UNITED STATES DEPARTMENT OF AGRICULTURE

FARM SERVICE AGENCY

Programmatic Environmental Assessment for the Emergency Forestry Conservation Reserve Program

USDA Farm Service Agency

COVER SHEET

Proposed Action: The U.S. Department of Agriculture, Commodity Credit Corporation (USDA/CCC) has agreed to implement the Emergency Forestry Conservation Reserve Program (EFCRP), a component of the Conservation Reserve Program (CRP). The program proposes to provide assistance to owners or operators of nonindustrial forest land who experienced a loss of 35 percent or more of merchantable timber in a designated county affected by hurricanes during the 2005 calendar year.

The EFCRP was authorized by Section 107 of Division B, Title I, of the Department of Defense Appropriations Act of 2006, H.R. 2863, signed by the President on December 30, 2005. The program will apply to the States of Alabama, Florida, Louisiana, Mississippi, North Carolina, and Texas.

Type of Statement: This Final PEA was prepared in accordance with the USDA, FSA National Environmental Policy Act Implementation Procedures found in 7 CFR 799, the Council on Environmental Quality implementing regulations at 40 CFR Parts 1500 – 1508, and the National Environmental Policy Act of 1969, Public Law 91-190, 42 U.S.C. 4321-4347, 1 January 1970, as amended. A Notice of Availability is being published in the Federal Register concurrent with this Final PEA.

Lead Agency: U.S. Department of Agriculture, Farm Service Agency

Further Information: For further information, please see the Comments Section below.

Comments: Any written comments regarding this document may be submitted to:

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EXECUTIVE SUMMARY

Purpose of and Need for the Programmatic Environmental Assessment

The preparation of this programmatic environmental assessment meets the requirements of the National Environmental Policy Act, Council on Environmental Quality Regulations section 1502.4: Major Federal actions requiring the preparation of Environmental Impact Statements, and 7 CFR Part 799: Environmental Quality and Related Environmental Concerns—Compliance with NEPA.

Farm Service Agency has a framework in place to ensure NEPA compliance at the field level, where a site-specific environmental review will take place prior to implementing an approved Emergency Forestry Conservation Reserve Program contract. The review will consist of completing a site specific environmental review, which may require consultation with applicable governmental agencies.

A programmatic environmental assessment allows Farm Service Agency to reduce paperwork (40 CFR §1500.4) and identify potential site-specific impacts at a State and ecoregion level. Farm Service Agency plans to use this programmatic environmental assessment to address similar actions in the implementation of this program and to tier off of this document for site-specific implementation of the program whenever NEPA analysis is required.

Purpose and Need for the Proposed Action

During the course of the 2005 hurricane season, one of the worst on record, five hurricanes made landfall on the United States: Dennis (Florida panhandle and southern Alabama), Katrina (Louisiana, Mississippi, and Alabama), Ophelia (North Carolina coast), Rita (Louisiana and eastern Texas), and Wilma (southern Florida). Each of these caused damage to infrastructure, homes, personal property, and agricultural resources, including privately owned forests.

The purpose of Emergency Forestry Conservation Reserve Program is to provide cost-share assistance for cleanup and replanting for those owners or operators of non-industrial forest land and school trust land who experienced a loss of 35 percent or more of merchantable timber directly related to hurricanes Katrina, Ophelia, Rita, Dennis, and Wilma during the 2005 calendar year.

The need for the Emergency Forestry Conservation Reserve Program stems from the severe damage caused by the hurricanes during 2005. Non-industrial private forestry in the southeastern United States provides a large majority of the nation's wood and paper product needs.

Description of Alternatives

The alternatives that will be discussed in this programmatic environmental assessment include two possible actions: Alternative A (No Action) and Alternative B (Preferred Action)—Implement the EFCRP. No other alternatives are being developed at this time.

Alternative A (No Action)

Under this alternative, the program and associated conservation practices would not be implemented, including improving wildlife habitat, preventing soil erosion, and improving water quality (section 107(F) of Division B, Title I of HR 2863). No 10-year contracts would be in place to effectively replace the forest in a way that is environmentally and economically beneficial.

Current management plans would continue to guide management of the project areas. However, there would be no targeted program specifically for the recovery of non-industrial private forestland and school trust lands from the hurricane damage incurred during 2005.

Removal of trees damaged from the hurricanes would occur under other Federal and State programs, including removal needed to protect public safety along roads and trails. Hazardous fuel loadings would remain and increase. Insect damage would increase and likely spread to surrounding healthy trees.

Hazardous conditions would persist and worsen for those workers engaged in wildfire suppression and prescribed burning operations.

The No Action alternative would result in the loss of timber volume offered for wood processing as the damaged mature trees are recycled by wildfire, or death and decay. There would be an economic loss of receipts and a loss of opportunity to provide related jobs and income into those local economies devastated by the hurricanes.

Alternative B (Preferred Action) — Implement EFCRP Based on Amount of Loss and Environmental Benefits Provided

Implementation of the Preferred Action is to provide cost-share assistance for cleanup and replanting for owners or operators of non-industrial private forest land (including school trust lands) who experienced a loss of 35 percent or more of merchantable timber directly related to hurricanes Katrina, Ophelia, Rita, Dennis, and Wilma during the 2005 calendar year.

Producers will be provided financial assistance for the following nine eligible conservation practices: CP 35A and CP 35B New and Existing Longleaf Pine, CP 35C and CP 35D New and Existing Bottomland Hardwood, CP 35E and CP 35F New and Existing Softwood, CP 35G and CP 35H New and Existing Upland Hardwood, and Mixed Existing, CP35I .

Each EFCRP contract would have a conservation plan developed by a professional forester. There would be a status review by FSA on each contract until the CP is established.

A summary comparison of the two alternatives can be found in Section 2.5 of the programmatic environmental assessment.

How to Read this Programmatic Environmental Assessment

This programmatic environmental assessment is organized into 10 chapters:

Chapter 1: Introduction is an introductory chapter that discusses the program, background, regulatory framework, and permits, licenses, and entitlements necessary to implement the proposed action.

Chapter 2: Alternatives Including the Proposed Action describes the preferred action and the No Action. These alternatives are compared in summary tables in terms of their individual environmental impacts. The geographic and temporal boundaries of the proposed action are defined, and resources eliminated from consideration are described.

Chapter 3: Affected Environment provides a description of each resource and identifies specific resources in the six States that may be affected. The resources most likely to receive impacts from the alternatives include:

- Biological resources (including wildlife and fisheries, vegetation, and protected species and habitat)
- Cultural resources (including archaeological resources, architectural resources, and traditional cultural resources)
- Water resources (including surface water, groundwater, sole source aquifers, coastal zones, wetlands and floodplains)
- Soil resources
- Air and noise
- Recreation
- Human health and safety
- Socioeconomics
- Environmental Justice

A description of each resource is followed by a discussion of the affected environment.

Chapter 4: Environmental Consequences provides a discussion of the environmental consequences of the proposed action on the resources described in Chapter 3, including the level of impact, and the effects of each alternative.

Chapter 5: Cumulative Effects describes the cumulative effects of the proposed action. Following a brief introduction of cumulative effects, past, present, and reasonably foreseeable actions are presented. The cumulative effects of the proposed action are summarized in a cumulative effects matrix.

Chapter 6: List of Preparers lists individuals who assisted in the preparation of this PEA.

Chapter 7: Persons and Agencies Contacted lists all agencies, agency personnel, and other experts who participated in supplying data for the PEA.

Chapter 8: Glossary

Chapter 9: References

How the Programmatic Environmental Assessment was Prepared

The best available information was used in the development of this document with the majority of information being obtained from State and Federal agency reports. The majority of these reports came from the following agencies:

- U.S. Census Bureau
- U.S. Fish and Wildlife Service
- U.S. Environmental Protection Agency
- USDA, Farm Service Agency
- U.S. Geologic Survey
- Alabama Department of Conservation and Natural Resources
- Alabama Department of Environmental Management
- Alabama Forestry Commission
- Federal Emergency Management Agency
- Florida Coastal Management Program
- Florida Department of Environmental Protection
- Florida Natural Areas Inventory
- Louisiana Department of Wildlife and Fisheries
- Louisiana Natural Heritage Program
- Mississippi Department of Marine Resources
- Mississippi Department of Wildlife, Fisheries, and Parks
- Mississippi Natural Heritage Inventory
- NOAA, National Marine Fisheries Service
- North Carolina Division of Coastal Management
- North Carolina Natural Heritage Program
- North Carolina Wildlife Resources Commission
- Texas Conservation Data Center
- Texas Coastal Management Program

Public Comments

A Notice of Availability was published in the Federal Register concurrent with the Final PEA. Please submit written comments concerning this PEA to:

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ACRONYMS AND ABBREVIATIONS

ACAMP	Alabama Coastal Area Management Program
ADCNR	Alabama Department of Conservation and Natural Resources
ADEM	Alabama Department of Environmental Management
AEC	Areas of Environmental Concern
AFC	Alabama Forestry Commission
AHNP	Alabama Natural Heritage Program
BA	Biological Assessment
BMPs	Best Management Practices
BO	Biological Opinion
CAA	Clean Air Act
CBRA	Coastal Barrier Resources Act
CCC	Commodity Credit Corporation
CEQ	Council on Environmental Quality Regulations
CFR	Code of Federal Regulations
CO_2	Carbon Dioxide
COC	County Office Committee
CP	Conservation Practice
CRMP	Comprehensive Resource Management Plan
CRP	Conservation Reserve Program
CTS	Cooperating Technical State
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
EA	Environmental Assessment
ECP	Emergency Conservation Program
EE	Environmental Evaluation
EFCRP	Emergency Forestry Conservation Reserve Program
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EWP	Emergency Watershed Program
FCMP	Florida Coastal Management Program
FDEP	Florida Department of Environmental Protection
FEMA	Federal Emergency Management Agency
FIA	Forestry Inventory Analysis
FIP	Feed Indemnity Program
FNAI	Florida Natural Areas Inventory
FSA	Farm Service Agency
FWS	Fish and Wildlife Service
GRP	Gross Regional Product
HAPC	Habitat Area of Particular Concern
HIP	Hurricane Indemnity Program
Hr	Hour
LCRP	Louisiana Coastal Resources Program
LDHH	Louisiana Department of Health and Hospitals
LDWF	Louisiana Department of Wildlife and Fisheries
LIP	Livestock Indemnity Program
LMRAF	Lower Mississippi River Alluvial Floodplain
LNHP	Louisiana Natural Heritage Program

LRR	Land Resource Regions
MDMR	Mississippi Department of Marine Resources
MDWFP	Mississippi Department of Wildlife, Fisheries, and Parks
MLRA	Major Land Resource Areas Handbook
MNHI	Mississippi Natural Heritage Inventory
NAAQS	National Ambient Air Quality Standard
NCDCM	North Carolina Division of Coastal Management
NCNHP	North Carolina Natural Heritage Program
NCWRC	North Carolina Wildlife Resources Commission
NEPA	National Environmental Policy Act
NERRS	National Estuarine Research Reserve System
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NIPF	Non-Industrial Private Forest
NMFS	National Marine Fisheries Service
NNLs	National Natural Landmarks
NOAA	National Oceanic and Atmospheric Administration
NRBI	Natural Resources Benefits Index
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OPA	Otherwise Protected Areas
PEA	Programmatic Environmental Assessment
PEIS	Programmatic Environmental Impact Statement
PM	Particulate Matter
SAV	Submerged Aquatic Vegetation
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SPB	Southern Pine Beetle
SSA	Sole Source Aquifer
T&E	Threatened and Endangered
TCDC	Texas Conservation Data Center
TCMP	Texas Coastal Management Program
TCP	Traditional Cultural Property
THPO	Tribal Historic Preservation Office
TIP	Tree Indemnity Program
TMDC	Total Maximum Daily Load
U.S.	United States
USDA	U.S. Department of Agriculture
USDA/CCC	U.S. Department of Agriculture, Commodity Credit Corporation
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
WHIP	Wildlife Habitat Incentives Program
WRP	Wetlands Reserve Program

1.0 INTRODUCTION

1.1 BACKGROUND

1.1.1 Emergency Forestry Conservation Reserve Program Overview

The United States Department of Agriculture (USDA), Farm Service Agency (FSA) is initiating the preparation of a Programmatic Environmental Assessment (PEA) to analyze the effects on the human environment of implementing the Emergency Forestry Conservation Reserve Program (EFCRP). EFCRP was authorized by Section 107 of Division B, Title I, of the Department of Defense Emergency Appropriations Act of 2006 (P.L. 109-148) (2006 Act), signed by President Bush on December 30, 2005. Section 107 amended the Food Security Act of 1985 (16 U.S.C. 3831), which provides statutory authority for the Conservation Reserve Program (CRP). Accordingly, the CRP regulations at 7 CFR part 1410 are changed by adding a new section, §1410.12. EFCRP will be funded by the Commodity Credit Corporation (CCC) and administered by FSA as a component of CRP.

CRP was established under subtitle D of the Food Security Act of 1985. The purpose of CRP is to cost-effectively assist owners and operators in conserving and improving soil, water, and wildlife resources on their farms and ranches. Highly erodible and other environmentally sensitive acreage, normally devoted to the production of agricultural commodities, is converted to a long term resource conserving cover. CRP participants enter into contracts for periods of 10 to 15 years in exchange for annual rental payments and cost-share assistance for installing certain FSA approved conservation practices (CPs).

The purpose of EFCRP is to provide cost-share assistance as a lump sum or through annual payment for cleanup and replanting for those owners or operators of non-industrial private forest land (including school trust lands) who experienced a loss of 35 percent or more of merchantable timber directly related to hurricanes Dennis, Katrina, Ophelia, Rita, and Wilma during the 2005 calendar year.

Producers will be provided financial assistance for the following eligible conservation practices:

- CP 35A and CP 35B longleaf pine forest reforestation
- CP 35C and CP 35D bottomland timber establishment on wetlands
- CP 35E and CP 35F softwood restoration
- CP 35G and CP 35H upland hardwood restoration
- CP 35I mixed existing timber restoration.

Under EFCRP, contracts will be for 10 years and will become effective the first day of the month following the month of contract approval by CCC. Participants will have the choice of receiving one discounted, lump-sum payment or annual rental payments for the duration of the contract. Total program funding is $404,100,000, which will remain available until expended.

This PEA analysis area covers the primary presidential and secretarial declaration counties of the 2005 hurricane season in the States of Texas, Louisiana, Mississippi, Alabama, Florida, and North Carolina (Figure 1-1).

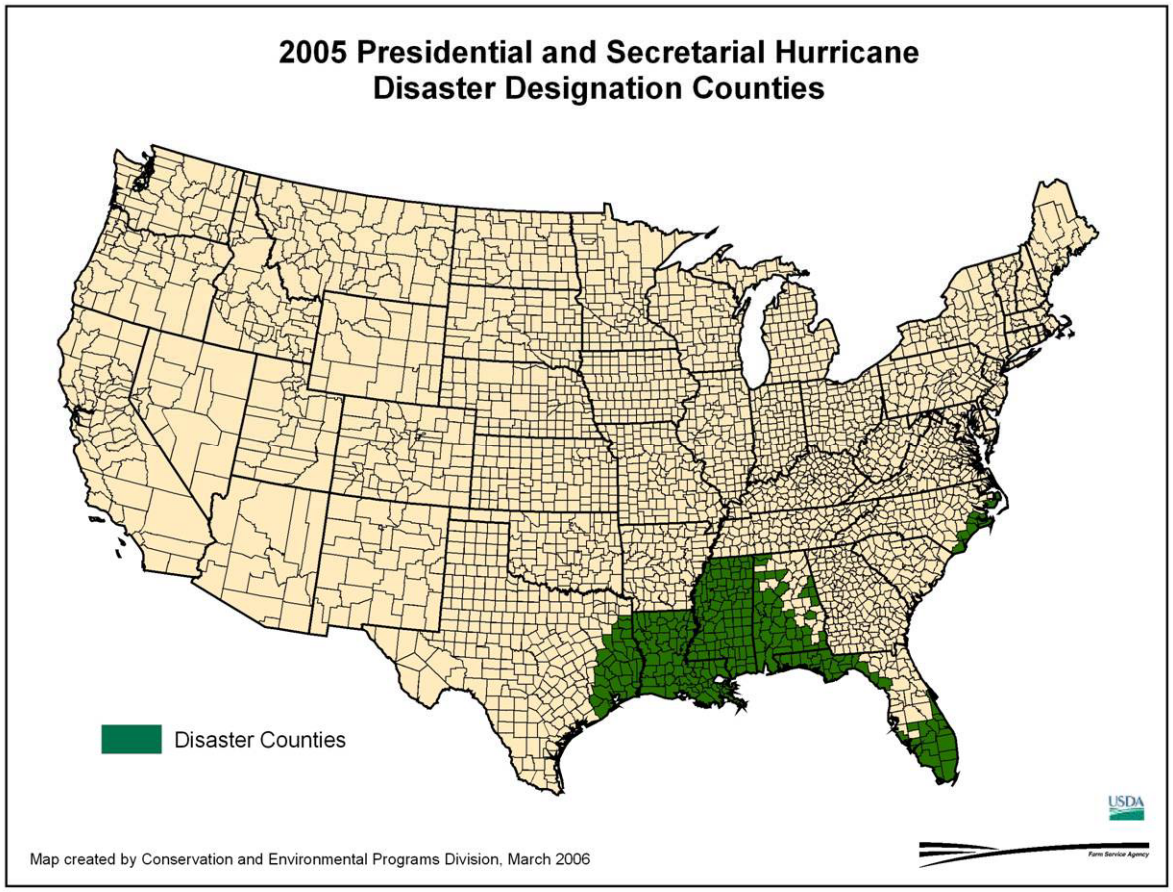

Figure 1-1. Eligible counties for EFCRP funds across Alabama, Florida, Louisiana, Mississippi, North Carolina, and Texas.

This PEA has been conducted in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended 42 USC 4321 – 4347, the Council on Environmental Quality implementing regulations at 40 Code of Federal Regulations (CFR) Parts 1500-1508, USDA's NEPA implementing regulations at 7 CFR Part Ib, and FSA's NEPA implementing regulations found in 7 CFR Part 799. This PEA does not address individual site-specific impacts which will be addressed at the time when conservation plans are developed.

CRP and EFCRP are administered by FSA in cooperation with the Natural Resources Conservation Service (NRCS), Cooperative State Research and Education Extension Service, State forestry agencies, and local Soil and Water Conservation Districts. FSA is the lead agency developing this PEA.

1.1.2 Purpose of Using a Programmatic Environmental Assessment to Analyze this Action

FSA's environmental regulations classify the Agency's actions into levels of environmental review such as categorical exclusions, environmental assessments (EAs), and environmental impact statements (EISs). Compliance with the National Historic Preservation Act (NHPA) and other cultural resource and environmental considerations also are incorporated into FSA's NEPA process.

The preparation of this PEA meets the requirements of NEPA, section 1502.4 of the CEQ regulations: Major Federal actions requiring the preparation of EISs, and 7 CFR Part 799: Environmental Quality and Related Environmental Concerns—Compliance with NEPA.

FSA has a framework in place to ensure NEPA compliance at the field level, where site-specific environmental reviews will take place prior to implementing an approved EFCRP contract. The review will consist of completing a site-specific Environmental Evaluation (EE), which may require consultation with applicable governmental agencies.

A PEA allows FSA to reduce paperwork (CEQ section 1500.4) and identify potential site-specific impacts at a State and ecoregion level. FSA plans to use this PEA to address similar actions in the implementation of this program and to tier off of this document for site-specific implementation of the program whenever NEPA analysis is required.

1.2 PURPOSE AND NEED FOR ACTION

During the course of the 2005 hurricane season, one of the worst on record, five hurricanes made landfall on the United States (U.S.) between July and October 2006: Dennis (Florida panhandle and southern Alabama), Katrina (Louisiana, Mississippi, and Alabama), Ophelia (North Carolina coast), Rita (Louisiana and eastern Texas), and Wilma (southern Florida). Each of these caused damage to infrastructure, homes, personal property, and agricultural resources, including privately owned forests.

Non-industrial private forestry land in the southeastern U.S. supplies a large majority of the raw wood products for the U.S. economy. The purpose of EFCRP is to provide cost-share assistance for cleanup and replanting for those owners or operators of non-industrial forest land and school trust land that experienced a loss of 35 percent or more of merchantable timber directly related to hurricanes Dennis, Katrina, Ophelia, Rita, and Wilma during the 2005 calendar year. Impacts to forestry are discussed by hurricane below.

Dennis

Hurricane Dennis made landfall on the Florida panhandle on July 10, 2005 as a Category 3 hurricane (115 to 120 mph winds). It continued north through Alabama, Tennessee, and the Ohio Valley as a tropical depression.

The American Insurance Services Group estimates the insured property damage in the U.S. at $1.115 billion. Based on a doubling of this figure to account for uninsured property damage, the total U. S. damage estimate for Dennis is $2.23 billion (Beven 2005). No breakout figures exist for estimated damage from Dennis to non-industrial merchantable timber in Florida or Alabama.

Katrina

The damage to homes, businesses, and critical infrastructure caused when Hurricane Katrina struck the Gulf Coast on August 29, 2005 as a Category 4 storm was unprecedented. Every aspect of the economy in southern Louisiana and Mississippi was affected by the storm, including private forestry. Stands of trees over 30 years old sustained the most damage by windthrow, snapping and root springing. Stands of trees under 30 years old sustained most damage by bending.

Hurricane Katrina blew down, snapped off, and damaged trees across Louisiana, Mississippi, and Alabama. Down and damaged trees impede access for fire suppression and fuels treatments and have created an increased risk of wildland fire within the wildland/urban interface. Downed and damaged trees pose safety risks for forest visitors and workers. Many of the remaining live trees experienced internal stem and root damage resulting in an increased risk of bark beetle infestations because of their stressed condition. Hardwood and pine trees along creeks and drainages were wind-thrown into the channels. Large numbers of trees are down and damaged within the longleaf and loblolly ecosystems. The down and damaged trees could impede prescribed burning for restoration and maintenance of these communities that contain threatened and endangered species habitats that are dependent on frequent, low-intensity fire.

The Gulf Coast States are significantly forested and are major producers of lumber and plywood. The U.S. Forest Service (USFS) estimated 19 billion board feet of timber damaged on over 5 million acres in Mississippi, Alabama, and Louisiana (Figure 1-2) (USDA 2005).

The Saffir-Simpson Hurricane Scale is a 1-5 rating based on the hurricane's intensity.

