Appendix I

Supplement #1, 6/99

Old Growth

Purpose of Supplement #1: The Region 8 Old Growth Team released it's final report "Guidance for Conserving and Restoring Old Growth Communities on National Forests in the Southern Region" in June 1997. This supplement of Appendix I makes changes to provide consistency with the Region 8 old growth report and to provide additional guidance. These changes do not modify any guidance contained in the Revised Land and Resource Management Plan, but do provide further refinement of that guidance. Exhibit 2 documents the comparison of guidance in the Region 8 old growth report with the process and guidance developed in the National Forest and Grasslands in Texas (NFGT) 1996 Revised Land and Resource Management Plan (Forest Plan).

National and Regional Direction

The public and the Forest Service have identified "old growth" as an important issue. A National old-growth task group was assembled in 1989 and developed a National policy statement and the following generic definition of old-growth:

> **Definition**: Old growth forests are ecosystems distinguished by old trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics that may include tree size, accumulation of large dead woody material, number of canopy layers, species composition, and ecosystem function.
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> **Description**: The age at which old growth develops and the specific structural attributes that characterize old growth will vary widely according to forest type, climate, site conditions, and disturbance regime. For example, old growth in fire-dependent forest types may not differ greatly from younger forests in the number of canopy layers or accumulation of downed woody material. However, old growth is typically distinguished from younger growth by several of the following structural attributes:
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> 1. Large trees for that species and site.
> 2. Wide variation in tree size and spacing.
> 3. Accumulations of large-size dead standing and fallen trees that are high relative to earlier stages.
> 4. Decadence in the form of broken or deformed tops or bole and root decay.
> 5. Multiple canopy layers.
> 6. Canopy gaps and understory patchiness.
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> Compositionally, old growth encompasses both older forests dominated by early seral species, such as fire-dependent species, and forest in later successional stages dominated by shade tolerant species. Rates of change in composition and structure are slow relative to younger forests. Different stages or classes of old growth will be recognizable in many forest types.

Sporadic, low to moderate severity disturbances are an integral part of the internal dynamics of many old-growth ecosystems. Canopy openings resulting from the death of overstory trees often give rise to patches of small trees, shrubs, and herbs in the understory.

Old-growth is not necessarily "virgin" or "primeval." Old-growth could develop following human disturbances. The structure and function of an old-growth ecosystem will be influenced by its stand size and landscape position and context.

In July, 1990, the R-8 old growth steering committee was organized. The committee, in cooperation with R-9, started the process for defining eastern old growth type groups. The eastern experiment stations worked with The Nature Conservancy to develop specific definitions for each forest type. The Final Project Report "The Development of Old-Growth Definitions for Eastern United States Forests Phase II" was competed by Gregory J. Nowacki of the Nature Conservancy in February 1993. This report also developed a crosswalk between SAF Cover Types, USFS R-8 Forest Type Codes and the Representative Old-Growth Forest Type Number(s). The crosswalk for forest types occurring on NFGT is shown in exhibit 1 of this appendix.

Regional direction is found in "Guidance for Conserving and Restoring Old Growth Communities on National Forests in the Southern Region" (R8 Report) which was released in June 1997, after the NFGT Forest Plan was approved. The R8 Report includes old growth operational definitions for sixteen forest community types, ten of which are believed to occur on the NFGT. An additional forest community type, hardwood wetland forest, is identified in the R8 Report as occurring on the NFGT but is more appropriately represented in the Forest Plan by the bay forests community type.

Old Growth on the NFGT

The NFGT, through the plan revision, has worked to ascertain the needs for old growth, with a goal of providing suitable blocks of old growth in each of the major forest types found on the NFGT. Old growth was identified as a sub-issue of biodiversity in the NFGT Five Year Review/Analysis of the Management Situation (AMS) of 1992. The AMS used the following accepted terminology that can be applied to all successional stages (seral to climax) of old growth regardless of the specific forest type or definition. This terminology is used to describe how old growth will be managed in the various management areas.

Old Growth - Areas having all or most of the attributes of old growth; existing old growth. Existing old growth may be allocated as designated old growth or for some other purpose, including harvest.

Potential Old Growth - Areas under consideration to be designated as old growth, future old growth, or restored old growth. These areas may be allocated to other purposes requiring vegetative manipulation for wildlife habitat or timber management, if not designated as some form of old growth.

Designated Old Growth - Areas which have been designated to be maintained in perpetuity as old growth subject only to natural forces. No active management practices such as thinning will be applied to these areas to enhance or maintain old growth attributes.

Restored Old Growth - Areas which have been designated to eventually become old growth. Active management practices may be applied to enhance or restore some old growth attributes. These areas may eventually be harvested.

Future Old Growth - Areas which have been designated to eventually become old growth. Areas will be subject only to natural forces. No active management practices such as thinning will be applied to these areas to develop or enhance old growth attributes.

An old growth discussion and workshop was held on the NFGT on July 17, 1992 with representatives from Universities, agencies, partner cooperators and USFS personnel. Written comments were received from Universities, agencies and other interested publics. An old growth subcommittee was organized by the ID Team in August 1993. Through planning and public scoping, the following social and biological demands for old growth have been identified.

Social Needs

The social aspect of old growth involves its intrinsic value, which has no market value and invokes deep human emotions. The aesthetics/visual quality of old growth are most often associated with big trees and possibly a park-like setting which can develop into a special "sense of place". The public perceives old growth as one part of the overall ecosystem, providing habitat for certain animals and plants, bringing about proper biological balance and harmony.

There are approximately 2.3 million recreational users in Texas, and many have indicated they wish to visit and experience areas of old growth. It is therefore important that old growth be found in sections of the forest accessible and often visited by the public, including socially valued areas such as historic and scenic sites, as well as other special management areas. Distribution of old growth needs to be evaluated at both the individual stand level and at the landscape level.

It is imperative that public involvement continue in the evaluation of social values of old growth. This involvement will help determine the range of physical access needed, where the important old growth images now occur and where did they occur, how do old growth areas relate to other areas in the forest, what size does an area of old growth really need to be to achieve the desired benefits, and how does the old growth area relate to the location of users. It will also be necessary to consider areas that do not presently meet the old growth criteria for future old growth locations.

Wildlife Considerations

Old growth, along with other mature forest areas, provides habitat and other benefits to a variety of wildlife species. While no old growth obligate wildlife species are known to exist in Texas, it is recognized that old growth can provide linkages between habitat management areas (HMA) and other older forests, reducing fragmentation, plus help maintain diversity. Wildlife benefits of older forests, including old growth, are discussed in the EIS, Chapter III, Part I(b), and in the Forest Plan, Management Area II.

As the Forest Plan is implemented, monitoring will track how management practices in old growth areas, special management areas, and habitat management areas are impacting and benefitting wildlife. This information, along with new research and data on wildlife old growth requirements, will be used in refining old growth policy on the NFGT as needed.

Old Growth Inventories

Table 1 lists the current allocation of National Forest land by classification as unsuitable and suitable for timber production. All unsuitable land would have the potential to develop into old growth over time.

