	~ RCW Colonies		[6619]	MA #2
	~ RCW Recruitment Stands		[3648]	MA #1, #2
	~ Other Threatened and Endangered Species, plus RCW expansion		[7527]	MA #1, #2
	~ Experimental Forest		[2561]	MA #11
	~ Recreation Areas		[4010]	MA #9
	~ Streamside (includes stringer acres) (Note.excludes those acres that are within Wilderness, Rec,Special and Minimum Level Mgmt Areas)		[34482]	MA #4
	~ Archaeological, Historical, & Scenic Special Management		[3935]	MA#8
9.	**Unsuitable Forest Land**		**108871**	
10.	**Total Suitable Forest Land**		**509952**	
	~ Management Area # 1*	349149		MA #1
	~ 1200 Meter RCW - Management Area # 2*	160803		MA #2
11.	**Total National Forest and Grassland**		**675572**	

* Note Acres in Mgmt Area less those acres within the Mgmt Area that are mgmt for RCW's or Other Pets

ALTERNATIVE #2
NET CHANGE FROM SUITABLE ACRES FROM CURRENT MGMT (ALT #1) TO ALTERNATIVE #2

8	**Forest Land Not Appropriate for Timber Production (Net change +19138)**		**81920**	
	~ RCW Colonies		6619 (No change)	MA #2
	~ RCW Recruitment		3648 (No change)	MA #2
	~ Other T&E (plus RCW expansion acres)		4554 (-2973 acres)	MA #1, #2
	~ Experimental Forest		2561 (No change)	MA #11
	~ Recreation Areas		5284 (+1274 acres)	MA #9
	~ Streamside Acres		52155 (+17673 acres)	MA #4
	~ Archaeological, Historical, & Scenic Special Management		7124 (+3189 acres)	MA #8
	~ *Administrative Adjustment Acres*		-25 (-25 acres)	MA #10
9.	**NET UNSUITABLE FOREST LAND**			**128009**
10.	**TOTAL SUITABLE FOREST LAND**			**490814**
	~ Mgmt Area #1 Upland Forest*	269631		
	~ Mgmt Area #2 HMA - RCW/Pine Woodlands*	221183		

* Note Acres in Mgmt Area less those acres within the Mgmt Area that are mgmt for RCW's or Other Pets

NOTE ALSO Other Unsuitable acres have been moved between management areas but do not effect suitability therefore not included in this table

ALTERNATIVE #3
NET CHANGE FROM SUITABLE ACRES FROM CURRENT MGMT (ALT #1) TO ALTERNATIVE #3

8.	**Forest Land Not Appropriate for Timber Production (Net change +23317)**		**86009**	
	~ RCW Colonies		6619 (No change)	MA #2, #6
	~ RCW Recruitment		3648 (No change)	MA #2, #6
	~ Other T&E (plus RCW expansion acres)		4634 (-2893 acres)	MA #1, #2
	~ Experimental Forest		2561 (No change)	MA #11
	~ Recreation Areas		5284 (+1274 acres)	MA #9
	~ Streamside Acres		50918 (+16436 acres)	MA #4
	~ Archaeological, Historical, & Scenic Special Management		12460 (+8525 acres)	MA #8
	~ Administrative Adjustment Areas		-25 (-25 acres)	MA #10
9.	**NET UNSUITABLE FOREST LAND**			**132188**
10.	**TOTAL SUITABLE FOREST LAND**			**486635**
	~ Mgmt Area #1 Upland Forest*	265790		
	~ Mgmt Area #2 HMA - RCW/Pine Woodlands*	220845		

* Note Acres in Mgmt Area less those acres within the Mgmt Area that are mgmt for RCW's or Other Pets

NOTE ALSO Other Unsuitable acres have been moved between management areas but do not effect suitability therefore not included in this table

ALTERNATIVE #4
NET CHANGE FROM SUITABLE ACRES FROM CURRENT MGMT (ALT #1) TO ALTERNATIVE #4

8.	**Forest Land Not Appropriate for Timber Production (Net change +24249)**		**87031**	
	~ RCW Colonies		6619 (No change)	MA #2, #6
	~ RCW Recruitment		3648 (No change)	MA #2, #6
	~ Other T&E (plus RCW expansion acres)		6047 (-1480 acres)	MA #1, #2
	~ Experimental Forest		2561 (No change)	MA #11
	~ Recreation Areas		6094 (+2084 acres)	MA #9
	~ Streamside Acres		50514 (+16032 acres)	MA #4
	~ Archaeological, Historical, & Scenic Special Management		11573 (+7638 acres)	MA #8
	~ Administrative Adjustment Acres		-25 (-25 acres)	MA #10
9.	**NET UNSUITABLE FOREST LAND**		**133100**	
10.	**TOTAL SUITABLE FOREST LAND**		**485703**	
	~ Mgmt Area #1 Upland Forest*	12428		
	~ Mgmt Area #2 HMA - RCW/Pine Woodlands*	485703		

* Note Acres in Mgmt Area less those acres within the Mgmt Area that are mgmt for RCW's or Other Pets

NOTE ALSO, Other Unsuitable acres have been moved between management areas but do not effect suitability therefore not included in this table

ALTERNATIVE #4A
NET CHANGE FROM SUITABLE ACRES FROM CURRENT MGMT (ALT #1) TO ALTERNATIVE #4A

8.	**Forest Land Not Appropriate for Timber Production (Net change +22874)**		**85656**	
	~ RCW Colonies		6619 (No change)	MA #2, #6
	~ RCW Recruitment		3648 (No change)	MA #2, #6
	~ Other T&E (plus RCW expansion acres)		4672 (-2855 acres)	MA #1, #2
	~ Experimental Forest		2561 (No change)	MA #11
	~ Recreation Areas		6094 (+2084 acres)	MA #9
	~ Streamside Acres		50514 (+16032 acres)	MA #4
	~ Archaeological, Historical, & Scenic Special Management		11573 (+7638 acres)	MA #8
	~ Administrative Adjustment Acres		-25 (-25 acres)	MA #10
9.	**NET UNSUITABLE FOREST LAND**		**131745**	
10.	**TOTAL SUITABLE FOREST LAND**		**487078**	
	~ Mgmt Area #1 Upland Forest*	265895		
	~ Mgmt Area #2 HMA - RCW/Pine Woodlands*	221183		

* Note Acres in Mgmt Area less those acres within the Mgmt Area that are mgmt for RCW's or Other Pets

NOTE ALSO Other Unsuitable acres have been moved between management areas but do not effect suitability therefore not included in this table