Category One Hurricane:

Winds 74-95 mph. Storm surge generally 4-5 ft above normal. No real damage to buildings, but some damage to shrubbery and trees.

Category Two Hurricane:

Winds 96-110 mph. Storm surge generally 6-8 feet above normal. Some roofing material, door, and window damage of buildings. Considerable damage to shrubbery and trees with some trees blown down.

Category Three Hurricane:

Winds 111-130 mph. Storm surge generally 9-12 ft above normal. Some structural damage to small residences and utility buildings. Damage to shrubbery and trees blow down.

Category Four Hurricane:

Winds 131-155 mph. Storm surge generally 13-18 ft above normal. Curtainwall failures with some complete roof structure failures; extensive damage to windows and doors. Shrubs, trees, and all signs are blown down.

Category Five Hurricane:

Winds greater than 155 mph. Storm surge generally greater than 18 ft above normal. Complete roof failure on many residences and industrial buildings. Some complete building failures. All shrubs, trees, and signs blown down. Severe and extensive window and door damage.

http://www.nhc.noaa.gov/aboutsshs.shtml

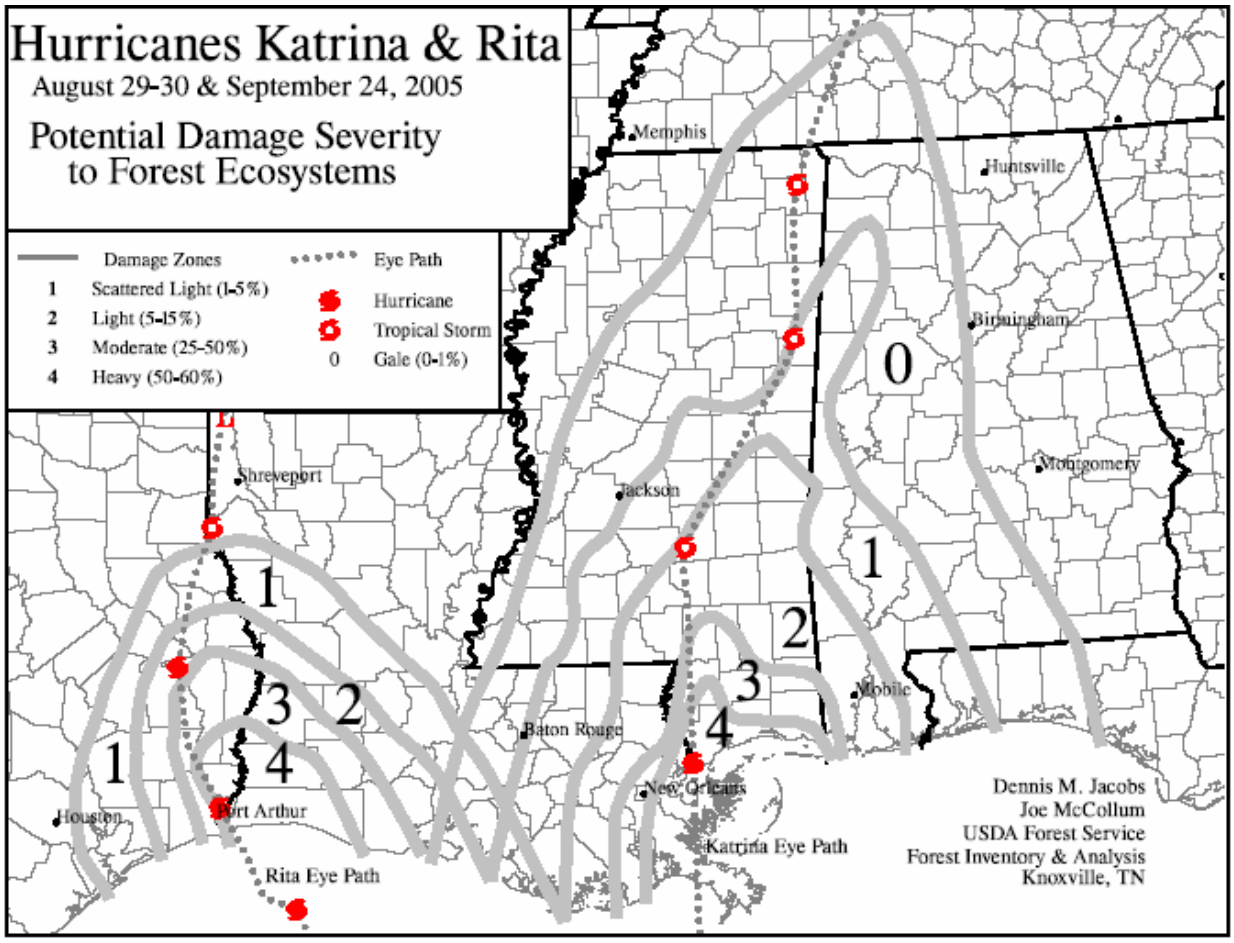

Figure 1-2. Potential Forestry Damage Severity Map for Hurricanes Katrina and Rita. Source: USDA Forest Service 2005.

Nearly 90 percent of all forests damaged were within 60 miles of the coast, predominantly in Mississippi. Nearly 60 percent of the damage occurred to softwoods—mostly pines—with the remainder of the damage occurring to hardwoods. According to the USFS, down and damaged wood would have been sufficient to produce 800,000 single family homes and 25 million tons of paper and paperboard (USDA 2005a). The forested area damaged represents 30 percent of the total timberland in the affected region, 90 percent of which occurred on non-Federal lands (Bosworth 2005).

Eighty percent of the damage occurred in Mississippi. The Mississippi Forestry Commission estimated that over 24.2 million cords (3.1 billion cubic feet) of pulpwood and sawtimber were damaged. With the total dollar value of the damage to all timber species (pulpwood and sawtimber) being $1.28 billion (MSES 2006).

The impact of Katrina's winds resulted in the destruction of an average of 20 percent of the timber that was standing in the damaged area prior to the storm, with rates in areas near the coast as high as 35 to 40 percent. This compares to an average loss of about 11 percent for Hurricane Camille which followed an almost identical landfall in 1969 and Hurricane Andrew with a 10 percent loss in southern Louisiana in 1992 (USDA 2005b).

Ophelia

Slow-moving Hurricane Ophelia caused excessive coastal erosion for the coastal States of Florida, Georgia, and South Carolina in early September 2005, and areas of North Carolina on September 14-15.

The agricultural damage in North Carolina, in aggregate, was estimated to impact 277,000 acres at a cost of approximately $19.3 million (NCDACS 2006). Agricultural products reported on North Carolina's website include selected crops (corn, sorghum, cotton, soybeans, tobacco, peanuts, wheat, and hay), selected livestock (hogs and pigs, broilers, turkeys, and cattle), and turf grass. North Carolina agriculture damage estimates were not broken out by agriculture type. No assessment has been provided for impacts to the private forestry sector from Ophelia.

Rita

Hurricane Rita, a Category 1 hurricane, made landfall on September 24, 2005 on the extreme southwest coast of Louisiana, then traveled through East Texas into Northeast Texas, then through the Mississippi Valley (Figure 1-2).

Total volume of timber damaged and affected was estimated at 1,458 million cubic feet on 1.4 million acres with a total approximate stumpage value of $1.26 billion. For perspective, East Texas contains almost 16 billion cubic feet of growing stock timber in 43 counties. Total damaged and affected volume by Hurricane Rita was about 6 percent of the total East Texas growing stock (TFS 2005).

Wilma

Hurricane Wilma made landfall on the southwest coast of Florida on October 24, 2005, and cut a southwest to northeast swath across the southern portion of the Florida peninsula before exiting into the Atlantic Ocean. No information about the effects on private forestry of this specific storm even has been made available.

Action is needed because limited private funding is available to help the non-industrial private forest landowner and school trust lands to effectively salvage the timber for sale and replant destroyed stock.

In addition to the damages to wildlife habitat and other environmental services from the loss of forest cover, the dead and damaged trees can become hazardous fuels for wildfires as well as a haven for forest insects and diseases. In southern Mississippi, for example, the amount of tree debris available for fueling a wildfire is an estimated 20-30 times the normal levels (Baker 2005). Efforts to remove fallen timber and salvage usable timber are underway, although some contend that the period for salvaging timber is declining due to warm and moist conditions that promote wood decomposition (Baker 2005). Prescribed burning needed to restore habitat for threatened and endangered species may be more difficult and costly if action is delayed.

Fallen timber can promote insect infestations as well as provide favorable conditions for the establishment of invasive species. Some damaging insect species such as the southern pine beetle and black turpentine beetle can thrive on fallen trees and then harm living trees. Forested land exposed to increased levels of sunlight caused by fallen trees is susceptible to invasive non-native species such as Chinese tallow tree (*Triadica sebifera*) and cogongrass (*Imperata brasiliensis*), which are prevalent in the areas damaged (Sheikh 2005).

Delays in cleanup and replanting may increase the risk to public safety and would continue to have negative long term impacts to the economic viability of the forestland and the communities that depend on that forest for their livelihood.

1.3 OBJECTIVES

The objectives of EFCRP include:

- Providing financial assistance to owners of non-industrial private forest land (including school trust lands) for recovering from the damage and destruction caused by the 2005 hurricanes.
- Preventing soil erosion on the hurricane damaged areas
- Improving water quality
- Providing for wildlife habitat restoration in forested areas.

In implementing the program, the Secretary of Agriculture shall consider an equitable balance among the purposes of soil erosion prevention, water quality improvement, wildlife habitat restoration, and mitigation of economic loss (section 107(F) of Division B, Title I of HR 2863).

1.4 ORGANIZATION OF THE PEA

The PEA is organized into 10 chapters:

Chapter 1: Introduction is an introductory chapter that discusses the program, background, regulatory framework, and permits, licenses, and entitlements necessary to implement the proposed action.

Chapter 2: Alternatives Including the Proposed Action describes the Preferred Alternative and the No Action Alternative. These alternatives are compared in summary tables in terms of their individual environmental impacts and their achievement of objectives. The geographic and temporal boundaries of the proposed action are defined, and resources eliminated from consideration are described.

Chapter 3: Affected Environment provides a description of each resource and identifies specific resources in the EFCRP area that may be affected. The resources most likely to receive impacts from the alternatives include:

- Biological resources (including wildlife and fisheries, vegetation, and protected species and habitat)
- Cultural resources (including archaeological resources, architectural resources, and traditional cultural resources)
- Water resources (including surface water, groundwater, sole source aquifers, coastal zones, wetlands and floodplains)
- Soil resources
- Air quality
- Recreation
- Socioeconomics
- Environmental Justice

A description of each resource is followed by a discussion of the affected environment.

Chapter 4: Environmental Consequences provides a discussion of the environmental consequences of the proposed action on the resources described in Chapter 3, including the level of impact, and the effects of each alternative on each resource.

Chapter 5: Cumulative Effects describes the cumulative effects of the proposed action. Following a brief introduction of cumulative effects, past, present, and reasonably foreseeable actions are presented. The cumulative effects of the proposed action are summarized in a cumulative effects matrix.

Chapter 6: Mitigation Measures identifies potential mitigation that may be added to a conservation plan if a site specific survey identifies that mitigation may be required.

Chapter 7: List of Preparers lists individuals who assisted in the preparation of this PEA.

Chapter 8: Persons and Agencies Contacted lists all agencies, agency personnel, and other experts who participated in supplying data for the PEA.

Chapter 9: Glossary

Chapter 10: References

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 PROPOSED ACTION

FSA proposes to implement EFCRP with total Congressional funding of $404,100,000, which will remain available until expended. The $404.1 million appropriated will provide sufficient funding to reforest approximately 650,000 to 802,000 acres of the 5.6 million acres affected throughout the six States, depending on the acreage enrolled and the value of CRP rental rates (FSA 2006).

This new program is available in counties with a Presidentially declared disaster designation. Eligible owners and operators may enroll applicable forestry acreage in the new EFCRP. The 2006 Act provided that acreage enrolled under this provision does not count towards otherwise applicable limits (currently 25 percent) on the number of acres that may be enrolled in any one county under CRP or against CRP's statutory maximum acreage enrollment authority.

Because the USFS estimated over 5.6 million acres received 35 percent or more timber damage, and appropriated funds can address less than one million acres, the statute provides guidance on what types of contracts will have priority. Offers for contracts under this section shall be submitted under continuous signup provisions as authorized in §1410.30. The continuous sign-up provisions allow owners or operators of non-industrial private forests to enroll under CRP at any time, provided they meet eligibility requirements, discussed below and funds are still available. These offers will be evaluated and ranked balancing the offers' contribution to soil erosion prevention, water quality improvement, wildlife habitat restoration, and mitigation of economic loss (FSA 2006).

2.1.1 Qualifications for EFCRP

To qualify for enrollment in EFCRP, the following two criteria must be met (FSA 2006a):

- **Acreage must be classified as non-industrial private forestland (NIPF).** NIPF is defined as land with existing tree cover, or which is suitable for growing trees, that is owned by an individual, group, association, corporation, Indian Tribe, other legal private entity, or person who receives concurrence from the landowner for practice implementation and who holds a lease on the land for a minimum of 10 years or State school trust means, as determined by the Deputy Administrator. Most non-industrial private forest landowners do not have the capability of processing the wood that they grow on their land. Corporations whose stocks are publicly traded or owners principally engaged in the primary processing of raw wood products are excluded. State school trust land is that acreage owned by a State with the explicit purpose of supporting public schools.
- **A producer must have suffered 35 percent or more damage to his/her merchantable timber.** Merchantable timber refers to timber that has a trunk diameter of at least six inches measured at a point no less than 4.5 feet above the ground.

2.1.1.1 Ownership Eligibility

An **owner** is eligible to offer land for enrollment in EFCRP if the owner meets one (1) of the following requirements:

- Owned the land for 12 months before an application is submitted
- Acquired the land by will or succession as a result of death
- Acquired the land under circumstances other than for placement in CRP under EFCRP, as determined by the FSA National Office.

Note: Ownership eligibility requirements are satisfied if there is any combination of continuously leasing and owning the same "person" during the 12-month period before application is filed.

2.1.1.2 Operator Eligibility

An **operator** is eligible to offer land for enrollment in EFCRP when the operator meets **both** of the following requirements:

- Operated the land for 12 months before application is filed
- Provides satisfactory evidence, as determined by County Office Committee (COC), that control of the land will continue uninterrupted for the 10-year period. Satisfactory evidence may include any of the following:
    - Statement signed by the owner
    - Written lease for the appropriate time period
    - Owner's signature on the application form

Operator eligibility requirements shall be satisfied if there is any combination of leasing and owning by the same "person" during the 12-month period before application is filed.

2.1.2 Approved EFCRP Conservation Practices

Conservation practices (CPs) authorized for under EFCRP are:

- CP 35A, New Longleaf Pine
- CP 35B, Existing Longleaf Pine
- CP 35C, New Bottomland Hardwood
- CP 35D, Existing Bottomland Hardwood
- CP 35E, New Softwood
- CP 35F, Existing Softwood
- CP 35G, New Upland Hardwood
- CP 35H, Existing Upland Hardwood
- CP 35I, Mixed Existing Timber

CPs, as determined by the technical agency, must be suitable for site conditions. CCC will pay up to 50 percent of the eligible cost of establishing CPs.

2.1.3 EFCRP Contract and Payment Terms

Under EFCRP, contracts will be for 10 years and will become effective the first day of the month following the month of contract approval by CCC.

Participants will have the choice of receiving one discounted, lump-sum payment or annual rental payments for the duration of the contract. The amounts and terms for those payments are discussed in Appendix A.

2.1.4 EFCRP Process

A summary of the process is described here. More detail is provided in Appendix A.

- A site visit will determine the percent stand loss, potential for soil erosion, overview of economic loss, potential water quality impacts, and other data.
- After collection of this data, offers will be ranked according to an environmental benefit index. Higher points are given for:
    - Potential erosion
    - Degree of water quality impact (more credit for ability to impact wetlands, streams, rivers, or lakes)
    - Degree of wildlife habitat enhancement (more credit for CP35A Longleaf or CP35B Bottomland Hardwood)
    - Mitigation of loss (percent of loss and value of loss)
- A second visit will occur for all accepted acreage
- A forestry conservation plan will:
    - Be developed by a professional forester
    - Be reviewed by NRCS/conservation district
    - Contain a site evaluation
    - Contain a detailed plan with specifics on:
        - Site preparation
        - Planting recommendations
        - Management, including wee control
        - Enhancement for wildlife
    - Lay out an implementation schedule
    - Provide for periodic review
    - Provide for 10 percent spot check.

2.2 SCOPING

The Proposed Action was developed by FSA to implement the EFCRP. Scoping letters were sent to State Forestry programs in Texas, Louisiana, Mississippi, Alabama, Florida, and North Carolina; the Nature Conservancy; Ducks Unlimited; Quail Unlimited; Wildlife Management Institute; International Association of Fish and Wildlife Agencies; Izaak Walton League; Southern Environmental Law Center; Sustainable Agriculture Coalition; the affected State Farm Bureaus; the Mississippi Flyway Council; and representatives of the timber industry in the above States.

Opportunities to comment on the scope of this PEA were provided by a letter e-mailed on March 16 and March 20, 2006 to potential stakeholders, and by making available the draft PEA for a 30-day public comment period. The 30 day public notice period began on April 11, 2006 and was noticed in the Federal Register.

2.2.1 Consultation with the Fish and Wildlife Service and National Marine Fisheries Service

In accordance with section 7 of the Endangered Species Act (ESA), FSA requested programmatic consultation with the Fish and Wildlife Service (FWS) concurrently with the publication of the NOA for the draft PEA in the Federal Register.

Open communication will be maintained with FWS throughout the NEPA planning process and FSA will solicit early input from FWS regarding the potential effects of CP implementation on threatened and endangered species and their habitat.

2.2.2 Consultation with the State Historic Preservation Offices and Tribal Historic Preservation Offices

FSA has initiated programmatic consultation by letters sent out on March 21, 2006 (Appendix C) with each State's State Historic Preservation Office (SHPO) and with appropriate Tribes for the six States. FSA made requests to SHPOs and the Tribes to review this process at the programmatic level. Responses were received from SHPOs of Alabama, Florida, North Carolina, and Texas (Appendix C). Tribes incorporated as part of this consultation process include:

- Eastern Band of Cherokee Indians of North Carolina
- Mississippi Band of Choctaw Indians
- Muscogee Nation of Oklahoma
- Poarch Creek Band of Alabama
- Caddo Nation of Oklahoma
- Quapaw Tribe of Oklahoma
- Chickasaw Nation
- Chitimacha Tribe of Louisiana
- Choctaw Nation of Oklahoma
- Coushatta Tribe of Louisiana
- Jena Band of Choctaw Indians of Louisiana
- Tunica-Biloxi Band of Louisiana
- Miccosukee Tribe of Florida
- Seminole Nation of Oklahoma
- Seminole Tribe of Florida
- Alabama-Coushatta tribes of Texas
- Kickapoo Traditional Tribe of Texas

Site-specific cultural resource considerations will be addressed during the environmental review process for individual contracts.

2.2.3 Consultation with the Environmental Protection Agency

Section 1424(e) of the Safe Drinking Water Act (SDWA) requires U.S. Environmental Protection Agency (EPA) review of any Federal actions that may affect sole source aquifers (SSAs). Since there

are SSAs located in EFCRP eligible counties, FSA made available the draft PEA to EPA to review EFCRP activities.

2.2.4 Resources Considered but Eliminated from Analysis

The following resources were considered but eliminated from analysis:

Wilderness

In Section 2(c) of the Wilderness Act of 1964 is the following definition of wilderness:

> *(c) A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this chapter an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.*

There are 26 federally designated wilderness areas in the EFCRP project area, covering 1,484,566 acres. These wilderness areas are managed by the USFS, FWS, and the National Park Service (NPS) (Wilderness.net, 2006). However, because EFCRP is only available for enrollment of private land, federally owned wilderness areas are not eligible for the program and were excluded.

National Natural Landmarks

The National Natural Landmarks (NNLs) program recognizes and encourages the conservation of outstanding examples of the Nation's natural history. It identifies and recognizes the best examples of biological and geological features in both public and private ownership. With the owner's concurrence, NNLs are designated by the Secretary of the Interior and the program is administered by the NPS (NPS 2005). There are 22 NNLs in EFCRP-eligible counties (see Table 2.1): 2 in Alabama, 11 in Florida, 4 in Mississippi, and 5 in North Carolina. There are no NNLs in Louisiana or in eligible Texas counties (NPS 2006). EFCRP is not expected to directly impact NNLs since non-industrial private forestland is not category utilized to select outstanding examples of the Nation's natural history. Therefore, this resource has been eliminated from further analysis.

Table 2.1. National Natural Landmarks in the project area.

National Natural Landmark	County	Ownership
Mobile Tensaw River Bottomlands	Baldwin, Mobile, Washington Counties, AL	State, Federal, Private
Red Mountain Expressway Cut	Jefferson, AL	State
Archibold Biological Station	Highlands County, FL	Private
Big Cypress Bend	Collier County, FL	State
Corkscrew Swamp Sanctuary	Collier County, FL	State
Florid Caverns Natural Area	Jackson County, FL	State
Lignumvitae Key	Monroe County, FL	State
Manatee Springs	Levy County, FL	State

National Natural Landmark	County	Ownership
Reed Wilderness Seashore Sanctuary	Martin County, FL	Federal
Torreya State Park	Liberty County, FL	State
Waccasassa Bay State Preserve	Levy County, FL	State
Wakulla Springs	Wakulla County, FL	State
Bienville Pines Scenic Area	Scott County, FL	Federal
Chestnut Oak District	Calhoun County, MS	Private
Green Ash-Overcup Oak-Sweetgum Research Natural Areas	Sharkey County, MS	Federal
Harrell Prairie Hill	Scott County, MS	Federal
Mississippi Petrified Forest	Madison County, MS	Private
Bear Island	Onslow County, NC	State
Green Swamp	Brunswick County, NC	Private
Nags Head Woods and Jockey Ridge	Dare County, NC	State, County, Municipal, Private
Salyer's Ridge Natural Area	Hyde County, NC	Federal
Smith Island	Brunswick County, NC	State, Private

Source: NPS 2005a, 2006c

Noise

There would be no observable impacts from noise as a result of EFCRP implementation. Site preparation may involve land clearing and the possible use of heavy machinery. These activities may temporarily increase noise levels. Temporary increases in traffic during site preparation may also increase noise levels. However, increases would be minor and occur only during site preparation. Once the CPs have been installed, it is expected that noise levels would return to normal, and there would be no continuing impacts on the local soundscape. With the long term nature of the contracts and associated CPs, noise level can be expected to decrease slightly overall. As a result, FSA has eliminated noise from further analysis in this PEA.