To further address old growth potential in this Forest Plan, all major resource management areas have been classified by the type and potential for old growth. Classification was made according to the old growth definitions defined under "Old Growth on the NFGT" above. Estimated acreage in each old growth category is: potential old growth, 51,090; designated, 605; restored, 11,555; and future, 37,216. No old growth allocations were made in MA-1, general forest area, or MA-2, habitat management area, although some stands in these two management areas probably could be classified as "old growth". The management emphases in these areas is not directed toward old growth. Old growth attributes may develop in these areas, particularly in the HMAs, due to the extended rotations, but management activities to meet area objectives may alter old growth character. As further assessment continues, areas within SMZs, scenic areas, botanical areas, and other special management areas (SMAs) categorized as potential old growth may be selected as restored old growth and managed for old growth attributes.

To help meet the old growth needs on the NFGT, an inventory of 95 year and older stands was completed. 1991 CISC data was used, and these older stands were mapped and coded by forest type. Tables 2 and 3 give the results of this inventory, with the data broken down by forest type and suitability for timber production. This preliminary inventory is to be used during project level planning to identify and assess possible old growth

The NFGT will continue inventorying and evaluating stands for old growth characteristics, and to monitor SMAs to assess how potential, designated, and future old growth is developing. Data will normally be gathered and analyzed during the compartment prescription process.

Implementing Directions

Operational Old-Growth Definitions: The operational old growth definitions identified in the R8 Report, "Guidance for Conserving and Restoring Old-Growth Forest Communities on the National Forests in the Southern Region," are adopted to supplement the National definitions used in the Forest Plan revision. The determination of a stand's status as existing old growth will be based on age, past disturbance, basal area, and tree size. Table 4 provides the attributes for determining the old growth status of forest stands on the National Forests in Texas. If, during field inventory, a stand meets all four criteria it will be considered existing old growth. Explanation of the 4 criteria follows.

Minimum Age of the Oldest Age Class. Table 4 provides the minimum age for the oldest age class for each old growth community type. In most cases, the scientific definitions do not contain information regarding the number of trees per acre in this age class. Based on information summarized in the R8 Report and as a conservative rule of thumb, the age criteria is applicable when at least 8 to 10 trees per acre for pine community types (possibly fewer per acre for savanna conditions) or when at least 30 trees per acre for deciduous community types are present. These estimates are not absolutes and there is a need for flexibility in applying this guidance during the field inventory.

Disturbance Criteria: For a stand to be considered as existing old growth, no obvious evidence of past human disturbance which conflicts with old growth characteristics of the area should be present. Recent vegetative management activities which maintain characteristics consistent with old growth would not disqualify an area as existing old growth. Examples of these activities may include commercial thinnings, mid-story treatments, prescribed fire, or interpretive trails.

Minimum Basal Area: The minimum basal area for each old growth forest community type in Table 4 is a conservative estimate to ensure that stands are not excluded due to the variety of ecological conditions which exist in the Southeast. This minimum is provided as a measurement of stand density and reflects the variability among old growth forest communities ranging from forests to savannas. Tree sizes for inclusion in the estimate of stand basal area will follow the Forest Service silvicultural stand examination protocols for pine and hardwood species.

Diameter at Breast Height (dbh) of the Largest Trees: Based on available information and as a conservative rule of thumb, the criteria for the dbh's of the largest trees are applicable when at least 6 to 10 trees for all old growth forest community types (possibly fewer for savanna conditions) are present. There is a need for flexibility in applying this guidance during the field inventory because there are situations in which the number of large trees per acre could be fewer.

Additional NFGT Direction: In October 1997 the National Forest and Grasslands in Texas Leadership Team reviewed the Forest Plan and the R8 Report to determine consistency of the two documents and to determine if additional direction and guidance is needed for project level planning. The Leadership Team determined that a Forest Plan revision or amendment was not needed because the Forest Plan, while not as detailed as the R8 Report, was consistent with it. Also, the R8 Report was to be considered when forest plans were revised; it did not initiate such a revision. The Leadership Team identified the following two objectives and additional guidance for use during project level planning.

Objectives:

1. Maintain 10% of the major community types in existing old growth, future old growth, unsuitable land classes, or stands with one or more old growth attributes to meet current old growth needs and maintain future old growth options.

2. Consider old growth needs in un-represented community types believed to occur on the National Forests in Texas during project level planning to maintain future old growth options.

The major community types are those discussed in detail in this Appendix and listed in Exhibit 1. The un-represented community types are those described in the R8 Report and not identified in Exhibit 1 but which are believed to occur on the National Forests in Texas. The five un-represented community types are Type 14, cypress-tupelo swamp; Type 27, seasonally wet oak-hardwood woodlands; Type 28, eastern riverfront forests; Type 21, dry-mesic oak forests; and Type 22, dry-xeric oak forests.

The Leadership Team determined that old growth in the major community types should be represented in about the same proportion as the other age classes to provide optimal diversity and conserve future old growth options until other evidence indicates a different amount of old growth may be needed. Based upon rotation ages and size class objectives, 10% old growth will provide approximately the same amount of old growth as each of the other age classes or size objectives. Based on acreages from Table 1, all major community types have at least 10% in the unsuitable land class except type 25, dry & dry-mesic oak-pine forests.

Guidance:

1. An additional 3021 acres are needed in community type 25, dry & dry-mesic oak-pine forests, from MA-1, MA-2, and MA-6 to meet the 10% old growth objective. This acreage is to be identified during project level planning in small areas (generally 100 acres or less) in forest type 32, shortleaf pine, where interim management for old growth is compatible with the Management Area and project area objectives and desired future conditions. These areas will not be allocated to old growth but will be managed for old growth character. See forest-wide standard FW-021 found in the Forest Plan.

2. Maintain all existing old growth in the un-represented community types.

3. Stands of un-represented wetland communities (type 14, type 27, and type 28) which meet the basal area and disturbance criteria for old growth may be prescribed for vegetation management treatments only if site specific analysis determines that the treatment is needed to meet the desired future condition for the area and existing or future old growth is adequate in the project area.

4. In stands of the un-represented community types which are within 20 years of the age criteria for old growth and which meet the basal area and disturbance criteria for old growth, only those vegetation management activities which maintain or enhance old growth character may be implemented unless site specific analysis determines the stand is not needed to contribute to the old growth needs for the community type.

5. Inventory the un-represented upland community types (type 21 and type 22) for occurrence and distribution. The inventory should normally be done as part of the compartment prescription process, but may also be ecosystem management projects or special projects with cooperators or partners.

Considerations for Old Growth During Project Level Planning

A first step during project level planning is to review any stands identified in the preliminary inventory as possible old growth. These stands should be visited in the field in order to determine their status as existing old growth. A stand must meet all four criteria in the operational definitions (age, basal area, past disturbance, and tree size) to be existing old growth. A second step is to determine the old growth status of other stands in the project area. For those stands which meet the operational definitions for old growth, the directions in the forest plan will provide management options. For those stands that do not meet the operational definitions for old growth and if they are not a part of any old growth allocation or management direction identified in the Forest Plan, then there is no old growth issue associated with the project.

When addressing areas with old growth direction in the Forest Plan or this appendix, but containing no Forest Plan land allocations for old growth, the district will have the added responsibility of considering small-sized old growth areas. Currently, only forest type 32-shortleaf pine and the un-represented community types discussed under "Implementing Directions" above are to be considered for designation as small-sized old growth areas under FW-021. The district should use the information from the preliminary inventory and the field examination to help in designating areas for old growth management.

Old Growth Forest Types

The narrative descriptions for the 35 old-growth forest type groups known to occur on the National Forests in Texas are taken from the Nowacki (1993) Final Project Report referenced above. Following each old growth group narrative description is a description of the old growth desired future condition and disturbance regime.

06 - Coastal Plain Upland Mesic Hardwood Forests

FOREST TYPES REPRESENTED: White Oak-Northern Red Oak-Hickory and Beech-Magnolia

These forests occur frequently on favorably moist upland sites in the Coastal Plain Physiographic Province. This forest type group develops best on fertile, well-drained, fine-textured soils. Due to the diverse environmental conditions of the region (e.g. topography, soils, land-use history, fire regimes), these forests are scattered over much of the Coastal Plain.

These type forests consist primarily of hardwood species; conifers are occasionally represented in the canopy by pines (Pinus L.). Overstory composition is quite variable, and may be largely restricted to a single species or encompass a number of species. Principal species include white oak (Quercus alba L.), laurel oak (Q. hemisphaerica Bartram.), pignut hickory (Carya glabra [Mill.] Sweet), southern magnolia (Magnolia grandiflora L.), yellow poplar (Liriodendron tulipifera L.), red maple (Acer rubrum L.), sweetgum (Liquidambar styraciflua L.), beech (Fagus grandifolia Ehrh.), American holly (Ilex opaca Ait.), live oak (Q. virginiana Mill.), and flowering dogwood (Cornus florida L.). Stands located on calcareous substrates are most diverse floristically, though fewer conifers are normally present.

The disturbance regime of this forest type group is characterized by small-scale, low intensity disturbance (single tree gap dynamics). However, large-scale disturbances do occur periodically, and are essential for the maintenance of oak (Quercus L.) and pine in these forests. These earlier-successional species are quite abundant in forests that have originated after large-scale disturbances (e.g. fires and/or hurricanes). Reductions in fire frequency and intensity this century have caused many pine forests on mesic sites to succeed to hardwood forests. Coastal Plain Upland Mesic hardwoods are most representative of mesic slope and hammocks along or within river floodplains and swamps.

FOREST TYPES: White Oak-Northern Red Oak-Hickory, and Beech-Magnolia

1. Desired Future Condition: These closed canopy forests exhibit a wide variety of hardwood species, including several oak species. Large hardwoods are common. Some large, old hardwood trees will develop heartrot with visible cavities and buttrot present. Trees with large broken branches or tops will be present. Pine may be a component after disturbance, but gradually decreases as the stand matures. A few very large pines may be present in the overstory. Vertical structure is provided by tolerant species in the midstory and understory and by more intolerant species in single or multiple tree fall gaps. The dominant overstory canopy will appear closed except in recent tree fall gaps which quickly fill in from the sides and from below.

a. Overstory: Hardwood species dominate the overstory with larger trees reaching 28-36 inches diameter breast height (DBH). Pine may be present in small numbers and may exceed 30 inches DBH. The canopy is closed except for recent mortality or tree falls. Due to differing ages, growth rates, and light tolerances, tree size is variable.

b. Midstory/understory: Midstory and understory hardwoods are represented in all size classes. Intolerant species may occupy intermediate crown positions with more tolerant species in suppressed and understory positions. Beech, American holly, red maple, eastern hophornbeam, American hornbeam, and dogwood are common understory species. Midstories are not dense, except under recent crown openings, due to the limited light reaching the forest floor and may appear park-like. A deep, actively decaying leaf litter layer is present.

Standing snags/down trees: Standing snags are present in moderate numbers, more so than in pine old growth due to the greater decay resistance of some of the hardwood species. Downed timber in all stages of decay is common. There is no buildup of undecayed down material. The high temperature and humidity in east Texas prevent large build-ups of snags or down timber over large areas.

2. Disturbance regime: The disturbance regimes of these forests are a combination of small-scale, single-tree fall gaps and infrequent large scale disturbances such as hurricane, tornado, and fire. The interval between major disturbances may be several hundred years. The small scale disturbances favor development of the more tolerant species such as beech and magnolia, although the long lived oaks and hickories remain an important component. The larger scale disturbances result in a greater percentage of intolerant species such as the oaks. Some loblolly or shortleaf pine is usually established after large scale disturbance.

13 - River Floodplain Hardwood Forests

FOREST TYPES REPRESENTED: Bottomland Hardwood-Yellow Pine, Swamp Chestnut Oak-Cherrybark Oak, Sweet Gum-Nuttall Oak-Willow, Sugarberry-American Elm-Green Ash, and Laurel Oak-Willow Oak

The majority of these forests are found in broad river valleys from Virginia to Florida, west to Texas, and north along the Mississippi River and its main tributaries to southern Illinois and Indiana. River floodplain hardwood forests are distinguished by an abundance of water and rich alluvial soils. Forests occur on first bottom ridges, terrace flats, flat bottomlands and in shallow sloughs. Alluvial bottomland soils may vary in composition from sand to clay; however, on higher locations (e.g. first bottom ridges) forests are restricted to heavier soils. Depending on landform and proximity to the river, soils can be saturated either continually, seasonally, or rarely.

The flooding regime, rather than soil type, seems to be the primary determinant of vegetational composition within these forests. Canopy dominance differs greatly among forests, and may be shared by many species or restricted to just a few. The most important species are sweetgum (Liquidambar styraciflua L.), willow oak (Quercus phellos L.), pin oak (Q. palustris Muenchh.), water oak (Q. nigra L.), swamp chestnut oak (Q. michauxii Nutt.), cherrybark oak (Q. pagoda Raf.), overcup oak (Q. lyrata Walt.), diamondleaf oak (Q. laurifolia Michx.). Nuttall oak (Q. nuttallii Palmer), water hickory (Carya aquatica [Michx. f.], red maple (Acer rubrum L.), sugarberry (Celtis laevigata Willd.), hackberry (C. occidentalis L.), green ash (Fraxinus pennsylvanica Marsh.), American elm (Ulmus americana L.), yellow poplar (Liriodendron tulipifera L.), sycamore (Platanus occidentalis L.), black tupelo (Nyssa sylvatica Marsh.), possum-haw (Ilex decidua Walt.) and musclewood (Carpinus caroliniana Walt.). Flooding is a natural component of these forests and aids in the perpetuation of primary tree species by keeping in check invading shade-tolerant species which are flood-sensitive. Flooding is considered to be a disturbance only where hydrological processes have been disrupted by humans (e.g. water control structures). Alterations in flooding duration and frequency by artificial measures can lead to changes in forest composition and structure. Wind-throw occurs routinely in these forests, especially in areas where high water tables limit the downward extension of root systems. Fire is a rare phenomenon, and occurs only during prolonged droughts. Other than fluctuating water levels, site conditions are usually quite stable. In areas where dynamic conditions exist due to river migration, scouring and/or sediment deposition, this forest type is replaced by Eastern Riverfront Forests.