Traffic and Transportation

EFCRP would have little to no discernible impacts to the transportation infrastructure of the affected States. EFCRP cost share funding is not authorized for the construction of new roads and existing roads would be used to transport any materials to and from a site. During site preparation, the transport of materials and equipment to and from the site may increase local traffic levels. However, these effects would be short-term, and would be localized during site preparation and CP implementation.

Any increases in local traffic levels would be minimal compared to existing local and regional levels, especially during the recovery process following the hurricane 2005 season. During the recovery process following these devastating storms, hauling of debris from affected lands and the transportation of materials that will be used in the rebuilding of private homes and other structures will increase traffic both leaving and entering the EFCRP counties. The additional traffic that will be associated with CP implementation would be incremental in comparison to these levels. Any impacts to air quality and noise would also be minor compared to impacts from other recovery efforts. In addition, CP implementation would occur in rural areas that already have high air quality and additional vehicle emissions and dust would not degrade air quality below air quality standards.

Although roads cannot be constructed using EFCRP funds, private landowners may construct temporary roads on private lands to facilitate tree removal and planting. It is expected that any roads constructed would be in compliance with State regulations, including any necessary Best Management Practices (BMPs).

Since EFCRP would have little to no effect on transportation infrastructure in the designated counties, FSA has eliminated this issue from further analysis.

2.3 ALTERNATIVES ELIMINATED FROM ANALYSIS

No alternatives that met the objectives in Section 1.3 above were eliminated from analysis. Only alternatives considered are analyzed.

2.4 ALTERNATIVES SELECTED FOR ANALYSIS

2.4.1 No Action Alternative (Alternative A)

Implementation of the No Action alternative would not implement EFCRP and would not disburse the $404.1 million allocated for this program. CPs would not be implemented, which require consideration of environmental benefits, including improving wildlife habitat, preventing soil erosion, and improving water quality (section 107(F) of Division B, Title I of HR 2863). No 10-year contracts would be in place to effectively replace damaged forestland in a way that is environmentally beneficial.

Current management practices and plans would continue to guide management of the damaged non-industrial private forestlands in counties with a Presidentially declared disaster designation. However, there would be no targeted program specifically for recovery of non-industrial private forestland and school trust lands from the hurricane damage of the 2005 hurricane season.

As a consequence of implementing the no action alternative, hazardous fuel loadings would increase and insect damage would increase and likely spread to surrounding healthy trees. Hazardous conditions would persist and worsen for workers engaged in wildfire suppression and prescribed burning operations. Due to heavy fuel loads, some areas would not be safe for wildfire suppression or prescribed burning. Lengthening the return interval for prescribed fire will allow accumulations of fuel, on top of the additions from storm damage, and increase the severity of wildfires.

The No Action alternative would result in the loss of timber volume offered for wood processing as the damaged mature trees are recycled by wildfire, or death and decay. There would be an economic loss of receipts and a loss of opportunity to provide related jobs and income in a local economy devastated by the hurricane.

2.4.2 Preferred Action Alternative (Alternative B): Implement EFCRP

Implementation of the Preferred Action would provide cost-share assistance for cleanup, salvage logging and replanting for those owners or operators of non-industrial private forest land (including school trust lands) who experienced a loss of 35 percent or more of merchantable timber directly related to hurricanes Dennis, Katrina, Ophelia, Rita, and Wilma during the 2005 calendar year. A site visit will determine the percent stand loss, potential for soil erosion, overview of economic loss, potential water quality impacts, and other data evaluate and rank proposed lands for participation in the EFCRP.

Owners and operators will be provided financial assistance for the following four eligible conservation practices:

- CP 35A Longleaf Pine New and CP 35B Longleaf Pine Existing: This practice would replace damaged, blown, or cut longleaf forests with other longleaf pines damaged by the 2005 hurricanes. Longleaf pine forests help restore and enhance habitat for wildlife, reduce windthrow, and reduce the potential for disease and pest infestation. The practice also would reduce soil erosion; enhance and restore wildlife habitat; and improve water quality.
- CP 35C Bottomland Hardwood New and CP 35D Bottomland Hardwood Existing: This practice would plant hardwood trees and shrubs in bottomland areas where hardwood or softwood areas have been damaged by the 2005 hurricanes. This practice would help

control erosion, improve air and water quality, provide wildlife habitat, sequester carbon, and provide forest products for future generations.

- CP 35E Softwood New and CP 35F Softwood Existing: This practice would plant softwood trees where previous hardwood or softwood areas have been damaged by the 2005 hurricanes. The practice also would reduce soil erosion; enhance and restore wildlife habitat; and improve water quality.
- CP 35G Upland Hardwood New and CP 35H Upland Hardwood Existing: This practice would plant hardwood trees and shrubs on upland areas where previous hardwood or softwood areas have been damaged by the 2005 hurricanes. The practice also would reduce soil erosion; enhance and restore wildlife habitat; and improve water quality.
- CP 35I Mixed Existing: This practice would plant a mixture of longleaf pine, bottomland hardwood, softwood, and upland hardwood. No more than 50 percent of any one species could be planted on a site. The practice also would reduce soil erosion; enhance and restore wildlife habitat; and improve water quality.

Implemented CPs must meet the minimum specifications outlined in the NRCS Field Office Technical Guide (FOTG) as well as all other applicable Federal, State, and local requirements. A conservation plan is required that outlines how these CPs (as appropriate) would be implemented on eligible forest lands. Detailed rental and incentive payments, cost share and maintenance payments, technical requirements, and operating procedures for each practice are outlined in the FSA Handbook 2-CRP (Revision 4, Amendment 1) and are included in Appendix A of this PEA.

Land enrolled in EFCRP would be maintained per the implemented CP for no less than 10 years. EFCRP would provide the financial and technical assistance necessary to assist eligible non-industrial private forest owners and operators and on school trust lands in voluntarily establishing CPs to restore habitat conditions and control nonpoint source pollution, including soil erosion and sedimentation. Owners and operators will be eligible to receive rental payments and other financial assistance in return for reforesting consistent with these nine CPs.

2.5 COMPARISON OF ALTERNATIVES

The criteria for the level of impact on the resources are shown in Table 2.2. Comparison of effects between the two alternatives is shown in Table 2.3.

Table 2.2. Definition of criteria used to determine the duration of effect, type of effect, and level of effect of EFCRP alternatives on wildlife and vegetation.

Duration of Effect	Type of Effect	Level of Effect
Short term: Impacts to a biological resource's condition, use, or value experienced during implementation of program, generally not exceeding than 3 years.	**Beneficial:** An effect that would improve the habitat's condition, use, or value compared to its current condition, use, or value for wildlife.	**Minor:** A perceptible localized impact on habitat condition, use, or value that has little direct consequence for wildlife.
Long term: Impacts to a biological resource's condition, use, or value experienced as result of program, generally lasting 3 or more years.	**Adverse:** An effect that would result in degradation of a biological resource's condition use, or value compared to its current condition, use, or value for wildlife.	**Moderate:** A measurable impact on habitat condition, use, or value that has a localized consequence for wildlife.
		High: A measurable impact on habitat condition, use, or value that is large and/or widespread and could have permanent

		consequences for wildlife.

Table 2.3. Comparison of Alternatives and their Effects

Issues	Alternative A: No Action	Alternative B: Implement EFCRP
Biological Resources	Long term moderate to high adverse effects – Forests damaged in hurricanes would recolonize naturally, potentially with invasive and slow-growing species with little wildlife value. Downed trees would promote outbreaks of pests and disease and provide surplus fuel, increasing the likelihood of high intensity forest fires.	Long term highly beneficial effects – EFCRP would allow landowners control over stands that re-establish damaged areas. Use of the NRBI favors high quality wildlife habitat for protected species and other wildlife and prevents invasions of exotic species. Removal of downed trees will minimize potential for disease and pest outbreaks and reduce fire fuels.
Cultural Resources	Long term moderate effects—Disturbance and destruction of prehistoric and historic sites and structures through existing forestry practices may occur with no consultation with SHPOs. Hurricane damage repair by landowners may involve large-scale projects of tree removal, temporary or permanent road establishment, and/or ground-disturbing site preparation that may impact culturally significant resources.	Minimal to no adverse effects—If cultural resources are discovered on enrolled lands, coordination would occur with the appropriate SHPO, THPO, or tribe to minimize effects. Some CPs may serve to protect inappropriate access to cultural resources. Installation of CPs may require earth moving activities, which may disturb shallow sites. Site-specific cultural resources reviews would minimize effects to cultural resources.
Surface Water Resources	Long term minor to moderate adverse effects –EFCRP funds would not be available for CPs that may have beneficial effects on surface water resources. The absence of forests may result in increased localized sedimentation of rivers and streams, resulting in a decline in surface water quality. Improvements to surface water would be dependent upon other existing State and Federal programs.	Long term moderate to high beneficial effects –EFCRP funds would be used to restore forested areas, remove downed trees, and clean up debris. These actions will decrease soil erosion, reducing the amount of sediment entering surface waters thus minimizing effects to surface water quality. Restoration of vegetation and trees in the riparian areas and wetlands will increase filtration of surface runoff, decreasing the amount of sediments and other contaminants entering nearby waterbodies.
Groundwater Resources including Sole Source Aquifers	Long term adverse effects –EFCRP funds would not be available for CPs that may have beneficial effects on groundwater and sole source aquifer recharge zones. The absence of forests in aquifer recharge zones may result in increased localized erosion, and groundwater quality may decline. Improvements to groundwater and sole source aquifers would be dependent upon existing programs.	Long term beneficial effects –EFCRP funds would be used to restore forested aquifer recharge areas and remove downed trees and clean up debris which may be adversely affecting stream and river channel surface waters. This would reduce the amount of sediment and potential contaminants in surface water that recharges aquifers.

Issues	Alternative A: No Action	Alternative B: Implement EFCRP
Coastal Resources	Long term, moderately adverse effects- Bottomland hardwood forests damaged during the hurricane will not be restored and water quality may continue to decline. Early successional stages may persist. Invasive species may gain a foothold reducing value of this habitat for wildlife.	Long term, moderately beneficial effects- Bottomland hardwood forests damaged during hurricane would be restored, reducing soil erosion and providing valuable wildlife habitat. CP35A would also improve water quality by filtering nutrients, processing organic wastes, and reducing sedimentation in coastal wetlands and along rivers and streams that flow into coastal zones.
Wetlands Resources	Long-term, minor to moderate adverse effects – Current trends in wetland loss would be expected to continue at present rates throughout all the States. Ongoing State and Federal programs would continue to strive to protect and restore wetlands. However, the benefits of CP 35B, bottomland hardwood restoration would not occur under the No Action Alternative and the benefits of revegetating these wetland types would not be realized at a scale as large as the EFCRP area.	Long term minor to moderate beneficial effects –bottomland hardwood plantings would be installed under CP-35B, helping to minimize loss of this habitat throughout EFCRP States.. Bottomland hardwood plantings would also help to maintain and restore wetland functions and values, increasing the availability of habitat for a number of wetland dependent wildlife species. Reforestation that would occur with all the CPs would decrease soil erosion, reducing sedimentation of wetlands and enhancing wetland functions and values.
Floodplains	Long term minor adverse effects- EFCRP funds would not be available for CPs that may improve the ability of floodplains to store floodwaters. Bottomland hardwood would not be restored, resulting in the decline of floodplain conditions and potentially in floodplain functions. Downed trees in stream and river channels would not be removed, potentially increasing localized erosion. Some construction may occur that would alter floodplain flowage, capacity, or other functions.	Minor long term beneficial effects- Restoration of forested floodplains and removal of downed trees would reduce adverse effects to stream and river channel morphology. These activities would increase floodwater storage capacity, slow flood flow velocities, and result in overall improvement in floodplain function.
Soil Resources	Long term adverse effects – EFCRP funds would not be available for CPs that may have beneficial effects on soils. The absence of forests and other vegetation may result in increased localized erosion, facilitating the potential for runoff. Additional soil erosion from wind and water will likely result from the lack of vegetation stabilizing the soil. Improvements to soil conditions would be dependent upon existing State and Federal programs.	Long term beneficial effects – EFCRP funds would be used to restore forested areas, remove downed trees, and clean up debris which may be adversely affecting soil resources. This would reduce the occurrence of soil erosion and surface runoff and encourage soil development by promoting natural soil building processes associated with forest litter accumulation and assimilation into the soil and mature microbial degradation of organics to improve soil productivity.

Issues	Alternative A: No Action	Alternative B: Implement EFCRP
Air Quality	Long term minor to moderate adverse effects- High fuel levels from downed trees would increase the likelihood of wildland fires, which negatively effects air quality. Indirectly, it may have an effect on the ability to implement other forestry practices such as prescribed burning, since prescribed burning in areas with large amounts of downed timber may be restricted due to risks associated with escaped fires. Loss of vegetation and wildland fires also decreases carbon storage of forests and releases carbon back into the atmosphere, further degrading air quality.	Minor adverse effects - Air quality could be temporarily reduced in the immediate vicinity of heavy equipment on dirt roads. During dry weather conditions, these activities would further reduce air quality by increasing dust. Effects from traffic of heavy vehicles would be incremental over other activity and short term, lasting only during site preparation (1-3 months). Long term minor to moderate beneficial effects would occur as trees and other vegetation become established, improving carbon storage capacity of forests, which would increase the amount of carbon dioxide that the restored forests would be able to remove from the atmosphere, thereby enhancing air quality.
Recreation	Short term minor to moderate adverse effects—Blocked roads and/or trails may prevent access to recreation sites. Wildlife and fish populations may recover slowly because of limited habitat. Unstable tress may be dangerous to participants. Recreation businesses and local economies reliant on recreation may be compromised.	Positive long term minor to moderate effects—Access to areas may be improved. Wildlife habitat would increase, aiding the recovery of populations. After installation, water quality would likely improve, providing better access and wildlife-viewing capabilities as well as increased fish habitat and fishing areas.
Socioeconomic	Short and long term moderate to high adverse effects—Severe timber damage has been sustained in the region. Short term timber prices would decrease, but increase as the supply would not be able to meet demand. Economic effects to timber markets, landowners, forest nurseries, and wood-processing would likely occur.	Short- and long term moderate beneficial effects—EFCRP would provide financial assistance to eligible landowners for 10 years. Payments from EFCRP would provide direct and indirect economic benefits to landowners and assist stimulating the economy of the entire region. Enrolled school trust lands would provide income to schools through the 10-year rental rates. Although EFCRP financial assistance would assist landowners in restoring forests and, consequently, positively affecting downstream and other regional industries, some short and long term negative economic effects to timber markets, landowners, forest nurseries, and wood-processing facilities would likely still occur because of the widespread destruction of forests in the area.
Environmental Justice	No effect to minor adverse effect—Any disproportionate effect currently existing in the Southeastern U.S. regarding forestry-related activities would continue. Some seasonal jobs could be lost due to the lack of financial resources to support cleanup and salvage logging on small private timber plots.	Short term minor beneficial effects—Qualified land owners, including minority landowners, would be eligible for funding. In addition, EFCRP money would be available to seedling-planting contractors who hire migrant and seasonal farm workers, potentially sustaining or increasing their income. Public schools that own school trust lands may benefit from the EFCRP funds.

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2.5.1 Identification of Geographical Boundaries

EFCRP targets acres of hurricane damaged, non-industrial private forest land and school public trust lands across six States (Texas, Louisiana, Mississippi, Alabama, Florida, and North Carolina). Figure 1-1 Chapter 1 shows the eligible counties for EFCRP, and a list of the counties is included in Appendix D.

2.5.2 Identification of Temporal Boundaries

In accordance with the amendments made to the Food Security Act of 1985, FSA is authorized to enroll land in EFCRP until the acreage limitation and/or funding limitation is met.

The contract term for EFCRP is 10 years. For acreage enrolled in CRP under EFCRP, FSA county offices shall use the current continuous signup number. Continuous signup numbers change the beginning of every fiscal year.

Depending on the type of CP used, planting or sowing of the approved cover shall be completed within the following timeframes of the effective date of CRP-1 (Table 2.4).

Table 2.4. Timelines for implementation of conservation practices.

Conservation Practice	Timeframe for Implementation
CP 35A and CP 35B longleaf pine new and existing	Within 24 months
CP 35C and CP 35D bottomland hardwood new and existing	Completed by the end of the next normal planting period, unless the producer can provide acceptable documentation that seed or tree stock is not available
CP 35E and CP 35F softwood restoration new and existing	Within 24 months
CP 35G and CP 35H upland hardwood new and existing	Within 12 months; over 36 months would be allowed when: • 10.0 acres or more are scheduled to be established; and • Hardwood tree planting is included in the tree planting plan
CP 35I mixed existing	Per type-specific timeframe for implementation as listed above.

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3.0 AFFECTED ENVIRONMENT

The Affected Environment discussion in this PEA addresses the following resources:

- Biological resources (including wildlife and fisheries, vegetation, and protected species and habitat)
- Cultural resources (including archaeological resources, architectural resources, and traditional cultural resources)
- Water resources (including surface water, groundwater, sole source aquifers, coastal zones, wetlands and floodplains)
- Soil resources
- Air quality
- Recreation
- Health and Human Safety
- Socioeconomics
- Environmental Justice

3.1 BIOLOGICAL RESOURCES

3.1.1 WILDLIFE AND VEGETATION

3.1.1.1 Affected Environment

Forests are the dominant land cover in the southeastern U.S., covering approximately 214 million acres of the landscape, with commercial timberland accounting for nearly 94 percent of the total. Georgia, Alabama, Mississippi, North Carolina, and Virginia are the most heavily forested of the southeastern States. Non-Industrial Private Forest (NIPF) land accounts for about 138 million acres or two-thirds of southern forest timberland (Dickson 2003).

Longleaf pine forests in Southeastern United States.

Upland hardwoods cover 37 percent of the timberland, while bottomland hardwood forests account for 15 percent, with over half of bottomland located in the alluvial floodplains of Louisiana, Florida, Georgia, and Mississippi. Pine woodland occupies nearly 37 million acres, where loblolly pine is the most common species. Pine plantations comprise nearly 15 percent of southern commercial forests region, with loblolly and slash pine being the most widely planted species (Dickson 2003).

The management of wildlife and forestry resources is the responsibility of individual State wildlife, conservation, and forestry divisions.

Natural vegetation is a result of the combination of geography, soils, and climate, and natural systems do not conform to jurisdictional boundaries. Given the regional scope of EFCRP, this PEA employs the

NRCS Land Resource Regions (LRR) and Major Land Resource Areas (MLRA) Handbook to describe the existing biological environment as related to resource area, rather than State jurisdictional boundaries (NRCS 2006).

Figure 3.1-1 illustrates the Land Resource Regions within the project area, which includes regions N, O, P, T, and U. In this section, each LRR is described and MLRA subregions within each LRR briefly presented.

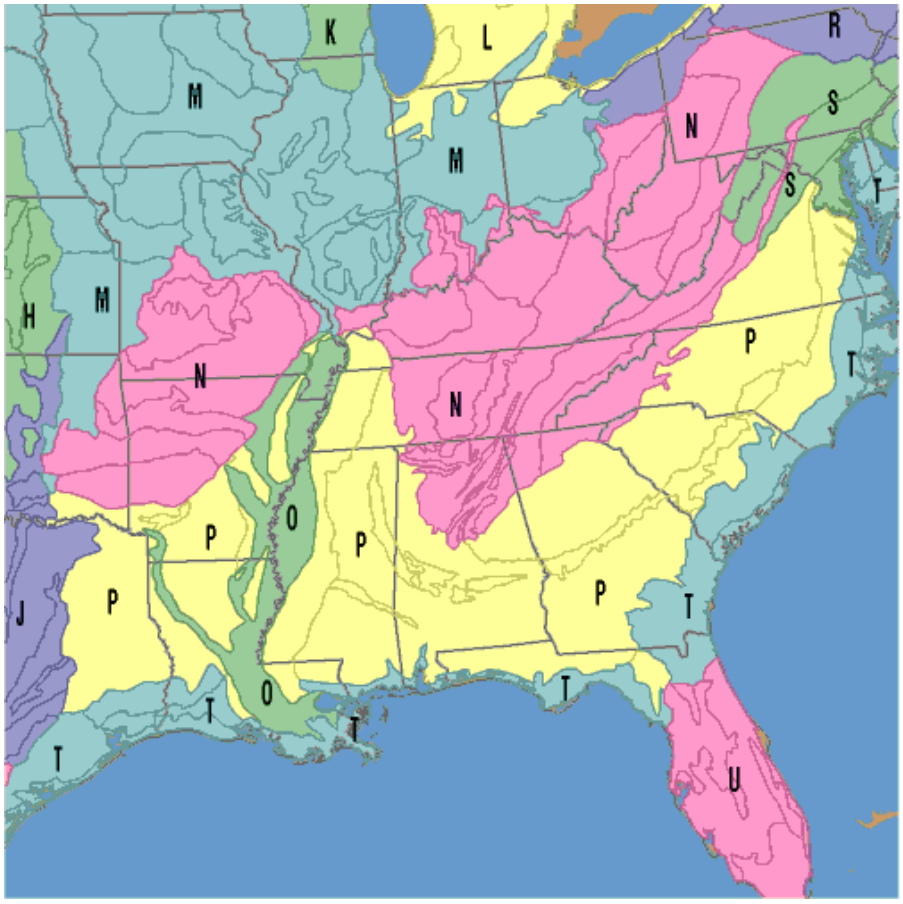


Figure 3.1-1. Major land resource regions in the southeastern U.S. based on NRCS soil survey data. (NRCS 2006).

N: East and Central Farming and Forest Region

The East and Central Farming and Forest Region covers 236,415 square miles, including portions of Kentucky, Missouri, Tennessee, Arkansas, West Virginia, Pennsylvania, Alabama, Ohio, Oklahoma, Virginia, North Carolina, Indiana, Georgia, and Illinois (Figure 3.1-2). The project area includes only a portion of this region, in Northern Alabama. The native vegetation is dominated by deciduous forests, with coniferous forests and glades at high elevations. Oak, yellow poplar, and pine are the dominant harvested species. Erosion resulting from harvest practices and maintenance of forest productivity is an environmental concern (NRCS 2006).