FOREST TYPE: Bottomland Hardwood Group

1. Desired Future Condition: These closed canopy forests exhibit a wide variety of hardwood species, including several oak species. Large hardwoods are common. Some large, old hardwood trees will develop heartrot with visible cavities and buttrot present. Trees with large broken branches or tops will be present. Loblolly pine may be a minor component with a few very large pine present in the overstory. Vertical structure is present in tolerant species in the understory and by more intolerant species in single or multiple tree fall gaps. The dominant overstory will appear closed except in recent tree fall gaps which quickly fill in from the sides and from below.

   a. Overstory: Large hardwood species dominate the overstory with diameters exceeding 26 inches DBH. Pine may be present in small numbers and may exceed 36 inches DBH. The canopy is closed except for recent mortality or tree falls. Due to differing ages, growth rates, and light tolerances, tree size varies.

   b. Midstory/understory: Midstory hardwoods are present in intermediate and suppressed trees, but are not particularly abundant due to the relative intolerance of many species. Periodic flooding may prevent the development of shade-tolerant trees and shrubs.

   c. Standing snags/down trees: Standing snags are present in small numbers since windfall is a common disturbance. Down timber in all stages of decay is present, but not abundant. There is no buildup of undecayed down material. The high temperature and humidity in east Texas prevents large build-ups of snags or down timber over large areas.

2. Disturbance regime: Single and multiple stem windfalls are the common disturbance regimes for these forests. The soil types and depth to the water table contribute to the frequent windfalls. These disturbances perpetuate the more common intolerant species.

24 - Xeric Pine and Pine-Oak Forests and Woodlands

FOREST TYPE REPRESENTED: Shortleaf Pine

Xeric pine and pine-oak forests and woodlands are found throughout most of the eastern United States: from southern Missouri to northeast Texas, eastward to the Atlantic coastline from southern Maine to South Carolina. These communities normally exist on sites with extreme moisture and nutrient deficiencies. Xeric site conditions may exist due to any number of reasons: (1) Low precipitation; (2) limited moisture absorption/retention (exposed bedrock, steep slopes, coarse-textured soils, shallow soils); and/or (3) elevated rates (southern exposures). Most pine and pine-oak forests and woodlands occur on ridgetops and south-facing, upper slopes in mountains or excessively-drained, sandy uplands on gentler terrain (e.g. Piedmont). Soils are normally quite acidic.

Principal species of these xerophytic communities include pitch pine (Pinus rigida Mill.), Virginia pine (P. virginiana Mill.), shortleaf pine (P. echinata Mill.), table mountain pine (P. pungens Lamb.), eastern white pine (P. strobus L.), and chestnut oak (Quercus prinus L.). Associate species are scarlet oak (Q. coccinea Muenchh.), black oak (Q. velutina Lam.), blackjack oak (Q. marilandica Muenchh.), post oak (Q. stellata Wang.), northern red oak (Q.rubra L.), southern red oak (Q. falcata Michx.), white oak (Q.alba L.), and pignut hickory (Carya glabra [Mill.] Sweet). Understories predominantly consist of ericaceous shrubs, and within its range bear oak (Q. ilicifolia Wang.).

Due to the prevailing xeric conditions, these forests and woodlands have historically experienced frequent fires. During the presettlement era, most fires were probably low intensity, surface burns, although occasional catastrophic canopy fires undoubtedly occurred in some stands. Periodic burns are more-or-less required by these early-successional forests for maintenance purposes, especially the pines (Pinus L.). Without fire, the pine component quickly becomes decadent, and over extended periods, increases in dead biomass can predispose these forests to catastrophic fire. However, even in the absence of fire, successional changes are normally quite restricted (possibly ending with oak domination) since most sites are very nutrient and moisture limiting.

FOREST TYPE: Shortleaf pine

1. Desired Future Condition: Old-growth xeric shortleaf pine forests are characterized by medium to large pine trees occupying a dominant overstory position with sparse to light density of midstory hardwoods. Many pine trees appear flat topped. Vertical structure is limited in the pine component, but some vertical structure may be provided by the hardwood component. The dominant overstory will appear somewhat open or even sparse on some sites. Denser stocking and main canopy closure may exist in patches due to the natural seeding pattern and random seedling escapes from fire mortality. A grass and forb understory, maintained by frequent fires, will be present in the open stands.

   a. Overstory: Shortleaf pine is the dominant overstory species with the largest trees reaching about 24 inches DBH. A few hardwood trees may occupy main crown positions, but not in abundance. Common overstory hardwoods are oak, blackgum, and hickory. The main canopy appears even-aged, but may actually represent two or more age classes. Hardwoods occupying main crown positions are older than the pines.

These forests were historically maintained by fire, and probably responded favorably to the large-scale disturbances (logging and subsequent fires) initiated by early European settlers. However, fire suppression during this century has allowed more shade tolerant species, such as red maple (Acer rubrum L.), to increase in understory frequency. In the absence of fire over extended periods, future shifts in composition seem inevitable. However, the actual direction of succession is obscure at this time since the rate of change of these forests is gradual due to the long life spans of the principal species. Indeed, fire is an integral part of these forests and is needed for their perpetuation.

FOREST TYPE: Loblolly Pine

1. Desired Future Condition: Old-growth loblolly pine forests are characterized by very large pine trees occupying a dominant overstory position with various densities of midstory hardwoods. Vertical structure is limited in the pine component, but is often provided by the hardwood component. The dominant overstory will appear somewhat open, but not to the extent of appearing sparse. Dense stocking and main canopy closure exists in patches due to the natural seeding pattern and random seedling escapes from fire mortality.

a. Overstory: Large loblolly pine is the dominant overstory species, often exceeding 30 inches DBH. Some shortleaf pine may also be present. Hardwood species occupying main crown positions may be present but will not exceed three per acre. Common overstory hardwoods are oak, blackgum, and sweetgum. The main canopy appears even-aged, but may actually represent two or more age classes. Hardwoods occupying main crown positions are usually older than the pines.

b. Midstory/understory: The structure of these forests exhibit two distinct features: the large, pine dominated overstory and a midstory of hardwoods of all size classes. There will be few pine trees in the midstory except in gaps created by overstory mortality. Oaks, hickory, and blackgum are common midstory species with all size classes represented. Midstory density is variable, depending on soil moisture and the fire regime. Understory conditions are also variable and may range from grass and forbs to dense brush and hardwood, depending on soil moisture, fire regime, and the amount of light reaching the forest floor (a function of midstory density). In the absence of fire, a dense midstory/understory will develop.

c. Standing snags/down trees: Standing snags are present, but are not abundant except in patches of pine recently killed by insect attack. Down timber in all stages of decay is present, but again not abundant except in patches. The high temperature and humidity in east Texas and the recurrent fires prevent large build-ups of snags or down timber over large areas.

2. Disturbance regime: Loblolly pine forests are maintained by large scale disturbances such as wind, insect attack, and fire. The interval between major disturbances may be 150 years or more. Fire is a recurrent agent during intervals between major disturbances. Loblolly pine produce abundant seed nearly every year and seedling growth is rapid. The overwhelming number of seedlings assures that enough seedlings survive period fires and competition to restock the stand. Under favorable light conditions, the loblolly seedlings develop and outgrow competing hardwoods and assume a dominant crown position.

FOREST TYPE: Shortleaf pine

1. Desired Future Condition: Old-growth dry and dry-mesic shortleaf pine forests are characterized by large pine trees occupying a dominant overstory position with light to medium density of midstory hardwoods. Many pine trees appear flat topped. Vertical structure is limited in the pine component, but is often provided by the hardwood component. The dominant overstory may appear somewhat open on some sites. Dense stocking and main canopy closure exists in patches due to the natural seeding pattern and random seedling escapes from fire mortality. A grass understory, maintained by frequent fires, will be present on the drier sites.

   a. Overstory: Large shortleaf pine is the dominant overstory species, often exceeding 28 inches DBH. Some loblolly pine may also be present. Hardwood species occupying main crown positions may be present, but will not exceed three per acre. Common overstory hardwoods are oak, blackgum, hickory, and sweetgum. The main canopy appears even-aged, but may actually represent two or more age classes. Hardwoods occupying main crown positions are usually older than the pines.

   b. Midstory/understory: There will be few pine trees in the midstory except in gaps created by overstory mortality. Oaks, hickory, and blackgum are common midstory hardwood species with all size classes represented. Midstory density is variable, depending primarily on the fire regime. Understory conditions are also variable and may range from grass and forbs to abundant brush and hardwood, depending on the fire regime and the amount of light reaching the forest floor (a function of the overstory and midstory density). In the absence of fire a midstory/understory will develop while frequent fires lead to a more open, grassy understory.

   c. Standing snags/down trees: Standing snag are present, but are not abundant except in patches of pine recently killed by insect attack. Down timber in all stages of decay is present, but again not abundant except in patches. The high temperature and humidity in east Texas and the recurrent fires prevent large build-ups of snags or down timber over large areas.

2. Disturbance regime: Shortleaf pine forests are maintained by large scale disturbances such as wind, insect attack, and fire. The interval between major disturbances may be 200 years or more. Fire is a recurrent agent during intervals between major disturbances. The ability of shortleaf pine seedlings to resprout after fire topkill aids in surviving repeated fires. This ability allows enough shortleaf seedlings, over time, to become establish under frequent fire return intervals. Under favorable light conditions, the shortleaf seedlings develop and outgrow competing hardwoods and assume a dominant crown position.

FOREST TYPE: Mixed Forest (Pine-Hardwood and Hardwood-Pine)

1. Desired Future Condition: Old-growth mixed forests are characterized by large pine and hardwood trees occupying a dominant overstory position with various densities of midstory hardwoods. While the main canopy dominates the site, some vertical structure is often provided by the hardwood component. The main canopy will appear closed or nearly so.

   a. Overstory: Both hardwood and pine are dominant overstory species, with trees exceeding 26 inches DBH. Pine may be either loblolly or shortleaf, or both. Common overstory hardwoods are oak, blackgum, hickory, and sweetgum. The main canopy appears even-age, but may actually represent two or more age classes.

b. Midstory/understory: Oaks, hickory, and blackgum are common midstory species with all size classes represented. There will be few pine trees in the midstory except in gaps created by overstory mortality. Midstory density is variable, depending on soil moisture and the fire regime. A light to medium density understory of shrubs and hardwoods is present, depending on soil moisture and the fire regime. Periodic fires control the understory.

c. Standing snags/down trees: Standing snags are present in moderate numbers and include both pine and hardwoods. Down timber in all stages of decay is present in moderate amounts. The high temperature and humidity in east Texas and the recurrent fires prevent large build-ups of snags or down timber over large areas.

2. Disturbance regime: Mixed forests are maintained by large scale disturbances such as wind, insect attack, and fire. The interval between major disturbances may be 200 years or more. Fire is a recurrent agent during intervals between major disturbances. Pine occurs in greater proportions in early development, but yield to hardwoods during later stages of succession.

26 - Upland Longleaf Pine Forests, Woodlands, and Savannas

FOREST TYPE REPRESENTED: Longleaf Pine

Upland longleaf pine forests, woodlands, and savannas are found from Virginia south to Florida and west to east Texas. On the Coastal Plain, these communities typically reside on sandhills, although in central and south Florida some occur on slight rises in flatwoods. In the mountains, most are restricted to sites which are most apt to burn, specifically ridge tops and middle and upper slopes with south and southwest exposures. In presettlement times, these forests covered a vast area, and were found on many different soil types. However, most of the better sites have been converted to agriculture and present-day forests are largely restricted to infertile, acidic and coarse-textured soils. Some forests still occupy richer sites, particularly on the Coastal Plain. Soils usually are well-or excessively-drained depending on topographic location and soil texture. Along the coast, communities develop on sands of marine origin.

The composition of these forests, woodlands and savannas differ widely due to differences in topography and climate. As its name indicates, the dominant species are longleaf pine (Pinus palustris Mill.) and South Florida slash pine (P. elliottii var. densa Little & Dorman). Loblolly pine (P. taeda L.), shortleaf pine (P. echinata Mill.), slash pine (P. elliottii Engelm.), sand pine (P. clausa [Chapm. ex' Engelm.] Vasey & Sar.), turkey oak (Quercus laevis Walt.), bluejack oak (Q. incana Bartr.), blackjack oak (Q. marilandica Muenchh.), sand post oak (Q. margaretta Ashe), post oak (Q. stellata Wang.) and sand live oak (Q. geminata Small) are common associates. Tree density is largely dictated by soil moisture, with density increasing from dry to mesic conditions. This forest type group is considered a pyroclimax. In the absence of fire, longleaf and South Florida slash pine communities will likely convert to other forest types comprised of fire-sensitive/shade tolerant species, particularly on mesic sites.

FOREST TYPE: Longleaf Pine

1. Desired Future Condition: Old-growth longleaf pine forests are characterized by open stands of nearly pure longleaf pine with an open, grassy understory. Tree size will be variable but older trees dominate. Longleaf trees over 100 years old will often appear flat topped. Intermingled within the predominantly older trees may be patches of younger growth which will occupy less than 25 percent of the area. Hardwoods will be largely absent, occurring as scattered individuals or clumps. Hardwoods that are present will usually be small. A grassy understory, maintained by frequent fires, will be present.

a. Overstory: Large longleaf pine is the dominant overstory species, often exceeding 28 inches DBH. Occasional loblolly or shortleaf pine may be present. Hardwood species occupying main crown positions are uncommon. The dominant overstory will appear open but will contain both sparsely and densely stocked patches. Diameters of trees occupying main crown positions will be highly variable.

b. Midstory/understory: The longleaf type is characterized by a very open midstory and understory. Midstory and understory hardwoods are generally absent except for scattered individuals, small patches, or along ephemeral and intermittent streams where increased moisture provides some protection from repeated fires. Blackjack and post oaks are the most common hardwood associates. The fire resistance of longleaf seedlings and saplings allow them to become establish in openings in the main canopy. However, longleaf is intolerant to shade and the seedlings will grow and develop only in openings of sufficient size to meet its solar radiation requirements. In these larger openings, longleaf regeneration will develop in even-age patches within the older tree component. The understory, very diverse in species composition, is dominated by grasses and forbs.

c. Standing snags/down trees: Standing snags are present, but are not overly abundant. Down timber in all stages of decay is present, but again not abundant except in patches. The high temperature and humidity in east Texas and the recurrent fires prevent large build-ups of snags or down timber over large areas.