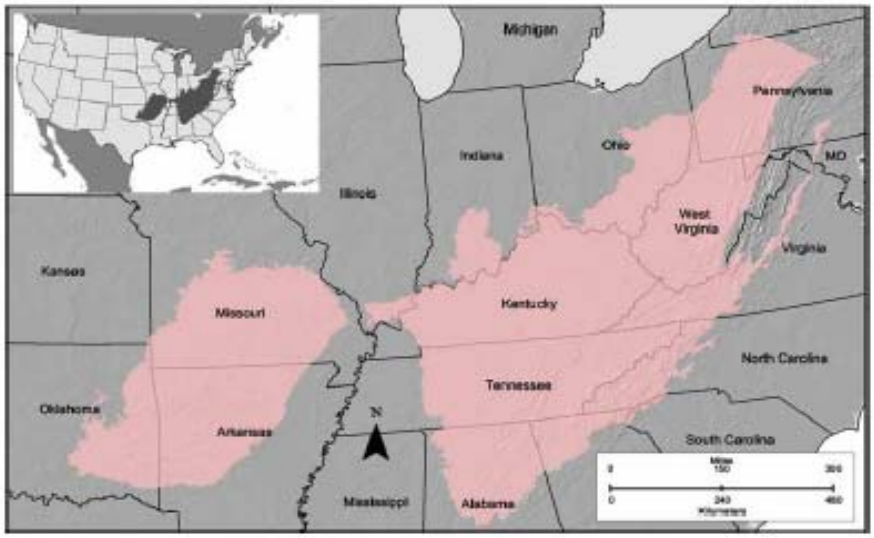


Figure 3.1-2. The East and Central Farming and Forest LRR. Source: NRCS 2006.

The project area encompassed by the East and Central Farming and Forest LRR contains three MLRAs, including the Highland Rim and Pennyroyal, South Appalachian Ridges and Valleys, and the Sand Mountain MLRA. Vegetation in this LRR is dominated by hardwood or mixed hardwoods and pine, and includes oak-hickory stands, yellow poplar, shortleaf pine, loblolly pine, Virginia pine, sweetgum, American beech, red oak, and white oak. Major understory species in the MLRAs include a variety of grasses, forbs, vines, and shrubs such as little bluestem, broomsedge, Japanese honeysuckle, greenbrier, low panicums, and native lespedezas (NRCS 2006).

Some of the major wildlife species in this area are white-tailed deer, red fox, gray fox, bobcat, raccoon, skunk, opossum, muskrat, mink, cottontail, gray squirrel, fox squirrel, bobwhite quail, and mourning dove. The species of fish in the area include carp, bullhead, largemouth bass, and bluegill (NRCS 2006).

O: Mississippi Delta Cotton and Feed Grains Region

The Mississippi Delta cotton and feed grains region covers 38,865 square miles over Arkansas, Louisiana, Mississippi, Missouri, and Tennessee (Figure 3.1-3). The region is characterized by smooth terraces and floodplains of the Mississippi River and major tributaries south of the confluence with the Ohio River. The area includes rich agricultural land and deciduous bottomland forests (NRCS 2006). The EFCRP area includes western Mississippi along the river as well as central Louisiana extending to the Gulf Coast.

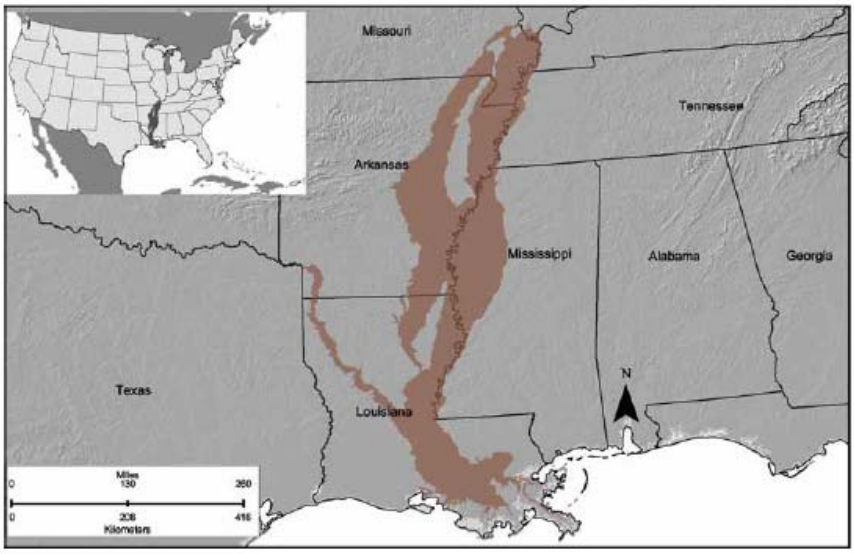


Figure 3.1-3. The Mississippi Delta Cotton and Feed Grains LRR. Source: NRCS 2006.

There are four MLRAs within the project area included in the Mississippi Delta Cotton and Feed Grains LRR: the Southern Mississippi River Alluvium, Arkansas River Alluvium, Red River Alluvium, and the Southern Mississippi River Terraces. The defining feature of this LRR is the Mississippi River (NRCS 2006).

The Alluvium MLRAs are dominated by bottomland hardwood forest and associated Cypress and Cypress-Tupelo Swamps (LDWF 2005). The major tree species in the areas of bottomland hardwoods are water oak, Nuttall oak, cherrybark oak, native pecan, red maple, sweetgum, eastern cottonwood, and hickory, while cypress, water tupelo, water oak, green ash, red maple, and black willow dominate in the swamps. Important native understory species include palmetto, greenbriar, wild grape, and poison ivy in the areas of bottomland hardwoods and buttonbush, lizardtail, waterlily, water hyacinth, sedges, and rushes in the swamps (NRCS 2006).

The Southern Mississippi River Terraces are dominated by hardwood and pine forests. Cherrybark and Shumard oak are widely distributed, and yellow poplar, white ash, cottonwood, and black walnut are important species on the floodplains. Loblolly pine and shortleaf pine are on a wide variety of sites, mainly the eroded soils on uplands and ridges. Other species that commonly grow in this area are white oak, basswood, sweetgum, water oak, American elm, blackgum, sycamore, sassafras, southern red oak, chinkapin oak, American beech, and hickory (NRCS 2006).

The diversity of vegetation in the region provides a highly productive habitat for a range of species. Over 240 fish species, 45 species of reptiles and amphibians, and 37 species of mussels depend on the river and floodplain system. In addition, 50 species of mammals and approximately 60 percent of all bird species in the contiguous U. S. currently utilize the Mississippi River and its tributaries and/or their associated floodplains (MMNS 2005).

Some of the major wildlife species in this area are white-tailed deer, fox, coyote, rabbit, gray squirrel, American alligator, water turtles, water snakes, frogs, otters, beavers, armadillo, crawfish, wild turkey, mourning doves, ducks, and geese. Fishing is mainly in oxbow lakes, rivers, and bayous. The species of fish in the area include largemouth bass, smallmouth bass, catfish, drum, bluegill, gar, and yellow perch. Crawfish are a commercial species in the southern end of this LRR (NRCS 2006).

P: South Atlantic and Gulf Slope Cash Crops, Forest, and Livestock Region

The South Atlantic and Gulf Slope Cash Crops, Forest, and Livestock Region covers 264,095 square miles over Georgia, Mississippi, Alabama, North Carolina, Texas, Louisiana, South Carolina, Virginia, Arkansas, Florida, Tennessee, Kentucky, and Oklahoma (Figure 3.1-4). This region covers much of the project area including most of central and eastern Mississippi, central and southern Alabama, northern Louisiana, eastern Texas, and much of the Florida panhandle. The smooth Atlantic and Gulf Coast marine terraces and hilly piedmont areas covering the area are dominated by oak-pine forests (NRCS 2006).

The South Atlantic and Gulf Slope Cash Crops, Forest, and Livestock LRR encompassing the project area include five MLRAs: the Southern Coastal Plain, Western Coastal Plain, Southern Mississippi Valley Loess, Alabama and Mississippi Blackland Prairie, and Southern Piedmont (NRCS 2006).

This region is heterogeneous, extending northward from the coast and containing barrier islands, coastal lagoons, marshes, lowlands, southern mixed forests, oak-hickory-pine forests, and oak-hickory forests, interrupted by occasional southern floodplain forests and black belt prairies. This ecological diversity makes this region one of the biologically richest in North America. Wet bottomlands include natural communities such as forested seeps, bayhead swamps, small stream forests, bottomland hardwood forests, and cypress swamps (NRCS 2006). The region features a high percentage wetlands, a diversity of river and stream systems, limited but important karst areas, and significant large scale disturbance events such as hurricanes (MMNS 2005). Blackland prairies in the region are among the most distinct topographic regions in the State of Mississippi, with typically calcareous soils formerly occupied by natural grasslands and associated vegetation (MMNS 2005).

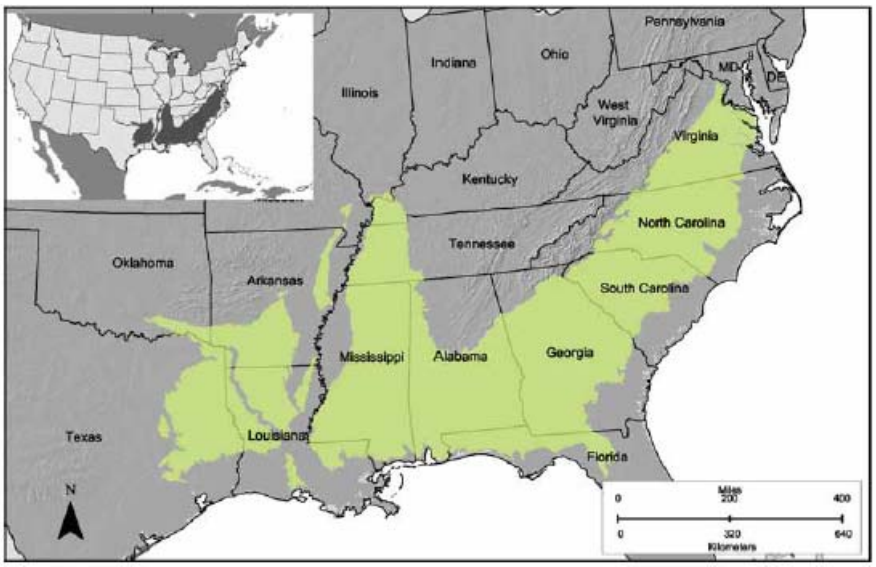


Figure 3.1-4. The South Atlantic and Gulf Slope Cash Crops, Forest, and Livestock LRR. Source: NRCS 2006.

This area supports mixed hardwood and pine vegetation. Loblolly pine, longleaf pine, slash pine, shortleaf pine, sweetgum, yellow poplar, southern red oak, post oak, and white oak are the major overstory species. Dogwood, gallberry, and farkleberry are the major understory species. Common sweetleaf, American holly, greenbrier, southern bayberry, little bluestem, Elliott bluestem, threeawn, grassleaf goldaster, native lespedezas, and low panicums are other understory species (NRCS 2006).

Although longleaf pine forests and woodlands were the dominant vegetation type of the Southeastern U.S. coastal plain, they now occur in only limited areas of this region. Northward, longleaf pine is replaced by shortleaf pine, and the majority of longleaf, oak, and hickory forests have been logged and has been replaced by loblolly pine plantations (MMNS 2005).

This region experiences high species richness, species endemism, and community diversity in terrestrial and aquatic systems. Imperiled plant species are concentrated in fire-maintained pinelands (wetland and upland) and associated seepage bogs, while significant concentrations of imperiled animal species occur in aquatic and bottomland systems (MMNS 2005). The loess bluffs provide habitat for plant species that are rare or absent from other parts of the region. In addition, the bluffs constituted a major refugium for mesophytic plant species (LDWF 2005).

Some of the major wildlife species in this area are white-tailed deer, coyote, beaver, raccoon, muskrat, mink, armadillo, rabbit, squirrel, bobwhite quail, and mourning dove. The species of fish in the area include largemouth bass, bluegill, bullhead, and channel catfish (NRCS 2006). This majority of the Mississippi Valley Loess region has been considered a priority for freshwater species conservation due to the richness of the fauna present, which includes habitat for over 206 native fish species, as well as large numbers of crawfish and mussel species (MMNS 2005).

T: Atlantic and Gulf Coast Lowland Forest and Crop Region

The Atlantic and Gulf Coast Lowland Forest and Crop Region covers 92,640 square miles over Texas, Louisiana, North Carolina, South Carolina, Georgia, Florida, Virginia, Maryland, New Jersey, Delaware, Missouri, and Alabama (Figure 3.1-5). This region includes coastal lowlands, coastal plains, and the Mississippi River delta along the Gulf Coast, as well as coastal lowlands, coastal plains, drowned estuaries, tidal marshes, islands, and beaches along the Atlantic Coast. The native vegetation is a mixture of pines and hardwoods, and the majority of private land is used for the production of lumber and pulpwood (NRCS 2006).

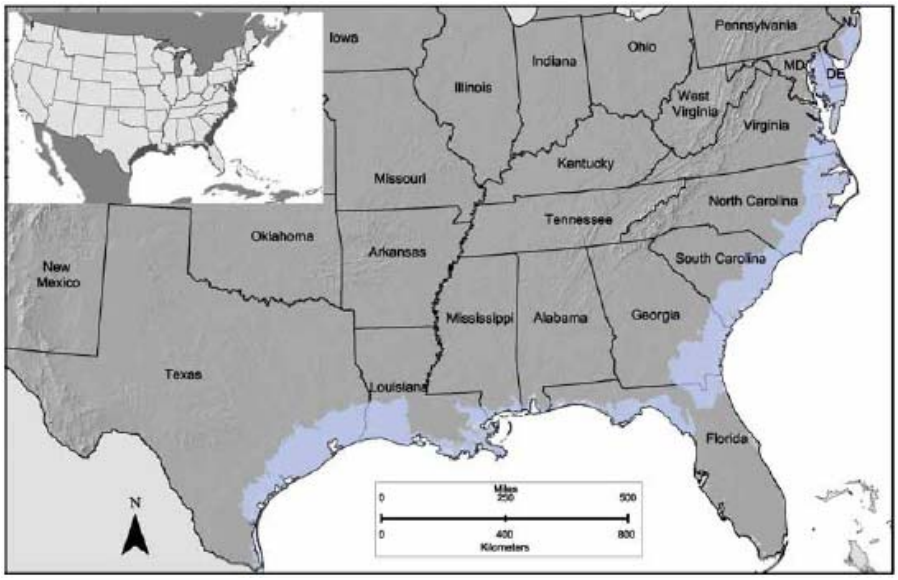


Figure 3.1-5. The Atlantic and Gulf Coast Lowland Forest and Crop LRR. Source: NRCS 2006.

This LRR includes six MLRAs: Gulf Coast Prairies, Saline Gulf Coast Prairies, Gulf Coast Marsh, Eastern Gulf Coast Flatwoods, Western Gulf Coast Flatwoods, and Atlantic Coast Flatwoods (NRCS 2006).

The Gulf Coast Prairies are dominated by natural grassland vegetation, including little bluestem, Indiangrass, switchgrass, gulf cordgrass, inland saltgrass, rushes, and sedges. The Gulf Coast Marshes support alt, brackish, intermediate, and fresh marsh types and include alligatorweed, bulltongue, marshay cordgrass, saltgrass, and black needlerush. Finally, the flatwoods on the Gulf and Atlantic coasts support mixed pine forest vegetation. On the Gulf Coast, longleaf pine, slash pine, and mixed hardwood vegetation dominate. The Atlantic Coast flatwoods consist of many swamps, marshes, and estuaries. Where longleaf pine once dominated, loblolly and shortleaf pine are now the major vegetation species (NRCS 2006).

The prairies and marshes in the area are home to a large diversity of wildlife. Some of the major wildlife species in this area are white-tailed deer, raccoon, opossum, rabbit, fox, coyote, squirrel, alligator, turkey, ducks, geese, javelina, armadillo, quail, and mourning dove. Migratory waterfowl, such as ducks and geese, and Neotropical migratory songbirds winter in this area. The species of fish in the area include bass, channel catfish, yellow catfish, blue catfish, largemouth bass, red fish, specked grout, flounder, and bream (NRCS 2006).

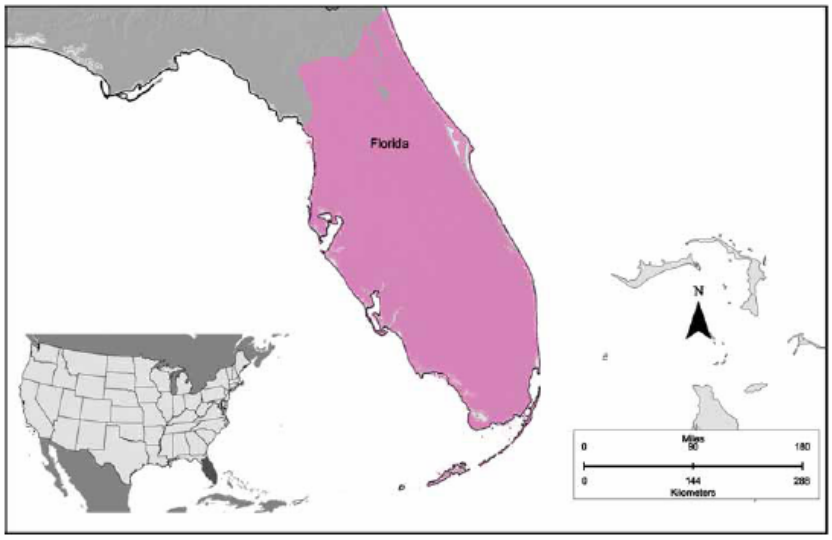


Figure 3.1-6. Florida Subtropical Fruit and Truck Crop and Range Region. Source: NRCS 2006.

The flatwoods also provide habitat for a myriad of upland and aquatic species, including a diverse assemblage of small mammals such as the cotton mouse and eastern harvest mouse, snakes such as the broad-banded water snake, copperhead, and hognose snake, and other amphibians and reptiles such as the five-lined skink, green anole, three-toed box turtle, Mississippi mud turtle, marbled salamander, East Texas toad, and bullfrog. The species of fish in the area include spotted bass, gar, bowfin, largemouth bass, crappie, catfish, bullhead, carp, and bluegill (NRCS 2006).

U: Florida Subtropical Fruit Truck Crop and Range Region

The Florida Subtropical Fruit Truck Crop and Range Region covers 35,610 square miles of southern and central Florida (Figure 3.1-6). The region includes flat, low coastal plains and more than half of the region consists of swamps and marshes (NRCS 2006). The frost free climate of Southern Florida distinguishes this region. It is characterized by flat plains with wet soils, marshland, and swamp land cover with everglades and palmetto prairie vegetation types. Relatively slight differences in elevation and landform have important consequences for vegetation and the diversity of habitat types. Although

portions of this region are in parks, game refuges, and Indian reservations, a large part of the region has undergone extensive hydrological and biological alteration (EPA 2002).

This region includes four MLRAs: South Central Florida Ridge, Southern Florida Flatwoods, Florida Everglades and Associated Areas, and Southern Florida Lowlands. The region supports "sand hill" vegetation, characterized by turkey oak, bluejack oak, and longleaf pine, as well as "flatwood" forest vegetation dominated by slash pine, longleaf pine, and live oak. Freshwater marsh and swamp vegetation, including the Florida Everglades, dominates the southernmost tip of Florida, and "hummock and slough" swamp vegetation dominated by slash pine and cabbage palm characterizes the Florida lowlands (NRCS 2006).

Wildlife in this region include white-tailed deer, feral hog, fox, raccoon, rabbit, gray squirrel, fox squirrel, turkey, bobcat, bobwhite quail, and dove. Alligators, turtles, and wading birds, including wood storks, white and glossy ibis, egrets, and herons, are abundant in the swamps and marshes. The species of fish in the area include black drum, red drum, sea trout, sheepshead, snook, tarpon, shellcracker, catfish, bluegill bream, crappie, and largemouth bass (NRCS 2006).

The Florida Everglades represent a particularly unique and valuable biological resource. Once a vast expanse of interconnected wetlands covering about 8.9 million acres, today this system has been altered by the construction of 1,000 miles of canals and 720 miles of levees. Flow is controlled by 16 pump stations and 200 gates and other water control structures. Countless rivers, sloughs and streams have been channelized or otherwise destroyed to support development or agriculture, reducing the Everglades by approximately 70 percent. These changes have drastically altered the ecosystem and negatively impacted its biological resources. About 90 to 95 percent of the wading bird population has been lost and 68 plant and animal species are now threatened or endangered. A major regional effort, the Everglades Restudy Plan, is underway to address conflicts between human use and alteration of the system and its natural ecological function (FDEP 2006d).

Fisheries

The Gulf Coast is a productive environment for commercial and recreational fishing. In 2004, the estimated commercial value of U.S. domestic landings in the Gulf was over $667 million (NMFS 2006). The Gulf Coast flatwoods and marshes are some of the most extensive and productive wetlands and seagrass habitats in the world. Freshwater and sediments from the Mississippi River and to a lesser extent freshwater entering through Mobile Bay determine the characteristics of nearshore waters in this region. Coastal waters are generally variable in salinity, and water clarity is low because of the sediment load. Bottom sediments tend to be fine clays and muds, which are ideal conditions for the growth of marshes and oyster reefs (MMNS 2005).

The drainage basin for the Gulf extends from the Appalachians to the Rockies. It contains nearly 60 percent of the land area of the continental U. S., including some the most fertile lands in the world. This productive drainage makes the Gulf one of the primary producers of finfish and shellfish in the U. S. Estuarine, seagrass and marsh environments, which populate the Gulf, are estimated to be 10 times more valuable to humans than any terrestrial habitat for ecosystem services like food production, recreation and nutrient cycling (MMNS 2005):

The Gulf Coast region also supports a diverse freshwater fishery, particularly important for recreational fishing in inland waters. Largemouth bass, striped bass, trout, and catfish are common freshwater species, and populations are often stocked by fish hatcheries such as the Edenton National Fish Hatchery in North Carolina or the Natchitoches National Fish Hatchery in Louisiana (FWS 2006c). Florida has a particularly valuable freshwater fishery, supporting both commercial and recreational uses. In 2004, over 14 million pounds of fish were caught in Florida's inland waters, including tilapia, catfish, and American eel. Important sportfish species include black basses (largemouth, shoal, spotted, and Suwannee) and crappie (FFWC 2006).

Forestry

Forests cover 214 million acres in the 13 States comprising the southern U.S., including Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia. Forests classified as timberland account for approximately 94 percent of total forestland, and private owners control more than two-thirds of this acreage (Sheffield and Dickson 1998).