2. Disturbance regime: Longleaf pine forests are maintained both by large scale disturbances, primarily wind, and by small scale disturbances. Intervals between major disturbances are variable with a more frequent return interval in coastal areas subject to strong hurricane winds. Small scale disrurbances are primarily wind and lightning caused. Fire is a frequent agent during intervals between disturbances. The ability of longleaf pine seedlings to survive fire allows the species to become established under frequent fire return intervals which prevent establishment of other tree species. Under favorable light conditions, the longleaf seedlings develop and grow in even-age patches or stands.

41 - Bay (Gordonia-Magnolia-Persea) Forests

FOREST TYPE REPRESENTED: Sweetbay-Swamp Tupelo-Red Maple

Bay forests occur exclusively in the Coastal Plain Physiographic Province, and range from Maryland to southeast Texas. These forests are restricted to coastal depression or floodplains where saturated conditions prevail. Soils usually are organic, although mineral soils do occur in floodplains. Most are highly acidic and low in nutrient availability. Surface flooding is common, but usually is not persistent.

In addition to loblolly bay (Gordonia lasianthus), sweet bay (Magnolia virginiana) and redbay (Persea borbonia), common species include swamp tupelo (Nyssa biflora), sweetgum (Liquidambar styraciflua), red maple (Acer rubrum), slash pine (Pinus elliottii), pond pine (P. serotina), live oak (Q. virginiana), baldcypress (Taxodium distichum), pondcypress (T. ascendens) and atlantic white cedar (Chamaecyparis thoides). Hydric conditions retard the invasion by flood-sensitive species and consequent succession to other forest types. Disturbances from fire and storm events play an important role in the ecological development of these systems. This forest type frequently reverts to Atlantic white cedar or pond pine forests (forest types #40 and #29, respectively) after catastrophic fires.

FOREST TYPE: Sweetbay, Swamp Tupelo, and Red Maple

1. Desired Future Condition: Old-growth "bay galls" may be indistinguishable from younger bay galls. Overstory trees will be small to medium size and generally not dense. Broken limbs and tops are apparent in overstory trees. The midstory is dense and includes numerous shrub species.

a. Overstory: Sweetbay magnolia, swamp blackgum, and red bay are the predominate overstory species. All sizes may be present.

b. Midstory/understory: Midstory species are variable with numerous shrub species. Various ferns, forbs, and sedges are present on the understory.

c. Standing snags/down trees: Standing snag are present, but are not abundant. Down woody debris in all stages of decay is present in various amounts, depending upon site conditions. The high temperature and humidity in east Texas prevent large build-ups of snags or down timber over large areas.

2. Disturbance regime: Disturbance regimes are primarily wind and fire. Bay galls are usually wet enough to escape the frequent fires from the surrounding uplands. However, fires during drought conditions do enter bay galls with catastrophic results. Windthrow and breakage are other common disturbances.

EXHIBIT 1

06. COASTAL PLAIN UPLAND MESIC HARDWOOD FORESTS

SAF Forest Cover Types:
- 53 - white oak
- 82 - loblolly pine-hardwood
- 89 - live oak (in part; mesic salt domes)

R-8 CISC Forest Type:
- 53 - white oak-northern red oak-hickory
- 54 - white oak
- 69 - beech-magnolia
- 13 - loblolly pine-hardwood

Representative Old-Growth Stands:
- Clear Branch Area, Angelina NF, TX
- Mill Creek Beech-Magnolia Forest, Sabine NF, TX

13. RIVER FLOODPLAIN HARDWOOD FORESTS

SAF Forest Cover Types:
- 65 - pin oak-sweetgum
- 82 - loblolly pine-hardwood
- 87 - sweetgum-yellow poplar
- 88 - willow oak-water oak-diamondleaf (laurel) oak
- 91 - swamp chestnut oak-cherrybark oak
- 92 - sweetgum-willow oak
- 93 - sugarberry-American elm-green ash
- 94 - sycamore-sweetgum-American elm (in part)
- 96 - overcup oak-water hickory
- 108- red maple (in part)

R-8 CISC Forest Type:
- 46- bottomland hardwood-yellow pine
- 61- swamp chestnut oak-cherrybark oak
- 62- sweet gum-Nuttall oak-willow
- 63- sugarberry-American elm-green ash
- 64- laurel oak-willow oak

Representative Old-Growth Stands:
- Grassy Lake Natural National Landmark, Hempstead Co., AR
- Moro Creek Bottoms Preserve, south-central AR
- Coochie Brake, Winn Parish, LA
- Zemurray's, along Little Chappapeela River, Tangipahoa Parish, LA
- Green Ash Research Natural Area, Delta NF, MS
- Morgan Brake National Wildlife Reguge, MS
- Overcup Oak Research Natural Area, Delta NF, MS
- Red Gum Research Natural Area, Delta NF, MS

24. XERIC PINE & PINE-OAK FORESTS & WOODLANDS

SAF Forest Cover Types:
- 43 - bear oak (in part)
- 45 - pitch pine (in part)
- 51 - white pine-chestnut oak (in part)
- 75 - shortleaf pine
- 76 - shortleaf pine-oak
- 78 - Virginia pine-oak
- 79 - Virginia pine

R-8 CISC Forest Type:
- 31 - loblolly pine
- 32 - shortleaf pine
- 12 - shortleaf pine-oak
- 44 - southern red oak-yellow pine
- 47 - white oak-black oak-yellow pine

Representative Old-Growth Stands:
- Hot Springs National Park, AR
- Lake Winona Acenic Area, Ouachita NF, AR
- Magazine Mountain, Logan Co., AR
- Roaring Branch Research Natural Area, Polk County, AR
- Torreya State Park, Liberty Co., FL
- Marshall Forest Preserve, near Rome, GA
- Ack Tract, along the Piney River, Texas Co., MO
- Meramec Upland Forest Natural Area, Meramec State Park, MO
- Mudlick Mountain Nat. Area, Sam A. Baker State Park, MO

25. DRY AND DRY-MESIC OAK-PINE FORESTS

SAF Forest Cover Types:
- 51 - white pine-chestnut oak
- 75 - shortleaf pine
- 76 - shortleaf pine-oak
- 78 - Virginia pine-oak
- 79 - Virginia pine
- 80 - loblolly pine-shortleaf pine
- 81 - loblolly pine
- 82 - loblolly pine-hardwood

R-8 CISC Forest Type:
- 31 - loblolly pine
- 32 - shortleaf pine
- 12 - shortleaf pine-oak
- 13 - loblolly pine-hardwood
- 44 - southern red oak-yellow pine
- 47 - white oak-black oak-yellow pine

Representative Old-Growth Forests:
- Hot Springs National Park, AR
- Lake Winona Scenic Area, Ouachita NF, AR
- Magazine Mountain, Logan Co., AR
- Roaring Branch Research Natural Area, Ouachita NF, AR
- Lennox Woods Preserve, Red River Co., TX