Nowhere in the U.S. are there a greater variety of native plant communities, native plant species, or rare and endemic native plants than in the forests of the Southeast. However, this exceptional bounty of diversity is under increasing stress from habitat conversion, alterations in community composition, and exotic pest and disease species. The South has the greatest absolute number of introduced plant species in North America. Florida alone reports 800 introduced species existing outside of cultivation (Wear and Greis 2002).

Throughout the South, forest ecosystems have been declining. Old-growth deciduous forests, longleaf pine forests and savannahs, wet and mesic coastal plains, and Black Belt and Jackson prairies have declined by more than 98 percent since European settlement. Many species have declined more than 70 percent, including longleaf pine, live oak, mature forests, bottomland and riparian forests, and flatwood ponds (Wear and Greis 2002). The current distribution of major forest types in the southeastern U.S. is illustrated in Figure 3.1-7. Loblolly-shortleaf pine, oak-hickory, and oak-pine forests dominate the southcentral U.S. Longleaf-slash pine is abundant is along the Gulf Coast and Florida, while oak-gum-cypress swamps are limited to riparian corridors, particularly surrounding the Mississippi River.

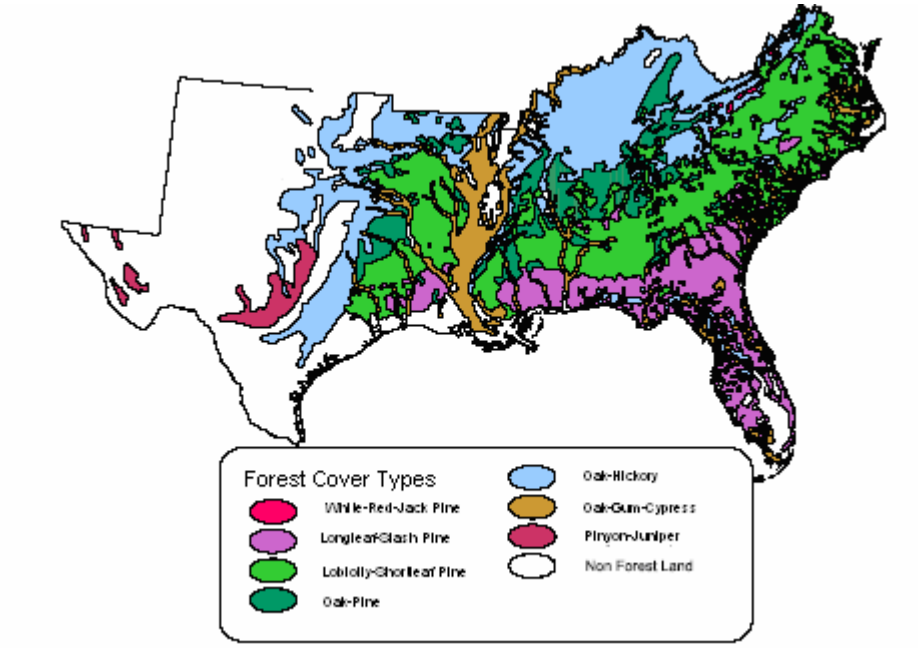


Figure 3.1-7. Major Forest Cover Types in the Southeastern United States (Wear and Greis 2002).

Despite popular opinion, the South is not dominated by southern pines, in fact, there are more hardwood trees than softwoods for almost all tree sizes for each State. Hardwood comprises 52 percent of timberland and upland hardwood forests occupy 75 million acres (37 percent of timberland). Oaks,

hickories, yellow poplar, American beech, and red maple are common in these stands. Bottomland hardwood forests cover 30 million acres (15 percent of timberland) with species such as cypress, tupelo, and blackgum. Bottomland hardwood forests are concentrated in EFCRP States, including Louisiana, Florida, and Mississippi (Sheffield and Dickson 1998).

Across the 13 southern States, one-third of timberland is classified as pine, and only 15 percent of pine is comprised of pine plantations. Loblolly pine is most commonly planted regionwide, and slash pine is the most commonly planted species in the southernmost States (Sheffield and Dickson 1998). Table 3.1-7 summarizes the percentage of timberland management classes in EFCRP States.

Table 3.1-1. Percentage of timberland in EFCRP States by forest management class.

State	Pine Plantation	Natural Pine	Oak-Pine	Upland Hardwood	Bottomland Hardwood
Alabama	18	18	19	33	10
Florida	33	19	9	14	25
Louisiana	18	21	12	15	34
Mississippi	16	15	17	32	20
North Carolina	11	22	14	38	14
Texas	15	21	21	27	15

Source: Sheffield and Dickson 1998.

Given that forestry is a valuable economic enterprise in the South, conflicts in forest management sometimes arise. Wildlife species are continuously impacted by the management and timber harvests in southern forests. Changes in land use, particularly reductions in the use of fire, have altered the structure and composition of southern forests and associated wildlife communities (Wear and Greis 2002). Loss and fragmentation of habitat has been shown to reduce reproductive success in neotropical migratory birds (Sheffield and Dickenson 1998).

However, stands receiving silvicultural treatments that promote complex forest canopies are heavily utilized by a variety of bird species. Retaining structural elements, such as a few mature trees and snags, in young, even-aged stands provides many benefits for a variety of wildlife species. Early successional stands promote diversity in plant and animal communities, but many of the beneficial aspects are negated when the canopies of these stands close (Wear and Greis 2002). The maturation of pine and natural hardwood stands favor species dependent on late successional habitat, while early successional species habitat declines (Sheffield and Dickenson 1998).

Site preparation for hardwood planting. Photo courtesy of B. Lockhart, USFS.

Insects and diseases can negatively impact forests in several ways. They can kill trees; reduce their growth; degrade wood and other products; cause dieback, decline and deformity; change the composition of the forest; reduce biological

diversity; affect water quality and quantity; create safety hazards; increase fire risk; reduce the quality of the landscape; and cause other kinds of damage. Native pests affecting forests in the South include bark beetles, Texas leaf cutting ant, forest tent caterpillar, and hardwood borers (Wear and Greis 2002).

Damaged trees indicative of Southern Pine Beetle infestation. Photo courtesy of G..J. Lenhard, www.forestryimages.com.

One of the most destructive and costly insect pests in the South is the southern pine beetle (SPB). From 1999 to 2003, SPB caused unprecedented $1.5 billion in damage on more than 1 million acres on private farms and forests, industry lands, State lands, national forests, and other Federal lands across the South. These losses severely impacted the natural resource base that supports the South's tourism and wood-based manufacturing industries, and also destroyed the habitat of threatened and endangered species, such as the red-cockaded woodpecker. In the aftermath of large infestations, dead and downed trees provide abundant fuel for wildfires, and pose additional threats to transportation corridors and public safety. Even though SPB populations have declined since 2003, epidemic populations will occur again and numerous high-hazard stands remain. The impact of future outbreaks in these high-hazard stands can be significantly reduced through healthy forest management. There are currently 15 million acres of pine forests in all 13 southern States in the South that are at risk of having 25 percent mortality in the next 15 years (Figure 3.1-8) (USFS 2005a).

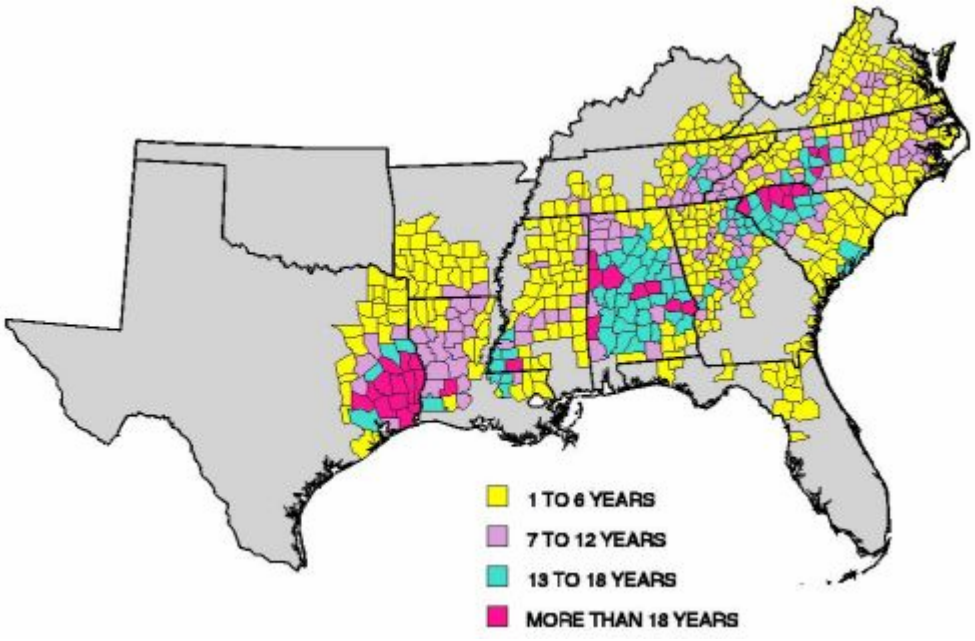


Figure 3.1-8. A 40 year summary of counties in outbreak status for southern pine beetle (Wear and Greis 2002).

The Southern Pine Beetle Prevention and Restoration Program, part of the USFS's Forest Health Protection Program, is a part of the comprehensive and integrated approach to managing SPB on Federal, State, and private lands. This program emphasizes proactive integrated pest management strategies such as prevention instead of relying on attempts to suppress outbreaks once they are underway. Forest Health Protection has funded restoration and prevention work on 12 National Forests, and is helping to develop SPB prevention programs in all 13 States in the Southern Region (USFS 2005a).

Invasive Species

Invasions of non-native plants into southern forests continue, increasingly eroding forest productivity, hindering forest use and management activities, and degrading diversity and wildlife habitat. Often called nonnative, exotic, nonindigenous, alien, or noxious weeds, they occur as trees, shrubs, vines, grasses, ferns, and forbs. While some have been introduced into this country accidentally, most were brought here as ornamentals or for livestock forage. Without natural predators and diseases to keep populations in natural balance, invasive species increase across the landscape with little opposition, beyond the control and reclamation measures applied by landowners and managers on individual land holdings (Miller 2003). Invasive species are a substantial problem in most ecological systems, both terrestrial and aquatic, in the southeastern U.S. However, in this PEA, only those species directly impacting southern forests will be discussed, as the nature of the program will target these species.

There are 33 plants or groups invading the forests of the 13 Southern States at an alarming rate, showing both growing and dormant season traits (Miller 2003). Table 3.1-8 summarizes the major invasive species in southern States.

Table 3.1-2. Invasive exotic plant species in southeastern U.S. Forests.

Species	Description	Species	Description
Tree-of-Heaven	Tree	English Ivy	Vines
Silktree, Mimosa	Tree	Japanese Honeysuckle	Vines
Princesstree, Paulownia	Tree	Kudzu	Vines
Chinaberrytree	Tree	Vincas, Periwinkles	Vines
Tallowtree, Popcorntree	Tree	Nonnative Wisterias	Vines
Russian Olive	Tree	Giant Reed	Grass
Silverthorn, Thorny Olive	Shrub	Tall Fescue	Grass
Autumn Olive	Shrub	Cogongrass	Grass
Winged Burning Bush	Shrub	Nepalese Browntop	Grass
Chinese / European Privet	Shrub	Chinese Silvergrass	Grass
Japanese / Glossy Privet	Shrub	Bamboos	Grass
Bush Honeysuckles	Shrub	Japanese Climbing Fern	Fern
Sacred Bamboo, Nandina	Shrub	Garlic Mustard	Forb
Nonnative Roses	Shrub	Shrubby Lespedeza	Forb
Oriental Bittersweet	Vines	Chinese Lespedeza	Forb
Climbing Yams	Vines	Tropical Soda Apple	Forb
Winter Creeper	Vines		

Source: Miller 2003.

Millions of acres of forest land in the Southeast are occupied by exotic invasive plants. Kudzu and Japanese honeysuckle occupy more than 7 million acres each, and their spread rates are increasing. Clearcuts in the South can become infested with exotic vines, which can prevent the growth of seedlings

and retard timber yields. English ivy and Japanese honeysuckle can overgrow and eventually kill trees and understory plants, transforming native communities into virtual monocultures of exotic vines, herbs, and shrubs. Chinese privet can replace native understory species and prevent forest regeneration in riparian forests and bottomland hardwood-pine forests (Wear and Greis 2002).

Biological invasions by exotic species may displace native animals and plants, disrupt nutrient and fire cycles, and change the patterns of plant succession. Approximately 42 percent, or about 400, of the 958 species that are listed in the U. S. as threatened or endangered under the ESA are at risk because of competition with or predation by exotic species. In south Florida, exotic plant species, such as Australian pine, Brazilian pepper, and leatherleaf fern, are invading disturbed areas and outcompeting native vegetation, reducing key deer foods and habitat (Wear and Greis 2002).

Kudzu, a Japanese vine introduced as an ornamental plant, covers nearly 7 million acres in the Southeastern U.S. Photo Courtesy of J.D. Byrd, MSU.

Despite the tendency of some exotic plant invaders to form dense monocultures that exclude native flora and fauna, many species of southern wildlife use exotic plant species for forage and cover, and some invasive plant species in southern forests were introduced because they were considered beneficial for wildlife habitat. For instance, Japanese honeysuckle, multiflora rose, lespedeza, and Chinese tallow can provide valuable food, cover, and habitat for songbirds and gamebirds. Still, the benefits of exotic species for wildlife can be provided by native species without the detrimental impacts on native forest vegetation (Wear and Greis 2002).

Insects and diseases have had considerable impact on southern forests during the past century, and serious damage from native and non-native invasive pests is expected to continue. About 360 exotic insect species have become established in American forests and approximately 30 percent of these species have become serious pests. The negative effects of invertebrate pest species, such as the gypsy moth and the balsam woolly adelgid, to southern forests have been well documented. Longleaf pine is the least susceptible of the southern pines to most insect and disease pests currently affecting southern forests, and its restoration on former longleaf pine sites currently forested with loblolly, slash, and shortleaf pine should lessen the impact of known insect and disease pests in those areas. For virtually all pests, stand age and density, tree size, and species composition affect pest behavior. Forest pest impact is greater in less intensively managed forests, and on small private tracts and public landholdings than on private industrial forests. Integrated pest management, which employs silvicultural methods and various mechanical, manual, biological, and chemical tools, is the most successful strategy currently available for pest management (Wear and Greis 2002).

3.1.2 PROTECTED SPECIES AND HABITAT

3.1.2.1 Affected Environment

With 116 federally listed species, Alabama has the most federally listed species of the States in the project area, including 98 animals and 18 plants. The State has numerous listed invertebrates, many of which are mussels. There are 112 federally listed T&E species in Florida, including 57 animal and 55 plant species. Florida has the greatest number of T&E plant species in the project area. Louisiana has 30 federally listed species, including 26 animals and 4 plants, and there are 41 federally listed species in Mississippi, including 37 animals and 4 plant species. North Carolina has 63 federally listed species, including 36 animals and 27 plant species. Finally, there are 94 federally listed T&E species in Texas, including 66 animals and 28 plant species (FWS 2006).

The freshwater ecosystems of the Southeastern U.S. support freshwater fish and shellfish. North America has the highest diversity of freshwater mussels in the world, many of which are imperiled, particularly along the Mississippi River. The Nature Conservancy estimates that two-thirds of the nation's freshwater mussels are at risk of extinction; almost 1 in 10 may already have vanished forever. In addition, half of all crawfish species are in jeopardy, over 40 percent of stoneflies are at risk, and about 40 percent of freshwater fishes and amphibians are at risk (EPA 2006g). The highest number of at-risk species per watershed are concentrated in the Southeastern U.S. (Figure 3.1-9).

Several T&E species are common to all six States in the project area. Five species of sea turtles are listed in all States, as is the gray wolf, finback whale, and humpback whale. Sturgeon are listed in all States as well, including the Alabama sturgeon in Alabama, Louisiana, and Mississippi and the Gulf sturgeon in Mississippi, Florida, and Alabama. The red-cockaded woodpecker is listed as endangered in all six States. This species prefers longleaf pine, and nests in the cavities. Table 3.1-9 summarizes the number of federally listed species in each State in the EFCRP area. A complete listing of Federal and State T&E species see Appendix B.

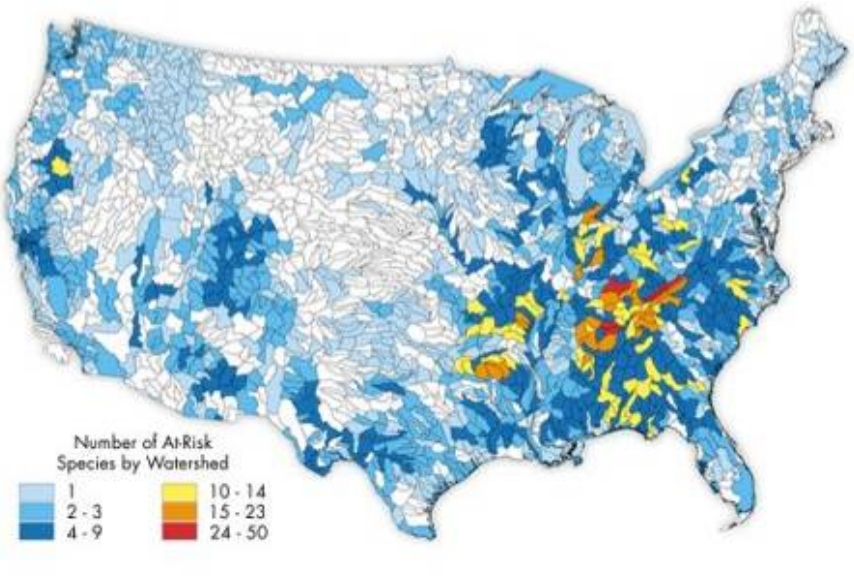


Figure 3.1-9. Hot spots for at-risk freshwater fish and mussels. Source: EPA 2006g.

Table 3.1.3. Number of federally listed animal and plants in each State in the EFCRP area.

State	Invertebrates	Amphibians & Reptiles	Fish	Birds	Mammals	Plants	Total
Alabama	59	12	15	5	7	19	116
Florida	11	12	4	11	19	55	112
Louisiana	4	8	2	6	6	4	30
Mississippi	13	9	4	6	5	4	41
North Carolina	11	5	5	6	9	27	63
Texas	20	11	11	13	11	28	94

Source: FWS 2006.

3.2 CULTURAL RESOURCES

Cultural resources consist of prehistoric and historic sites, structures, districts, artifacts, or any other physical evidence of human activities considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources can be divided into three major categories: archaeological resources (prehistoric and historic), architectural resources, and traditional cultural properties.

Archaeological resources are locations and objects from past human activities.

Architectural resources are those standing structures that are usually over 50 years of age and are of significant historic or aesthetic importance to be considered for inclusion in the National Register of Historic Places (NRHP).

A **traditional cultural property** is defined as a property that is eligible for inclusion in the NRHP because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. Traditional cultural properties may be difficult to recognize and may include a location of a traditional ceremonial location, a mountaintop, a lake, or a stretch of river, plant sources or culturally important neighborhood (U.S. Department of the Interior 1998).

There are currently 13 federally recognized Tribal entities in six States of the EFCRP project area (500Nations 2006) (Table 3.2.1).

Table 3.2.1. Federally recognized tribes in States in the EFCRP project area.

STATE	Federally Recognized Tribes
FLORIDA	Seminole Tribe of Florida
	Miccosukee Tribe
ALABAMA	Poarch Band of Creek Indians
LOUISIANA	Tunica-Biloxi Indian Tribe of Louisiana
	Coushatta Tribe
	Chitimacha Tribe
	Jena Band of Choctaws
MISSISSIPPI	Mississippi Band of Choctaw Indians
NORTH CAROLINA	Eastern Band of Cherokee Indians
TEXAS	Texas Band Kickapoo Traditional Council
	Alabama-Coushatta Tribal Council
VARIOUS	Muscogee Nation of Oklahoma
	Caddo Nation of Oklahoma
	Seminole Nation of Oklahoma

Source: 500Nations (2006).

The significance of such resources relative to the American Indian Religious Freedom Act, the Archaeological Resources Protection Act, Native America Graves Protection and Repatriation Act, EO 13007, and/or eligibility for inclusion in the NRHP is considered a part of the EA process. The regulations and procedures in 36 CFR 800, which implements Section 106 of the NHPA, requires Federal agencies to consider the effects on properties listed in or eligible for inclusion in the NRHP. Prior to approval of the proposed action, Section 106 requires that the Advisory Council on Historic Preservation be afforded the opportunity to comment.

3.2.1 Affected Environment

The waterways draining the interior of the Southeastern region of the U.S. played a major role in both prehistoric and historic times, with rivers and streams providing easy and efficient transportation for trade and commerce, as well as sustenance from the fish, shellfish, and migratory waterfowl passing through the area twice a year. These watersheds improved the land for agriculture with periodic deposits of fresh sediments. They also provided the energy to drive the mills of the Industrial Revolution when it later spread across the area (NPS 2006).

There are many archaeological and architectural sites listed on the NRHP within the six States with counties eligible for EFCRP. A summary of the number of sites per State is included in Table 3.2.2.

Table 3.2.2. Summary count of NRHP listed sites for States in the EFCRP area.

State	Sites Listed on the NRHP, within the EFCRP-Eligible Counties
Alabama	739
Florida	621
Louisiana	1,275
Mississippi	1,277
North Carolina	172
Texas	283

Source: NPS 2006d.

The States do not maintain a list of TCPs, so no TCPs within the project area are included in the summary count above.

3.2.1.1 Alabama

Archaeological Resources

Prehistoric Period

As early as 11,000 B.C., Paleoindians lived in small nomadic groups located in areas where animals and plant foods were plentiful. Paleoindians camped near streams in temporary shelters made of branches, grass, and hides. They also occupied high ground where game could be observed. They hunted bison, mammoth, and mastadon and smaller game such as deer and rabbit. When an animal was killed, all of its parts were used. The meat was eaten, the hide tanned and used for clothing and shelter, bones were made into awls, pins, fish hooks, and other tools (UA 2005).

The Archaic Indian period (6,000– 2,000 B.C.) reflected Indians in small nomadic groups that remained longer in each camp location and exploited smaller geographical areas. During the fall and winter, they camped in the forested hills where the hunting was better and they could also gather nuts. In the summer and spring, Archaic people returned to the lower lying river valleys to take advantage of fishing and collecting shellfish. New tools introduced in this period include the atlatl and nutting bowls to grind nuts and plants (UA 2005).

During the Woodland period (2,000 B.C. – A.D. 1,600), population expanded and people stayed in one place for extended periods. Ceramics that were being produced by groups along the Atlantic coast began to spread westward into Alabama (UA 2005).