26. UPLAND LONGLEAF AND SOUTH FLORIDA SLASH PINE FORESTS, WOODLANDS, AND SAVANNAS

SAF Forest Cover Types:
- 70 - longleaf pine
- 71 - longleaf pine-scrub oak
- 83 - longleaf pine-slash pine
- 111 - South Florida slash pine

R-8 CISC Forest Type:
- 21 - longleaf pine

Representative Old-Growth Stands:Fontainebleau State Park Site, LA
Fort Polk Military Reservation, LA
Boykin Springs Management Area, Angelina NF, TX
Longleaf Pine Roadside Park, between Hemphill and Pineland, TX

41. BAY (Gordonia-Magnolia-Persea) FORESTS

SAF Forest Cover Types:
- 85 - slash pine-hardwood
- 104 - sweet bay-swamp tupelo-redbay

R-8 CISC Forest Type:
- 68 - sweetbay-swamp tupelo-red maple

Representative Old-Growth Stands:
- None identified

EXHIBIT 2

Comparison of R8 Guidance with NFGT Forest Plan Revision Process

The R8 Report was reviewed to compare the completed forest plan revision process with the guidance contained in the R8 Report. This review determined that the forest plan revision was very consistent with the R8 Report guidance although there were some differences. The review also identified some areas where additional guidance is needed to supplement the Forest Plan direction. The additional guidance the NFGT will follow is incorporated into this supplement of Appendix I. The additional guidance does not modify existing Forest Plan direction, but supplements it. The following section compares the R8 Report and the Forest Plan.

Incorporating Old Growth Into Forest Plan Revisions, beginning on page 7, R8 Report:

Terminology: The R8 Report, pages 7-8, identifies only 3 terms to describe old growth while the Revised Plan defines 5 terms. Their relationships are:

R8 Report	Corresponding Forest Plan Term
Existing old growth	Old growth Designated old growth
Future old growth	Future old growth Restored old growth
Possible old growth	Potential old growth

Some of the Forest Plan terms include management options and will continue to be used.

Preliminary Inventory: The R8 Report, pages 8-11, provides guidance for conducting a preliminary inventory to analyze the distribution and representation of possible old growth communities. A preliminary inventory was done by the NFGT during the revision process. Criteria from the R8 Report and comparison with the NFGT inventory are:

R8 Report	Forest Plan Inventory
Refine CISC/old growth relationship	Done. Exhibit 1, Appendix I.
Include identified old growth	None identified prior to revision
Include allocated old growth	None allocated prior to revision
Identify possible old growth Use old growth minimum age from Table 1, R8 Report	Identified from CISC Used 95 years, which is less than any minimum age from Table 1, R8 Report
Display spatially and tabular	Tabular completed, but not entirely mapped
Use to develop alternatives	Not used in developing alternatives
Make public	Available to the public, but not published

The NFGT inventory was conducted very closely to the R8 Report guidance although there were significant differences with the use made of the inventory. The inventory served the intended purpose for forest planning and is available to the Ranger Districts for project level planning. Additional guidance on use of the inventory during project level planning is included under the Old Growth Inventories and Project Level Planning sections of this supplemented appendix.

Determining Forest-wide Old-Growth Issues: This section of the R8 Report, pages 11-14, addresses public scoping and the biological and social values of old growth forests. These items were adequately addressed in the FEIS and Appendix I and are consistent with the R8 Report.

Developing Directions for Old Growth in Forest Plans: The R8 Report, pages 14-22, provides guidance for management area goals and objectives, management area allocations, management area standards and guidelines, management prescriptions, and monitoring. Criteria from the R8 Report and comparison with the NFGT process are:

R8 Report	Revised Forest Plan Process
Include old growth in DFC's	Included in management area DFC's and Standards & Guidelines
Quantify old growth in DFC's, objectives, and standards	Quantified only on entire MA basis
Map old growth allocations	Old growth not mapped
Identify by old growth community types	Community types not identified in MA's
Classify suitability	Done
Consider all old growth types	Done
Distribution across various ecological sections	Old growth distribution crosses all eco-sections on NF in Texas
Specify old growth management prescriptions	Limited management options in the old growth definitions
Forest plan monitoring	Provided
Provide old growth in different size areas	Large (optional) and medium areas provided but not specifically identified as such
Provide for small-sized areas	Provided only in Texas Natural Heritage Report (TNHR) areas

The R8 Report provides guidance on small-sized old growth areas which are to be implemented through project-level decisions. Small-sized old growth areas are generally between 1-99 acres in size and are stands which: (1) are existing old growth, or (2) have been identified in the forest plan as being an under-represented old growth community type or which normally occurs in small, isolated patches. Small sized areas are addressed elsewhere in this Appendix.

Implementing Directions in Forest Plans, beginning on page 23, R8 Report: Much of this section of the R8 Report is procedural guidance, except the operational definitions of old growth.

Field Inventory of Old-Growth Forest: This section of the R8 Report, pages 23-26, provides the operational old-growth definitions and guidance on use of them. This information was not available when the forest plan was implemented, but is not inconsistent with the forest plan. It supplements the generic definitions used in the forest plan and is further addressed elsewhere in this appendix.

The Old-Growth Forest Community Types of the Southeast, beginning on page 31, R8 Report. The R8 Report provides operational definitions for 16 old growth community types. Twelve of the 16 are shown to have potential distribution on the NFGT. The forest plan identifies 6 old growth community types, one of which is not contained in the R8 Report. The following section examines the 7 old growth community types that are not identified in the Forest Plan but which the R8 Report shows as potentially existing on the forest:

Type #	Community Type Name	Description and NF in Texas Occurrence
29	Southern wet pine forest	Longleaf pine flatwoods forests on mineral soils where flooding is limited. Fire dependent. Not known to exist on NF Texas.
10	Hardwood wetland forests	Only sweetbay-swamp tupelo-red maple forest type is represented in Texas. Forest Plan has this type in community type 41, bay forests, which is more appropriate. Type 41 is not included in the R8 Report.
14	Cypress-tupelo swamp	Includes baldcypress, baldcypress-water tupelo, and sweetbay-swamp tupelo-red maple forest types. Occurrence in very limited amounts in MA-4 which is already allocated to potential old growth.
27	Seasonally wet oak-hardwood woodlands	Commonly known as oak glades or flatwoods. Relative open understories. Occurs on river bottomlands and isolated depressions that are seasonally flooded for short periods. Seasonally dry and subject to low-intensity fires. White oak, sweetgum-nuttal oak-willow oak, and laurel oak-willow oak forest types. May occur on Sam Houston and part of Sabine.
28	Eastern riverfront forests	Occurs on sites immediately adjacent to major rivers and streams (river banks and first bottoms, sandbars, islands). River birch, sycamore, silver maple, elm, cottonwood, willow, etc. Subject to intense flooding. Occurs in MA-4
21	Dry-mesic oak forests	Represented by post oak-black oak and white oak-red oak-hickory (in part) forest types. Can have up to 25% pine, usually shortleaf. Probably occurs in small quantities.

22	Dry-xeric oak forests	Very dry and infertile uplands. Post oak-blackjack, scrub oak, and oak barrens. May be small statured trees. Often associated with longleaf pine communities. Known to occur in MA-6 in 3 TNHR sites and may occur on Sabine or Davy Crockett. May also occur as small pockets associated with longleaf pine.

Five of the above community types are wetland communities. Type 29 does not exist on the NFGT. Type 10, the hardwood wetland forests, exist as only one forest type which is more appropriately included in community type 41, bay forests, in the Forest Plan. Occurrences of the other 3 wetland types is not extensive, but may occur in small areas within MA-4. Type 27, seasonally wet oak-hardwood woodlands, may occur as depressions outside MA-4.

Of the 2 upland communities, type 22, dry-xeric oak forests, exist in TNHR sites in MA-6 and may also occur on the Sabine or Davy Crockett. Dry-xeric oak forests may also occur as small patches in longleaf or possibly shortleaf pine stands on very dry and infertile uplands. The TNHR sites are managed for their unique character and may be allocated to old growth (MA-6-01).

The other upland community, type 21, dry-mesic oak forests, does occur in a few stand-size areas. This type can have up to 25% pine. It is probable that this type will increase as some mixed pine-hardwood stands are managed for hardwood or hardwood-pine on upland sites. The closest community represented in the revised plan is type 25, dry and dry-mesic oak-pine forests. These two types may occur on the same sites with the difference being the disturbance regime and the amount of pine present.

Table 1. Number and Percentage of all Potential Old Growth Acres by Forest Type.

Group	Total Acres by Forest Type	Potential Old-Growth Acres[1]	% of Total Forest Type
25. Dry & Dry-Mesic Oak-Pine Forests			
31- loblolly pine	334,419	33,717	10
32- shortleaf pine	160,628	6,728	4
12- shortleaf pine-oak	2,798	2,070	74
13- loblolly pine-hardwood	15,989	5,494	34
44- southern red oak-yellow pine	874	398	46
47- white oak-black oak-yellow pine	1,426	185	13
26. Upland Longleaf and South Florida Slash Pine Forests, Woodlands, and Savannas			
21- longleaf pine (includes slash)	31,748	4,452	14
06. Coastal Plain Upland Mesic Hardwood Forests			
53- white oak-northern red oak-hickory	17,394	5,511	32
69- beech-magnolia	307	307	100
13. River Floodplain Hardwood Forests			
46- bottomland hardwood-yellow pine	7,394	2,383	32
61- swamp chestnut oak-cherrybark oak	11,276	7,820	69
62- sweet gum-Nuttal oak-willow	17,148	10,732	63
63- sugarberry-American elm-green ash	1,529	256	17
64- laurel oak-willow oak	1,996	1,064	53
41. Bay (Gordonia-Magnolia-Persea) Forests			
68- sweetbay-swamp tupelo-red maple	760	207	27

[1]Acres of forest type classified in "unsuitable for timber production" land base.

Table 2. Stands 95 Years and Older by Forest Type, from 1991 CISC Data

Forest Type	Acres
Dry and Dry Mesic Oak-Pine	
Loblolly pine	6,720
Shortleaf pine	12,100
Shortleaf pine - oak	32
Loblolly pine - hardwood	786
White oak - black oak - yellow pine	103
Post oak - black oak	62
Upland Longleaf	
Longleaf pine	165
Coastal Plain Upland Mesic Hardwood	
White oak - northern red oak - hickory	393
Beech - magnolia	123
River Floodplain Hardwood	
Bottomland hardwood - yellow pine	679
Swamp chestnut oak - cherrybark oak	1,502
Sweetgum - Nuttal oak - willow	4,421
Laurel oak - willow oak	202
Bay	
Sweetbay - swamp tupelo - red maple	37
Total	27,325

Table 3. Acres of 95 Year and Older Forest by Forest, Forest Type, and Suitability for Timber Production, from 1991 CISC Data

Forest and Forest Type	Acres Suitable	Unsuitable	Total
Angelina National Forest	3,536	1,707	5,243
Loblolly pine	538		538
Shortleaf pine	716		716
Longleaf pine	94	71	165
Loblolly pine - hardwood	233		233
Bottomland hardwood - pine	435	48	483
White oak - northern red oak - hickory	319	25	344
Swamp chestnut oak - cherrybark oak	632	135	767
Sweetgum - Nuttal oak - willow	569	1,428	1,997
Davy Crockett National Forest	**6,346**	**2,164**	**8,510**
Loblolly pine	3,169	179	3,348
Shortleaf pine	2,597	227	2,824
Loblolly pine - hardwood	50		50
Shortleaf pine - oak		32	32
Bottomland hardwood - pine	103		103
White oak - black oak - pine	103		103
Swamp chestnut oak - cherrybark oak		404	404
Sweetgum - Nuttal oak - willow	324	1,322	1,646
Sam Houston National Forest	**2,509**	**533**	**3,062**
Loblolly pine	469	234	703
Shortleaf pine	877	65	942
Loblolly pine - hardwood	12		12
Post oak - black oak	62		62
White oak - northern red oak - hickory	23		23
Swamp chestnut oak - cherrybark oak	331		331
Sweetgum - Nuttal oak - willow	550	200	750
Laurel oak - willow oak	148	54	202
Sweetbay - swamp tupelo	37		37
Sabine National Forest	**9,310**	**1,200**	**10,510**
Loblolly pine	1,834	297	2,131
Shortleaf pine	6,948	670	7,618
Loblolly pine - hardwood	479	12	491
Bottomland hardwood - pine		93	93
White oak - northern red oak - hickory	21	5	26
Sweetgum - Nuttal oak - willow	28		28
Beech - magnolia		123	123

Table 4. The operational definitions* to determine old growth forest community types during the field inventory and monitoring on the National Forests in Texas.

Old growth forest community type	Minimum age of the oldest existing age class	Minimum basal area	D.B.H. of largest trees
	Years	Sq.ft./acre	Inches
06 -Coastal plain upland mesic hardwood forest	120**	40	>=24
41 -Bay forest (from Type 10 -Hardwood wetland forest in R8 Report)	120**	40	>=20
13 -River floodplain hardwood forest	100	40	>=16
14 -Cypress-tupelo swamp forest	200	40	>=30
21 -Dry-mesic oak forest	130**	40	>=20
22 -Dry and xeric oak forest, woodland, and savanna	110*** 90***	10 10	>=16 >= 8
24 -Xeric pine and pine-oak forest and woodland	Shortleaf - 100 Mixed - 100	30 20	>=20 >=10
25 -Dry and dry-mesic oak-pine forest	120**	40	>=19
26 -Upland longleaf pine forest, woodland, and savanna	110	10	>=16
27 -Seasonally wet oak-hardwood woodland	100**	40	>=20
28 -Eastern riverfront forest	100**	40	>=25

*The disturbance criteria is discussed in the narrative section.

**Based on half life of dominant tree species.

***Widespread subtype - 110 years, southern subtype - 90 years.

- Widespread subtype includes black oak (Quercus velutina), post oak (Q. stellata), blackjack oak (Q. marilandica), and white oak (Q. alba).
- Southern subtype may be associated with the longleaf pine community or oak barrens. Trees are usually small-statured and include turkey oak (Q. laevis), bluejack oak (Q. incana), and sand post oak (Q. margaretta).