Woodland Indians continued to hunt small game and forage in the forests, but cultivating plants such as maize, sunflowers, beans and squash led to a more sedentary society. Towns and villages appear to be occupied year round. In the spring, summer, and fall the Woodland Indians hunted and tended their gardens. By drying the meat and storing their crops and gathering nuts, the Woodland Indians could remain in their villages during the lean winter months. The Woodland Indians also added pipes and the bow and arrow to their tool assemblage (UA 2005).

In addition, The Woodland Indians constructed conical mounds for ceremonial purposes. The Alabama landscape includes numerous conical mounds. Across the Tennessee-Alabama border is Pinson Mounds, a Tennessee State archaeological park, made of 15 mounds and many other earthworks across 1,200 acres. The tallest mound at that park is Sauls Mound with a height of 72 feet (UA 2005).

The Mississippian period (2,000 B.C. – A.D. 1,600) followed, with population expanded and some groups stayed in one place for extended periods. Tools and other objects used by Indians in this period included stone and pottery vessels, baked clay balls, as well as decorative or ceremonial objects.

Around the time of Columbus, the prehistoric societies had largely faded, replaced by new tribes such as the Alabamous, Mobilians, and Taensa, from whom key place names (Alabama, Mobile, and Tensaw) were derived (AWF 2006).

Indians of this period also constructed large earthen mounds. Two representative sites in Alabama are the Bottle Creek Indian Mounds and Moundville. Archaeologists believe that leaders of a Mississippian Period Indian culture lived atop these mounds during their cultural dominance around 700 years ago (AWF 2006).

Historic Period

In 1559, explorer Tristan de Luna waded ashore in Mobile Bay to attempt one of the first European settlements in the New World. Where Spanish efforts fizzled, the French settled successfully in the Mobile Delta area in the early 1700s (AWF 2006). The Creek Indians invited the French to build Fort Toulouse in 1717. The fort was turned over to the British after the French and Indian War (1756-1763) and was used as a trading center (Wetumpka 2006).

Old St. Stephens is an important site on the Tombigbee River, just above shoals that prevented boats from going further upstream. During a brief three decades, St. Stephens was the site of a Spanish fort (1790), an American fort (1799) and trading post with the Choctaw Indians, and the Alabama Territorial capital (1817 to 1819) (St. Stephens 2006).

A treaty signed in 1814 at Fort Toulouse between U.S. Major General Andrew Jackson and William Weatherford, the Creek Indian leader ceded 23 million acres of Creek territory to the U.S. and opened up settlement in Alabama (Wetumpka 2006). In 1819, Alabama received statehood.

Architectural Resources

Alabama's historical buildings include the earliest examples of folk vernacular architecture, ranging from simple two-story farmhouses known as "Ihouses" to Greek Revival. Alabama's architecture reflects the many different eras in American History, including The Old Southwest, King Cotton, The Civil War, and Civil Rights (Kaufmann 2005).

Classic Modern architecture returned from the embellishments of the Victorian style to adapt the International style. Classic Modern structures used geometric form and flowing space. Examples of this style include the Waterman Building in Mobile, the Bank for Savings Building, the AmSouth Building in Birmingham, the Isle Dauphin Club on Dauphin Island, and the YMCA Downtown Branch in Birmingham. The International Style was also adapted for the postwar housing boom. Houses for the new market used joined spaces, open interiors, and connections between outside and inside. Auburn's Applebee-Shaw house, Birmingham's Brown-Hughey House, and the Crestwood Subdivision in Birmingham exemplify small-scale Classic Modern architecture (Bowsher 2006).

Traditional Cultural Properties

Federally recognized tribes with traditional ties to Alabama include the Poarch Band of Creek Indians, the Eastern Band of the Cherokee and the Muscogee Nation of Oklahoma. The Alabama Department of Archives and History does not maintain a list of traditional cultural properties within the State.

3.2.1.2 Florida

Florida was the gateway to the New World. Its cultural heritage represents the presence of people for over 12,000 years. This heritage is embodied in historic buildings and structures, prehistoric and historic

archaeological sites, artifacts, documents, and public records, as well as in the traditions and folkways of the State's diverse citizenry.

Florida was named by Spanish explorer Juan Ponce de León when he first saw it during *Pascua Florida*, the Feast of Flowers, at Easter 1513. Ponce was followed by other Spaniards who established St. Augustine in the land of the native Timucuan Indian people in 1565. This settlement is the oldest continuously occupied city in the U.S. To the West, Pensacola was Florida's only other major Spanish settlement. The Spanish colonized the land by establishing missions among the native populations. Mission San Luis de Apalachee, at present-day Tallahassee, was the headquarters for the chain of missions that spread east toward St. Augustine (Mattick 2005).

Over the next 250 years, Florida was an arena of colonial rivalry between the French, Spanish, British, and Americans. Florida became a U. S. territory in 1821. In 1824, Tallahassee was established as the territorial capital, midway between St. Augustine and Pensacola. Today's Tallahassee stands on the site of what once was the capital of the native Apalachee Indian people (Mattick 2005).

As of 2005, Florida's Master Site File (its record for archaeological and architectural listings) had recorded more than 150,000 resources, with approximately 7,000 being added annually (Mattick 2005).

Archaeological Resources

Prehistoric Period

The cultural characteristics of the prehistoric time period in Florida were similar to Alabama to the north and west. From the earliest Paleoindian hunters (11,000 – 6,000 B.C.) to the time of the Spanish explorers, Florida's first inhabitants were Native Americans. Along the coasts and St. Johns River, shellfish was an important resource. Huge mounds of shell still attest to the presence of pre-European living. On the richer soils in the Florida panhandle, people grew corn, beans, and squash, and settled villages. An example of the Paleoindian time is the Page/Ladson Site in Jefferson County, dating from 10,000-7,500 B.C.

Approximately 1,500 Archaic (6,000 – 2,000 B.C.) sites are recorded throughout Florida. In general, most Archaic sites are found in the interior highlands, along the Atlantic coast, in the St. Johns River Valley, along the southwest coast, in the Everglades, along the Gulf coast near Tampa, and along the coast of the panhandle, although isolated Archaic points are found throughout the State. Because sea levels continued to rise during the Archaic, many more Archaic sites are undoubtedly located on the continental shelf off the coast of Florida. Examples of the Archaic period is the Windover Site near Titusville, which dates from 7,500 B.P., and the Crystal River Indian Mounds, dating from 500 B.C. to A.D. 200.

About 1,000 years ago, the well-known Mississippian chiefdoms began to construct large pyramids of earth, some more than 40 feet high, organized in regular patterns around a central plaza. The Apalachee, the Timucua, the Tocobaga, and the Calusa ranked among the largest and most powerful chiefdoms encountered by European explorers. From initial European contact in the early 1500s, less than 200 years elapsed before these great societies fell victim to disease, warfare, and slavery. The Florida landscape is rich with remains of their mounds, canals, plazas, villages, and other sites.

Historic Period

Following the Woodland stage is the North Florida and North Peninsular Gulf Coast stages (2,500 B.C. – A.D. 1700). Following the Deptford culture (2500 B.P.-200), poorly represented in both regions, ceramic assemblages are different enough to allow recognition of separate, but related regional cultures. In north Florida these post-Deptford cultures are McKeithen Weeden Island (A.D. 200-700); a post-McKeithen Weeden Island assemblage tentatively called Indian Pond which appears to last into the late prehistoric or early historic period (A.D. 700 to ca. 1585); and a mission period assemblage associated with the Leon-Jefferson ceramic complex (ca. A.D. 1585 to ca. 1700). Approximately 300 sites are

recorded in the North Peninsular Gulf Coast stage. This stretch of the Gulf coast has received less archaeological attention than perhaps any other in Florida. The region is also notable for its lack of environmental and cultural homogeneity through both space and time. Because of these factors, the prehistory of the area is poorly known and resists definition as a single archaeological culture area (FDHR 1990).

Architectural Resources

Architectural resources in Florida span over 400 years. Architectural sites include Fort Caroline, the 16th century site of the French attempt to colonize Florida; the Castillo de San Marcos in St. Augustine, constructed between 1672 and 1696 and the oldest masonry fort in the U.S.; the Town of Eatonville, established in 1887 as the first all-black incorporated town in Florida; Florida's Old Capitol, restored to its 1902 configuration and serving today as the Florida Center of Political History and Governance; the Miami Beach Art Deco Architectural District; and the Kennedy Space Center (Mattick 2005).

The Arcadia Mill Site in Milton represents the first and largest Early American water-powered industrial complex in Florida. This was a multi-faceted operation with various mills, shops, a mule-drawn railroad, and a sixteen mile log flume. Although the complex operated only for 38 years (from 1817 to 1855), it played a pivotal role in the political and economic development of northwest Florida (UWF 2006).

Traditional Cultural Properties

Federally recognized tribes with traditional ties to Florida include the Seminole Tribe of Florida and the Miccosukee Tribe. The Florida Division of Historic Resources does not maintain a list of traditional cultural properties within the State.

3.2.1.3 Louisiana

Louisiana has a huge and diverse collection of prehistoric and historic sites and buildings which reflect the wide variety of social, economic, cultural, political, artistic and architectural trends that shaped the State over the centuries. There are also several submerged cultural resources in the Gulf of Mexico and in the lakes, rivers, and bayous of the State.

Archaeological Resources

Due to its rich cultural history, several thousand prehistoric and historic sites have been recorded in Louisiana. The following reviews the principal prehistoric and historic periods relevant to Louisiana.

Prehistoric Period

The prehistory of Louisiana is typically divided into three periods – *Paleo-Indian, Meso-Indian,* and *Neo-Indian*. As early as 11,000 B.C., Paleo-Indians lived in small nomadic groups that remained in areas where animals and plant foods were plentiful. Paleo-Indians camped near streams in temporary shelters made of branches, grass, and hides. They also occupied high ground where game could be observed. They raised no animals or crops, did not have metal implements, and used spears tipped with lanceolate stone points made from carefully selected varieties of stone from neighboring regions. Paleo-Indian sites in Louisiana are not common because few artifacts were left at any location. Changing landscape, rising sea levels, and erosion led to the disappearance of sites (Neuman and Hawkins 1993).

By 6,000 B.C. the gradual transition from the late Paleo-Indian to the early Meso-Indian period (6,000–2,000 B.C.) had occurred. Meso-Indians (also called Archaic Indians) lived in small nomadic groups and remained longer in each camp location and exploited smaller geographical areas. Meso-Indians had a varied diet, consuming seeds, roots, nuts, fruits, fish, clams, reptiles, amphibians, birds, and mammals. Although population movements were influenced by hunting and gathering seasons, streams were the focus of settlement due to the availability of shellfish and fish. They used fishhooks, traps, and nets to procure water based food sources, and an atlatl and spear to hunt larger mammals (Neuman and

Hawkins 1993). Meso-Indians also collected plants in the spring; fruits in the summer; and acorns, pecans, and walnuts in the fall.

During the following Neo-Indian period (2,000 B.C. – A.D. 1,600), population expanded and some groups stayed in one place for extended periods. Tools and other objects used by Neo- Indians included stone and pottery vessels, baked clay balls, as well as decorative or ceremonial objects. Neo-Indians also constructed large earthen mounds. The Neo-Indian period included the following cultures: Poverty Point, Tchefuncte, Marksville, Troyville-Coles Creek, Caddo, and Plaquemine- Mississippian (Neuman and Hawkins 1993). Major Neo-Indian period settlement sites are Poverty Point, a large earthwork located in West Carroll Parish.

Historic Period

During the period of early Spanish and French exploration, Louisiana was occupied by Caddoan-speaking groups that included the Adaes, Doustioni, Natchitoches, Ouachita, and Yatasi. The territory of these groups stretched from the Ouachita River west to the Sabine River and south to the mouth of Cane River. The earliest contacts with Europeans in Louisiana are poorly documented; however, the best accounts were left by Henri de Tonti who had reached a Natchitoches village in 1690. The Ouachita lived in the Ouahita River basin and by 1720 had completely fused with the Natchitoches. In 1701 Governor Bienville and Louis Juchereau de St. Denis, guided by the Tunica chief Bride les Boeufs or Buffalo Tamer; arrived at the Natchitoches area. They visited the Doustioni, Natchitoches, and Yatasi villages in attempt to obtain livestock and salt for French settlements in lower Louisiana. After St. Denis returned to Red River in 1714, the Caddoan people in Louisiana were in regular contact with European immigrants (Webb and Gregory 1990).

Beginning in 1541 with Hernando de Soto's claim of the region for Spain, Louisiana has been governed under 10 different flags. Louisiana was at one time or another a subject of Great Britain, France, Republic of West Florida, and the U.S. At the outbreak of the Civil War, Louisiana became an independent republic for six weeks before joining the Confederacy. In 1803, Louisiana had become a part of the U.S. because of the region's importance to the trade and security of the American Midwest. New Orleans and the surrounding territory controlled the mouth of the Mississippi River upon which produce from the Midwest was transported to markets. To obtain American control over this vast territory, in 1803 President Thomas Jefferson negotiated the Louisiana Purchase with Napoleon. With the acquisition of Louisiana, Jefferson nearly doubled the size of the U.S. and made it a world power (Louisiana Department of Economic Development 1994).

Through much of its early history, Louisiana was a trading and financial center. The fertility of its land also made it one of the richest agricultural regions in America as first indigo, then sugar and cotton, rose to prominence in world markets. Many Louisiana planters were among the wealthiest men in America. However, the plantation economy was shattered by the Civil War although the State continued to be a powerful agricultural region. The discovery of sulphur in 1869 and oil in 1901, coupled with the rise of forestry sent the State on a new wave of economic growth. Eventually, Louisiana became a major American producer of oil and natural gas and a center of petroleum refining and petrochemicals manufacturing (Louisiana Department of Economic Development 1994).

Archaeological Sites

There are 36 archaeological sites in Louisiana that are listed on the NRHP. The Poverty Point site in West Carroll Parish is the largest and most complex ceremonial earthwork in North America, and the largest community of the first millennium B.C. known in the U.S. Many other archaeological sites whose NRHP eligibility has not been determined are found throughout EFCRP-eligible counties.

Historic period (1750-present) archaeological sites include both Native American and non-Native American sites. European traders, settlers, soldiers, and missionaries, encountered and interacted with the aforementioned Native groups. Historic archaeological sites may represent areas of large settlements or individual plantation, or residences, remnants of transportation systems, or other early industrial

activities, educational, religious, social, or commercial structures, ditches, dams or refuse dumps, and cemeteries or family burial plots.

Architectural Resources

Louisiana historic architectural resources include historic buildings such as plantation houses, courthouses or log cabins; historic structures such as old bridges, lighthouses or forts; and historic districts such as old residential or commercial neighborhoods. There are 96 historic districts and 1,113 individual historic properties listed on the NRHP in Louisiana.

The early architecture of Louisiana was dominated by French culture long after the territory was sold to the U.S. in 1803. While the French continued their traditions, the areas of the State outside French settlement showed different architectural styles, brought by settlers from the Eastern U.S. In the 1830's, Louisiana became a cultural battleground between the traditions of France brought by way of the Caribbean and those of England brought by settlers from the Atlantic coast (Lane 1993).

Famous structures from the 1800s include the Ursuline Convent; the Cabildo; Presbytère and Cathedral in New Orleans; the monumental columned houses along the Mississippi; the St. Charles Hotel with its 185-foot-high dome; and Belle Grove, a sprawling Romantic villa in ruins. The two competing traditions, French and English, created two types of Louisiana plantation houses (Lane 1993). The styles that continued from the late 19th century into the 20th century reflected the more global nature of architecture and styles brought to the State by both settlers and trade magazines.

Traditional Cultural Properties

Federally recognized tribes with traditional ties to Louisiana include the Alabama-Coushatta Tribe of Texas, the Caddo Tribe of Oklahoma, the Chitimacha Tribe of Louisiana, the Jena Band of Choctaw Indians, the Mississippi Band of the Choctaw, the Quapaw Tribe of Oklahoma, and the Tunica-Biloxi Indians of Louisiana (Federal Register 2002). The Louisiana Division of Historic Preservation does not maintain a list of traditional cultural properties within the State.

3.2.1.4 Mississippi

Mississippi has a rich history that is reflected in a wealth of historic properties, from prehistoric and early historic Native American sites and mounds to its architectural legacy reflecting British, French, Colonial, and other styles.

Archaeological Resources

The prehistory of Mississippi generally coincides with the sequence established for much of that vast geographic region spanning the area from the Mississippi River to the Atlantic Ocean, an area known as the Eastern Woodlands, and followed similar development patterns as those followed in Alabama to the east and Louisiana to the west.

Prehistoric Period

The earliest period in Mississippi was the Paleo-Indian period, with its nomadic activity following animals for food. Then followed the Archaic (circa 8,000 B.C. to 500 B.C.), the Woodland (circa 500 B.C. to A.D. 1000), and Mississippian (circa A.D. 1000 to 1550) periods.

Within Mississippi are found several complexes of mounds. The earliest major phase of earthen mound construction began some 2,100 years ago. Mounds continued to be built sporadically for another 1,800 years. Of the mounds that remain today, some of the earliest were built to bury important members of local tribal groups, such as the Boyd, Bynum, and Pharr mound sites. These mounds were usually rounded, dome-shapes. Later mounds were rectangular, flat-topped earthen platforms upon which temples or residences of chiefs were erected. Examples of this type of mound can be seen at the

Winterville, Jaketown, Pocahontas, Emerald, Grand Village, Owl Creek and Bear Creek sites (NPS 2006X).

Historic Period

Indians had established thousands of prehistoric settlements in Mississippi because of the area's favorable environmental factors: abundant plant and animal life, warm climate, fertile soils, and navigable rivers and streams. In 1540 during the Hernando de Soto expedition, approximately 200,000 Indians lived in the area known today as Mississippi. Primarily because of diseases introduced by the Spaniards, the Indian population declined drastically over the next two centuries. By the time the French arrived in Mississippi at the end of the 17th century, only about 37,000 Indians remained. This population fell to an all-time low of approximately 16,500 by 1750 (Morgan 2002).

This historic period brought more settlers into Mississippi, including farmers and plantation owners with slaves. Statehood was achieved in 1817, and an expansion of the textile industry in England led to the expansion of the 19th century slave trade in Mississippi. The invention of the cotton gin in 1793, the advent of the steamboat in 1811, and the introduction of the Mexican variety of cotton into the United States in the 1820s, all helped expand the plantation society in Mississippi (Barnett and Burkett 2001).

Later, during the Civil War, Mississippi played a pivotal role. It was the second State to secede from the Union. With a population of 791,000 people, Mississippi's slaves outnumbered whites 437,000 to 354,000. Slavery, therefore, seemed to be an absolute necessity for the State's white citizens. In addition, Mississippi's location along the Mississippi River made the State a scene of a number of major battles, including Vicksburg, Jackson, Raymond, Port Gibson, Corinth, Iuka, and Meridian. Both black and white Mississippians participated in the battle (Marszalek and Williams 2001). Structures and works related to those battlefields dot the surrounding landscape.

Architectural Resources

Mississippi has a rich history that is reflected in a wealth of historic properties showing the contributions of Mississippians of diverse ethnic origins. The State is widely recognized for its many fine examples of antebellum residential architecture, but its architectural legacy also includes buildings such as pioneer log houses and Art Deco skyscrapers. The oldest surviving building in the State is believed to be the De la Pointe-Krebs House (formerly referred to as the "Old Spanish Fort") in Pascagoula -- a French Creole timber-frame building, portions of which may date to the early 18th century. There are notable examples of virtually all major American architectural styles of the 19th and 20th centuries. Other sites include the Old Capitol Museum, Grand Village of the Natchez Indians, Historic Jefferson College, Governor's Mansion, Manship House Museum, and the Eudora Welty House (MDAH 2000).

There are also historic districts containing a variety of buildings and other properties; Civil War battlefields and related sites; ships and boats; shipwrecks and other underwater resources; lighthouses, bridges, earthworks, and other types of engineering works; properties associated with space exploration at the Stennis Space Center; industrial facilities; railroad facilities and equipment; historic rural landscapes and landscape features; designed landscapes including parks, gardens, and college campuses; public and private statuary and other art objects; cemeteries; historic roads and trails; and sites with traditional cultural value, as well as other types of resources (MDAH 2000).

Traditional Cultural Properties

Federally recognized tribes with cultural interests in Mississippi include the Chickasaw Nation, Choctaw Nation of Oklahoma, Mississippi Band of Choctaw Indians, Jena Band of Choctaw Indians, Quapaw Tribe of Oklahoma, and the Tunica-Biloxi Indians of Louisiana (MDAH, personal communication). The Mississippi Department of Archives and History (MDAH) does not maintain a list of traditional cultural properties within the State.

3.2.1.5 North Carolina

Archaeological Resources

Prehistoric Period

The prehistory of North Carolina generally coincides with the sequence established for much of that vast geographic region spanning the area from the Mississippi River to the Atlantic Ocean, an area known as the Eastern Woodlands, and followed similar development patterns as those followed in Alabama, Mississippi, South Carolina, Georgia, and northern Florida.

The earliest period in North Carolina was the Paleo-Indian period, followed by the Archaic (circa 8,000 B.C. to 500 B.C.), the Woodland (circa 500 B.C. to A.D. 1000), and Mississippian (circa A.D. 1000 to 1550) periods, although little of the Mississippian culture has been identified in prehistoric North Carolina (NCSHPO 1996). At the point of European contact, North Carolina's history diverges somewhat from its neighboring States.

Historic Period

Four hundred years ago, the English Roanoke colonists met numerous native inhabitants along the coast of what would become the State of North Carolina. Even earlier, during the 1540s, Spanish explorers under Hernando de Soto "discovered" several Indian groups occupying the interior regions of the Carolinas. These groups were part of a larger group occupying the entire mid-Atlantic coastal area, identifiable by a shared language and culture called Algonkian. The Native Americans whom de Soto met included Siouan, Iroquoian and Muskogean speakers, whose descendants are the historic tribes of the Catawba, Cherokee, and Creek Indians (NCSHPO 1996).

Algonkian Indians exhibited some religious ties with Mississippian practices more common in the far South. Cherokee religion and certain traits of pottery manufacture likewise may hint at parallels in Georgia, Alabama, Tennessee, and elsewhere in the heart of Mississippian territory. Ancestral ties of language or other cultural elements probably always linked North Carolina's Indians more closely with northern and western traditions; however, and such associations may have prevented the total acceptance of Mississippian cultural traits so pervasive in other Southeastern regions (NCSHPO 1996).

North Carolina was one of the thirteen original U.S. colonies and played a role in both the Revolutionary and Civil Wars. In 1726, the town of Brunswick was founded on the Cape Fear River. The port became a bustling shipping area for exporting tar, pitch, and turpentine, essential for maintaining the wooden sailing ships of the Royal Navy and the merchant fleet. Brunswick was also a political center and the residence of two royal governors. In 1765, the colonists challenged the tax stamps, which stopped the collection of tax along the Cape Fear eight years before the Boston Tea Party. The town was razed and burned by British troops in 1776 and never rebuilt. Moores Creek National Battlefield, in Pender County, was the site of the first southern battle and patriot victory in the American Revolution in 1776 (NCECHO 2005).

During the Civil War, the Confederate Fort Anderson was constructed atop Brunswick as a defense for Wilmington. The Cape Fear was an essential route for supplies moving by rail from Wilmington to Petersburg and Richmond for General Lee's army. Fort Anderson was overrun in 1865 by Union forces. Fort Fisher, farther along the Cape Fear River, was also used to protect Wilmington, and fell in 1865 (NCHS 2006).

Architectural Resources

Because of the location of the counties eligible for the EFCRP in North Carolina, many of the historic structures in the area are associated with the ocean or its coast, including lighthouses; ships; structures associated with a U.S. Navy facility; military forts, including Fort Raleigh; and shipwrecks including one thought to be the remains of Blackbeard's *Queen Anne's Revenge*. Other historical structures

include the Wright Brothers National Monument, cemeteries, churches, including African-American churches, and other public buildings (NCSHPO 1999). North Carolina's oldest standing lighthouse, Old Baldy (1817), dominates the landscape on Bald Head Island, located at the confluence of the Cape Fear River, the Intracoastal Waterway, and the Atlantic Ocean (NCECHO 2005). Other resources located in the EFCRP-eligible counties include the USS North Carolina Battleship Memorial (on the Cape Fear River); the Cape Lookout Historic District (in Carteret County); Tryon Palace, North Carolina's first capitol; .Cape Hatteras and Ocracoke Island activities; and Roanoke Island.

North Carolina was also important to the antebellum era and many plantation homes and full plantations are included on the NRHP, including Lake Landing Historic District, the State's largest historic district. There are also many historic districts in the area (NCSHPO 1999).

Traditional Cultural Properties

Federally recognized tribes with traditional ties to North Carolina include the Eastern Band of Cherokee Indians. The North Carolina Department of Cultural Resources does not maintain a list of traditional cultural properties within the State.

3.2.1.6 Texas

Archaeological Resources

The prehistory of east Texas also coincides with the sequence established for much of that vast geographic region spanning the area from the Mississippi River to the Atlantic Ocean, an area known as the Eastern Woodlands, and followed similar development patterns as those followed in Louisiana.

The earliest known inhabitants of the State can be linked to the Clovis Complex around 9,200 B.C. The distinctive Clovis fluted point is widespread and was used at least in some cases in mammoth hunting. The Folsom Complex, around 8,800-8,200 B.C., is distinguished by Folsom fluted points and is known from sites where now-extinct forms of bison were killed and butchered (Bonfire) or from campsites (Adair-Steadman) where the points are found along with other stone tools (Hester and Turner 2000).

Dalton and San Patrice points may date around 8,000 B.C. in East Texas. The Scottsbluff points in East Texas are from around 6,500 B.C. The Angostura projectile point marks the end of the Paleo-Indian period; radiocarbon dates from the Wilson-Leonard Site and the Richard Beene Site near San Antonio date it at around 6800 B.C. (Hester and Turner 2000).

Much of Texas prehistory is subsumed within a long time span of hunting and gathering cultural patterns known collectively as the Archaic (around 6,000 B.C.). In the latter Archaic period, in East Texas, pre-Caddo sites mark the beginning of settled village life shortly after 500 B.C. Cemeteries are more notable in some regions, such as Southeast Texas.

In East Texas, agriculture provides the base for the Gibson Aspect, which marks the earliest Caddoan culture; mound building, specific types of pottery and arrow points, sedentary villages, ceremonial centers, and an established social hierarchy are salient features. Around A.D. 1,200, Gibson gives way to the Fulton Aspect, which continues into the Historic era and is clearly linked with the Caddos. Examples are the George C. Davis Site with large mounds, flat-topped ones sometimes used to support structures and conical ones for burials (Hester and Turner 2000).

Larger settlements are mainly distributed on elevated landforms adjacent to major streams, while smaller farmsteads can be found along minor tributaries and spring-fed branches. Hamlets and farmsteads are the most common type of Caddoan settlement, although larger communities occur in association with mound centers. The Caddo tradition lasted until European contact.

The transition from Late Prehistoric to Historic is difficult to discern in many parts of the State. The initial European expeditions had little, if any, effect on the native cultures, which were largely unchanged for another 100-150 years (Hester and Turner 2000).

Historic Period

The historic period began in Texas in the form of the Spanish Colonial Empire. Expansion progressed slowly in the 17th century, but the number of explorations and settlements were increasing by mid century. In response to the challenges of the frontier, the Spanish used two institutions, the presidio and the mission (Tides 2005).

During this century the Spanish were very concerned with French threats to Spanish land. French trading endeavors provoked the Spanish into action in East Texas, where Spanish missionaries built missions to convert and provide aid to the Native peoples as well as entice them to help protect European land boundaries. Native populations adopted the use of European horses and guns into their cultures for hunting and raiding (Tides 2005).

By the late 17th century, the Spanish reached the home of the Caddo people. After failed attempts to convert and alter their lifestyle, the Caddo ordered the Spanish to leave their lands. In the 18th century, the mission system fell out of favor with the Spanish frontier strategy. In the 1790s, the Spanish government began to secularize missions and answer the demands of their growing civilian population for the land occupied by the missions. By the end of the 18th century, many Spanish missions had succeeded in assimilating Native American populations into a Hispanic lifestyle (Tides 2005).

The 1800s brought struggle to Texas as battles for land and control occurred between Spain and Mexico, Spain and the U.S., and Mexico and the U.S. Texas won its independence from Mexico in 1836, and in 1846 became the 28th U.S. State. It seceded from the Union and became a member of the Confederate States of America during the Civil War (1861-1865), and was readmitted again as a State in 1870 (Tides 2005).

In the 1900s to present day, East Texas is one of the most important oil and natural gas regions of the nation. It also includes heavily timbered softwood and hardwood acreage for a thriving timber industry (TSHA Online 2006).

Architectural Resources

In East Texas, the earliest fixed architectural presence came from the Caddoan people and their mounds. During the Spanish Colonial/Mexican era (the end of the 17th century and throughout the 18th century), Spanish missionaries and soldiers brought building types and construction techniques they knew at home. They established missions with chapels, convents, apartments, and various service structures; presidios with fortifications, chapels, barracks, and storerooms; ranches with dwellings and, in some instances, defensive works; and towns with plazas, commons, churches, and dwellings—all according to Spanish traditions and laws (TSHA Online 2006a).

In heavily forested East Texas, palisado walls of wooden pickets, a construction method used throughout Europe for centuries, enclosed rooms roofed with thatch in both missions and presidios. Chapels, apartments, and other spaces of San Francisco de los Tejas Mission, for instance, had walls of posts planted vertically in the ground (TSHA Online 2006a).

At San Antonio, each of the five missions there eventually built a stone chapel with a design based upon customs in Mexico. The most famous of these, San Antonio de Valero Mission, the Alamo (1718), has an incomplete chapel executed between 1744 and 1756, with a Baroque portal similar to a number of Mexican examples. The Chapel of Nuestra Señora de la Purísima Concepción de Acuña Mission (1731), the best preserved of the Texas missions, has a portal with Plateresque details. A beautiful Ultra-Baroque portal with niche pilasters was completed at San José y San Miguel de Aguayo Mission (1720), commonly regarded as the "Queen of the Missions." At both San Juan Capistrano (1731), and San

Francisco de la Espada (1731), durable chapels were built, but with little ornamentation (TSHA Online 2006a).

During the Mexican period (1821-35), relatively little architectural progress was made beyond the construction of dwellings and some military work, although several new towns were established, including Bastrop (1830), Liberty (1831), and Gonzales (1832). A poor economy, along with religious and political turmoil, precluded noteworthy undertakings (TSHA Online 2006a).

Following the Mexican period was the Republic-antebellum period (1835 to 1870), other cultural traditions and styles were brought to Texas by Anglo-Americans and European immigrants. In regions where trees were available, log cabins were common to Anglo-American and European settlers. They required few tools for construction and were used for virtually every type of building, including dwellings, churches, courthouses, schools, jails, barns, and forts.

Later, neat wooden, brick, and stone buildings appeared. Frame and masonry buildings were plain, but others were distinguished by historic styles, including the Greek Revival style, which dominated Texas architecture from 1840 to 1870. The Greek Revival style marked numerous houses, school buildings, some courthouses and churches, and even an occasional commercial building. Examples of the Greek Revival include the Governor's Mansion (1854-56) in Austin, the Galveston Post Office and Custom House (1858-61) and the Methodist Episcopal Church, South (1860) (TSHA Online 2006a).

The Republic-antebellum period gave way to the Victorian period, following the Civil War (1870 to 1900). The economy and technology were growing at this time, with several new towns being established and other regions further west being opened for farming and ranching. The expansion was reflected in architecture as well, with the Greek Revival style being pushed out by the Victorian style. This style was rich in detail, exceedingly ornate, and designed to achieve a romantic and picturesque effect. The buildings were seldom symmetrical, but were characterized by the off-center tower and projecting bay. Among the impressive surviving monuments of the era are the Driskill Hotel (1880), Austin, the Turn-Verein Building (1892), San Antonio, the Albert Maverick Building, San Antonio (1881), the granite Capitol (1888), and several structures in Galveston, including the Bishop's Palace. Large courthouses and adjacent jails, banks, opera houses, and churches in various Medieval, Romanesque, and Gothic styles were common at this time (TSHA Online 2006a).

The years following the turn of the century witnessed continuing immigration and growth of towns and cities throughout the State. During this period, architecture throughout the United States embodied new aesthetic ideals aimed at achieving noble images reflecting cultural advancement. Eclecticism dominated the first 30 years of the twentieth century, where structures reflected formal principles with the addition of some characteristics of its locale. Skyscrapers started appearing in larger cities, and styles diversified and followed both local and national trends (TSHA Online 2006a).

Traditional Cultural Properties

Federally recognized tribes with traditional ties to Texas include the Texas Band Kickapoo Traditional Council, Alabama-Coushatta Tribal Council, Muscogee Nation of Oklahoma, Caddo Nation of Oklahoma, and Seminole Nation of Oklahoma. The Texas Historical Commission does not maintain a list of traditional cultural properties within the State.

3.3 WATER RESOURCES

3.3.1 SURFACE WATER

The Clean Water Act (CWA) of 1972 requires States to report on the water quality of waterbodies and their ability to support beneficial uses (e.g., recreation, drinking water, fisheries, aquatic life, agriculture). Under the CWA, States are required to identify and establish a priority ranking of all waterbodies that are not meeting the State water quality standards of their designated beneficial uses.

These waterbodies are often referred to as impaired, and are included on a Water Quality Limited Segments List (commonly called a 303(d) list) that is issued every two years by each State. Development of a total maximum daily load (TMDL) is required for impaired waterbodies. A TMDL is described as a pollution budget for a specific river, lake, or stream, and is an established wasteload allocation for point and nonpoint sources.

Production of high quality water is a major benefit of forestland and silviculture activities such as road construction and use, timber harvesting, regeneration methods, site preparation, mechanical equipment operation, prescribed burning, and application of chemicals can result in impacts to water quality. BMPs can reduce impacts to water quality from forestry practices. BMPs are any practice or routine procedure designed to either reduce pollutants that can be picked up by surface runoff or reduce the amount of pollutants in runoff before it reaches a body of water. Proper implementation of BMPs can reduce pollutants associated with forestry activities such as sediment, nutrients, chemicals, oil, grease, and organic debris (LDEQ 2006a and TAMU 2006a).

Each EFCRP State has developed guidelines regarding BMP implementation related to silviculture and many States also regulate and monitor the use of BMPs. A summary of each State's silviculture BMP program is summarized in Chapter 6.0: Mitigation Measures.

3.3.1.1 Affected Environment

Alabama

Alabama is divided into 14 major river basins (Figure 3.3-1) containing 77,272 miles of rivers and streams. Alabama has ponds, lakes, and reservoirs in excess of 490,472 acres (ADEM 2004).

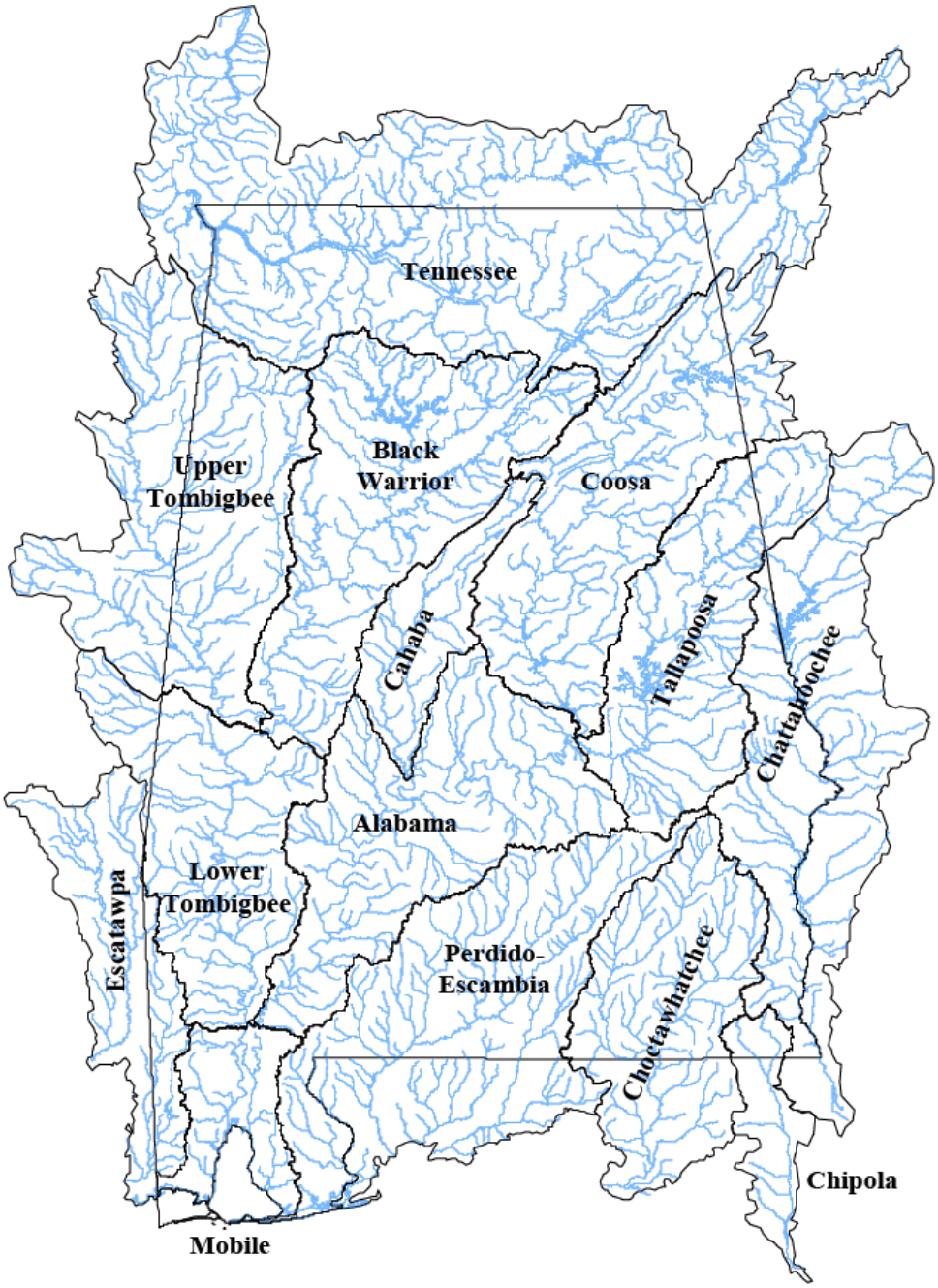


Figure 3.3-1. Map showing major river basins in Alabama (ADEM 2004).

Alabama's surface water is of generally high quality. The total mileage for rivers and streams not supporting designated uses is 1,815.3 miles. This total is 2.3 percent of the 77,272 total river and stream miles. This is a good indication that Alabama has a high percentage of full use support for rivers and streams. Of the impaired streams and rivers, the highest percentage are impaired by siltation (36.4 percent), followed by metals (28.1 percent), habitat alteration (24.1 percent), pathogens (18.3 percent), and nutrients (16.8 percent). Unknown sources and urban runoff are the major sources causing impairment followed by agriculture, abandoned surface mines, and land development (ADEM 2004).

Alabama's publicly accessible lakes and reservoirs have a 82.6 percent full support status. Much of the non support acreage is related to historic as well as recent PCB contamination and eutrophic conditions

in the Coosa River Basin reservoirs. Naturally higher nutrients in the soils of the Coosa River Basin, to a large extent, dictate its reservoirs' eutrophic conditions. In an effort to manage eutrophic conditions more directly, the Department has developed nutrient criteria for 13 reservoirs (Weiss Lake, Lake Harris, West Point Lake, Walter F. George Lake, Lake Martin, Yates Lake, Thurlow Lake, Lake Guntersville, Wheeler Lake, Wilson Lake, Pickwick Lake, Little Bear Creek Lake, and Cedar Creek Lake) (ADEM 2004).

Drinking Water Quality

Approximately 65 percent of drinking water is obtained from surface sources such as lakes, rivers, and streams and provided with full treatment to include coagulation, sedimentation, filtration, and disinfection. One hundred percent of these systems meet turbidity requirements, 97 percent meet trihalomethane standards, 100 percent meet haloacetic acid standards, and 100 percent meet inorganic and radiological drinking water standards (ADEM 2004).

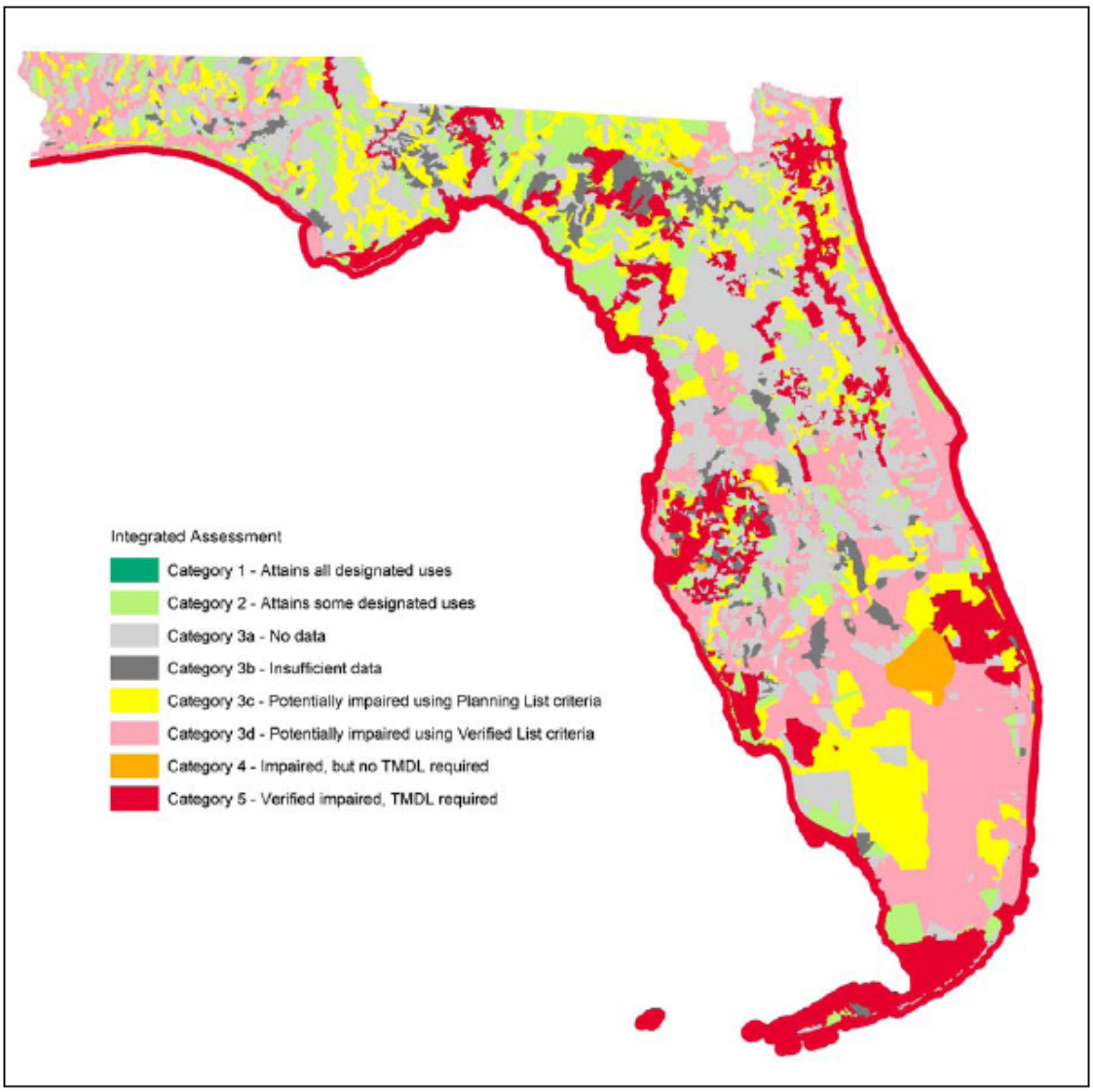
Florida

The State has more than 1,700 rivers and streams that flow for almost 52,000 miles, over 7,700 lakes covering about 1.6 million acres, 4,460 square miles of estuaries and bays, and more than 700 known springs—all of which support diverse habitats, plants, and animals, as well as food crops, industry, and recreation (FDEP 2004).

Most of Florida is relatively flat. The highest elevations are 345 feet near Lakewood, in Walton County in the Panhandle, and 312 feet at Sugarloaf Mountain in the peninsula (Lake County). The longest river, the St. Johns on Florida's east coast, only falls about a tenth of a foot per mile from the headwaters to the mouth. Farther south, below Lake Okeechobee, the land relief is less than six feet. Surface drainage and topographic relief are greatest in the streams and rivers entering north and northwest Florida from Alabama and Georgia. Most of these streams are alluvial, or sediment carrying. As the land flattens farther south, surface drainage becomes less distinct. Rivers and streams are typically slower moving, non-eroding, and non-alluvial. Many Florida rivers have their headwaters in wetlands. In its natural setting, the Green Swamp in Central Florida is the headwater for five major river systems: the (South) Withlacoochee, Ocklawaha, Peace, Kissimmee, and Hillsborough. In north Florida, the Suwannee and St. Marys Rivers originate in the Okefenokee Swamp. Throughout the State, smaller streams often disappear into wetlands and later reemerge as channeled flows. In the past, many wetlands were drained (for agriculture and urban development), and numerous rivers were channelized for navigation. The modifications were most intense in south Florida where, beginning in the 1920s, canals and levees were built to control flooding and drain wetlands. These modifications resulted in the loss of much of the original Everglades wetlands from Lake Okeechobee south and the channeling of the Kissimmee River (FDEP 2004).

In Florida 1,416 miles of streams and rivers and approximately 700,000 acres of lakes and reservoirs are impaired. The majority of impaired waterbodies do not support the uses of aquatic life, primary contact (e.g. swimming), and fish and shellfish. Most water quality problems are found in highly urbanized central and south Florida. Problems are evident around the densely populated, major urban centers, including Jacksonville, Orlando, Tampa, Pensacola, Cape Kennedy, and the southeastern Florida coast. Basins with intense agricultural and industrial use are also associated with poor water quality. Water quality in the northwest and west-central sections of the State is better than in other areas (FDEP 2004).

Because Florida is so populous and has grown so rapidly, especially over the last two decades, runoff from urban development or septic tanks is a major cause of nonpoint pollution. Other sources include agricultural activities (both row crops and animal farming), unvegetated lands, and atmospheric deposition (FDEP 2004).



[11] *Potentially impaired waters in Categories 3c and 3d have not been verified as impaired, and only Category 5 waters are considered on the state's 303(d) list of impaired waters.*

Figure 3.3-2. Map showing designated use of waterbodies in Florida. Orange and red areas indicate impaired waterbodies. Source: (FDEP 2004)

Drinking Water

Surface waters supply only about 13 percent of Florida's drinking water. Of 7,200 public drinking water systems, 19 obtain their water from surface water. An additional 26 systems wholly or partially purchase water from these 19 systems. Because it is expensive to operate a surface water system (given that filtration and advanced disinfection are costly), most systems are large. In general, surface water sources meet drinking water quality standards and only 38 miles of streams and rivers are considered impaired for drinking water (FDEP 2004).

Louisiana

Louisiana, well known for its abundance of water resources, contains over 66,294 miles of rivers and streams and 1,078,031 acres (1,684 square miles) of lakes and reservoirs. Major river basins in Louisiana include the Mississippi River and its major tributary the Red River, along with Ouachita, Black, Calcasieu, Atchafalaya, Sabine, Pearl, and Mermentau. (LNHP 2006).

There are approximately 488 lakes, ponds, and man-made reservoirs in Louisiana. These water bodies account for nearly 1.5 million surface acres of water. The largest of these is Lake Pontchartrain with a surface acreage that covers 621 square miles and totals 397,000 acres. Toledo Bend Reservoir located on the Louisiana/Texas border is the largest man-made body of water in the South and fifth largest in surface acres in the U. S. The reservoir covers 186,000 acres and has a controlled storage capacity of 4,477,000 acre-feet (1.4 trillion gallons) (LNHP 2006).

The majority of streams and lakes in Louisiana are of good quality and meet their designated use. Of Louisiana's impaired waterbodies most are impaired for the designated use of fish and wildlife propagation. This is largely due to the fact there are so many possible causes and sources of impairment impacting this use. Any one of these causes can result in a water body being considered impaired for fish and wildlife propagation. There are over 30 different suspected causes of impairment reported as impacting fish and wildlife propagation. With the exception of mercury, all of the top eight suspected causes of impairment can generally be related to nonpoint sources of pollution. The remaining causes of impairment are generally related to various forms of industry, small business, or municipal sources. However, pesticides from agriculture are also a source of impairment to a lesser extent (LDEQ 2006b).

Drinking Water

Louisiana has abundant supplies of safe drinking water. Groundwater is the source of drinking water for 61 percent of the State's residents, surface water supplies the remaining 39 percent and the State has a large number of rivers, lakes, and reservoirs that are used as public water supplies (TAMU 2006b and EPA 2006).

Disease monitoring after Hurricane Katrina indicated that drinking water supplies were not a source of bacteriological infection. Neither EPA, the Louisiana Department of Health and Hospitals (LDHH), nor local water system operators have identified or heard of occurrences of waterborne illnesses or diseases from drinking contaminated water following Hurricane Katrina (EPA 2006).

With assistance from EPA and others, the LDHH assessed the operational capacity of 600 public water systems in areas affected by the hurricane by September 20, 2005, and all systems were assessed by the end of October 2005. While there has been considerable progress in assessing the operational status of 1,591 drinking water systems in Louisiana and bringing damaged facilities back on-line, substantial work remains to restore the drinking water infrastructure to pre-Katrina conditions (EPA 2006).

Mississippi

The State is divided into 10 major stream basins with a total length of streams in excess of 86,000 miles, of which 37 percent are perennial. There are over 2,400 miles of man-made ditches and canals in the State. The Mississippi River (approximately 400 miles) and the Pearl River (approximately 80 miles) form Mississippi's border with Arkansas and Louisiana on the west side of the State (MDEQ 2004).

The State is covered with hundreds of publicly owned lakes, reservoirs, and ponds covering a combined area of approximately 246,000 acres. The largest lakes in Mississippi are man-made reservoirs. Grenada Reservoir; Enid Reservoir; Sardis Reservoir and Arkabutla Reservoir in the Yazoo Basin are used for flood control. All of these large reservoirs support numerous recreational activities. Pickwick Lake, in the State's northeastern corner, is part of the Tennessee River and is shared with Alabama and Tennessee. Numerous other smaller lakes and reservoirs are maintained by cities, counties, water districts, State parks, and conservation agencies (MDEQ 2004).

The majority of Mississippi's streams and rivers (76 percent) and all of its lakes and reservoirs have not been formally assessed and their ability to support beneficial uses is currently unknown. Of the assessed streams and rivers, 15 percent (4,741 miles) are not currently of sufficient water quality to support designated beneficial uses and are considered impaired waterbodies. Most of these waterbodies (3,119 miles) are impaired for biological uses, and pathogens have been identified as the major pollutant of concern. To a lesser extent, impacts statewide are attributed to mercury, low dissolved oxygen, salinity, PCBs, and pesticides. Sources of impairment include contaminated sediments, nonpoint sources (i.e. urban, agricultural, silvicultural, and industrial), and other smaller sources (MDEQ 2004).

Drinking Water

The overall abundance and quality of groundwater resources and the high cost of treating surface water result in a small number of public water systems that are dependent on surface water, and only three community water systems in Mississippi rely on surface water for their source. Two of these systems are located in Jackson, and one system is located in Tupelo (MDEQ 2006b).

North Carolina

North Carolina river basins within EFCRP counties include Lumber, Cape Fear, White Oak, Neuse, Tar Pamlico, and Pasquotank. These basins are shown in Figure 3.3-3.

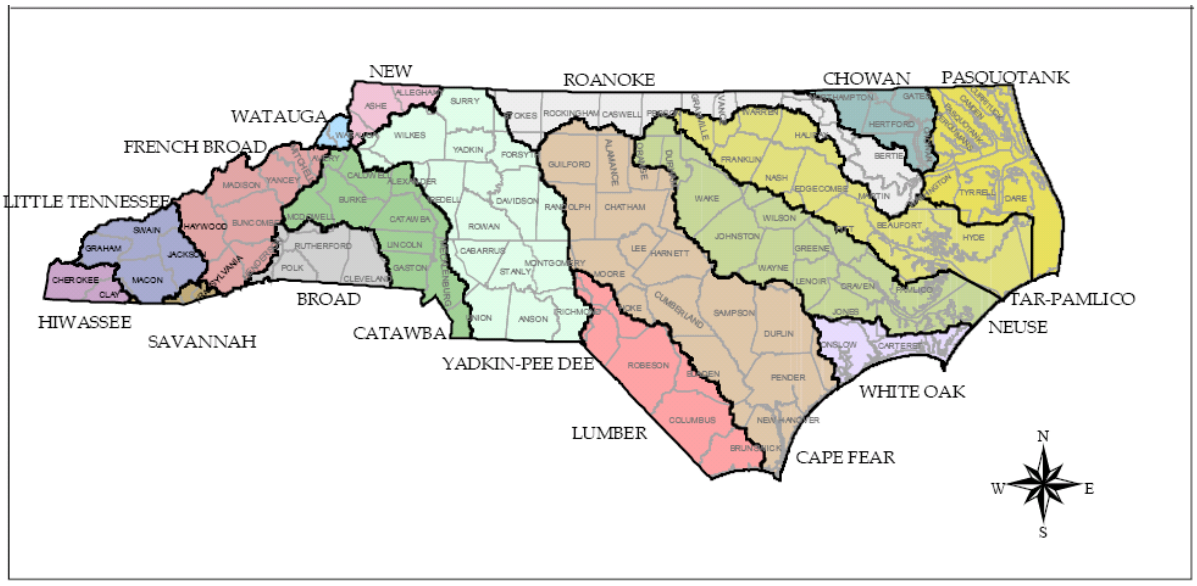


Figure 3.3-3. North Carolina river basins. Source: NCDENR 2006a

Approximately nine percent of freshwater streams and shorelines in North Carolina are considered impaired. Surface waters in the river basins located in EFCRP counties are impaired for a number of pollutants including, impaired biological integrity, fish advisory-mercury, low dissolved oxygen, fecal coliform (bacteria), and turbidity (sediments). Sources of impairment include animal wastes, leaking septic tanks and sewers, agricultural land, urban runoff, and industrial areas (NCDENR 2006a).

Drinking Water

Surface water is a critically important resource for North Carolina and approximately 3 million people in North Carolina depend upon surface water supplies for a clean source of drinking water. The North Carolina Environmental Management Commission and the North Carolina Department of Water Quality administer a Water Supply Protection Program for surface water sources of drinking water. Through this

program water supply watersheds for drinking water are identified and surface waters are protected within these watersheds. There are not any water supply watersheds located within the EFCRP area, and this issue is not discussed further (NCDENR 2006b and NCDENR 2006c).

Texas

Texas has approximately 191,228 miles of streams and rivers, of which 40,194 miles (21 percent) are considered perennial; more than three million acres of reservoirs and lakes, including 211 major reservoirs greater than 5,000 acre-feet that encompass 1,994,600 surface acres; 2,394 square miles of bays and estuaries; and 3,879 square miles of open gulf water along its 624 miles of coastal shoreline (TCPS 2006).

Water Quality in EFCRP Counties

A summary of water resources in the Texas EFCRP counties has been compiled by USDA. These resources are summarized below. The complete report can be found in Appendix F.

The 2000 303(d) list shows 58 impaired water bodies located within EFCRP counties (Figure 3.3-4). Low dissolved oxygen and high levels of bacteria are the primary parameters of concern in these impaired segments. The majority of streams in EFCRP counties are not meeting water quality standards for contact recreation (27 percent), followed by aquatic life use (25 percent), dissolved oxygen (21 percent), and fish consumption advisory (12 percent). Impairments include metal, ambient toxicity, temperature, pH, and oyster consumption advisory (Unknown Source 2006).

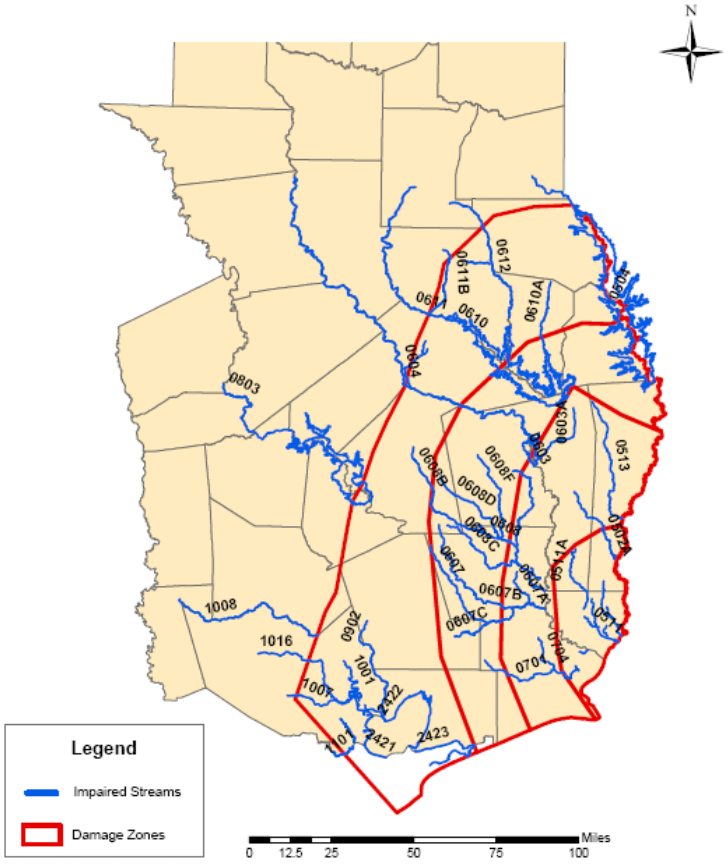


Figure 3.3-4. Impaired Streams in EFCRP Counties, Texas. Source: Unknown 2006

Twenty TMDLs have been completed and implemented in this region (14 in the Houston Ship Channel for nickel and 6 in Clear Creek Above and Below Tidal for chlordane, trichloroethane, dichloroethane) with 3 more in the process of being developed (Orange County – bacteria, DO, pH) (Unknown Source 2006).

Drinking Water

Drinking water for most of the EFCRP counties comes from groundwater supplies, due to its abundant supply and lower treatment costs. Future demand will lead to greater use of surface water, mainly from Say Rayburn Reservoir, Lake Livingston, and Toledo Bend Reservoir. The surface water that is currently being used as a drinking water source is of good enough quality to support this use (Unknown Source 2006).

3.3.2 GROUNDWATER

3.3.2.1 Affected Environment

Groundwater is defined as water that occurs in the open spaces and geologic layers below the surface of the earth. These layers are called aquifers where such geologic units yield sufficient water for human use. The EFCRP boundaries in Texas, Louisiana, Mississippi, North Carolina, and a portion of Alabama are located within the Atlantic and Gulf Coastal Plain Groundwater Region. Florida and the southeastern portion of the Alabama EFCRP boundaries are located in the Southeast Coastal Plain Groundwater Region (USGS 1984).

Atlantic and Gulf Coastal Plain Groundwater Region

The Atlantic and Gulf Coastal Plain Region is an area of about 325,870 square miles extending from Cape Cod, Massachusetts in the north to the Rio Grande in Texas (Figure 3.3-5). This region does not include Florida and parts of the adjacent States. Although those areas are a part of the Atlantic and Gulf Coastal Plain physiographic province, together they form a separate groundwater region (USGS 1984).

The region is underlain by unconsolidated sediments that consist principally of sand, silt, and clay transported by streams from the adjoining uplands. These sediments, which range in age from Jurassic to the present, range in thickness from less than a meter (3.1 feet) near the inner edge of the region to more than 12,000 meters (39,370 feet) in southern Louisiana. The greatest thicknesses are along the seaward edge of the region and along the axis of the Mississippi embayment. The sediments were deposited on floodplains and as deltas where streams reached the coast and, during different invasions of the region by the sea, were reworked by waves and ocean currents. Thus, the sediments are complexly interbedded to the extent that most of the named geologic units into which they have been divided contain layers of the different types of sediment that underlie the region. These named geologic units (or formations) dip toward the coast or toward the axis of the Mississippi embayment, with the result that those that crop out at the surface form a series of bands roughly parallel to the coast or to the axis of the embayment. The oldest formations crop out along the inner margin of the region, and the youngest crop out in the coastal area (USGS 1984).

From the standpoint of well yields and groundwater use, the Atlantic and Gulf Coastal Plain is one of the most important regions in the country. Recharge to the groundwater system occurs in the interstream areas, both where sand layers crop out and by percolation downward across the interbedded clay and silt layers. Discharge from the system occurs by seepage to streams, estuaries, and the ocean. Movement of water from recharge areas to discharge areas is controlled, as in all groundwater systems, by hydraulic gradients, but in this region the pattern of movement is complicated by downdip thickening of clay which hampers upward discharge. As a result, movement down the dip of the permeable layers becomes increasingly slow as distance from the outcrop areas increases. This causes many flow lines to converge on the discharge areas located on major streams near the downdip part of outcrop areas (USGS 1984).

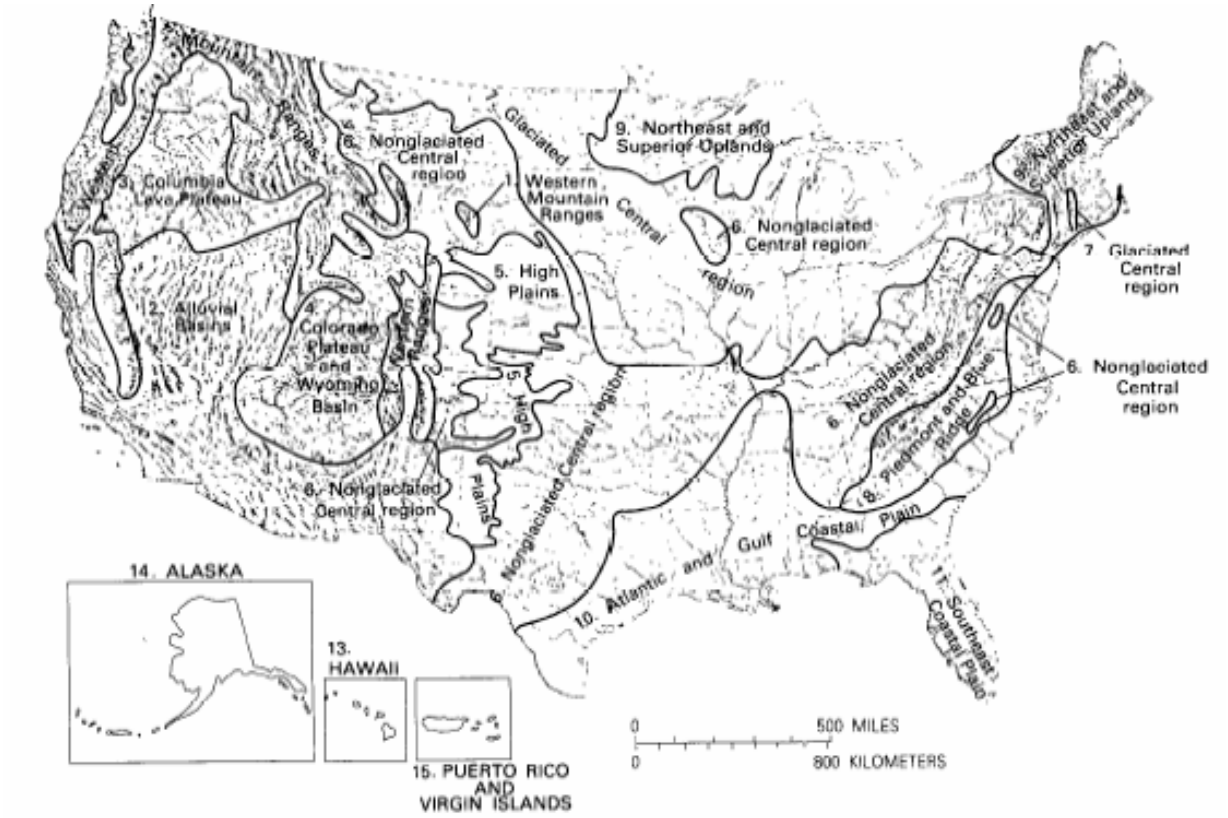


Figure 3.3-5. Groundwater Regions of the United States.

Source: USGS 1984.

Southeast Coastal Plain Groundwater Region

The Southeast Coastal Plain is an area of about 81,854 square miles in Alabama, Florida, Georgia, and South Carolina (Figure 3.3-5). It is a relatively flat, low-lying area in which altitudes range from sea level at the coast to about 328 feet down the center of the Florida peninsula and as much as 656 feet on hills in Georgia near the interior boundary of the region. Much of the area, including the Everglades in southern Florida, is a nearly flat plain less than 33 feet above sea level (USGS 1984).

The land surface of the Southeast Coastal Plain is underlain by unconsolidated deposits of Pleistocene age consisting of sand, gravel, clay, and shell beds and, in southeastern Florida, by semi-consolidated limestone. From the coast up to altitudes of nearly 328 feet, the surficial deposits are associated with marine terraces formed when the Coastal Plain was inundated at different times by the sea. In most of the region the surficial deposits rest on formations, primarily of middle to late Miocene age, composed of interbedded clay, sand, and limestone. The most extensive Miocene deposit is the Hawthorn Formation. Where formations of middle to late Miocene age are absent, the surficial deposits overlie semi-consolidated limestones and dolomites that are as much as 4,921 feet thick. These carbonate rocks range in age from early Miocene to Paleocene and are generally referred to collectively as Tertiary limestones (USGS 1984).

The marked difference in groundwater conditions between the Southeast Coastal Plain and the Atlantic and Gulf Coastal Plain regions is apparent in the response of groundwater levels to withdrawals. In the Atlantic and Gulf region most large withdrawals are accompanied by a pronounced continuing decline in groundwater levels. In the Southeast Coastal Plain, on the other hand, large withdrawals have significantly lowered groundwater levels in only a few areas (USGS 1984).

3.3.2.2 Affected Environment

Alabama

Drinking Water

Groundwater is an important part of the public and domestic water supply in Alabama. Of the 913 million gallons per day of water used for public and domestic water supplies, 39.4 percent comes from groundwater (Hutson et. al. 2004).

Hydrogeology

The EFCRP area is divided into five groundwater provinces: the Coastal Plain, Piedmont, Valley and Ridge, Cumberland Plateau, and the Highland Rim (Figure 3.3-6). The provinces are defined on the basis of differences in water bearing properties of rocks, rock type, structural geology, and physiography. Such characteristics determine the types of aquifer in these areas. Eighty percent of public water supply systems in Alabama have at least one groundwater source (ADEM 2006a). Each province is described below based upon the hydrogeology and water use of each province.

Coastal Plain Province

The Coastal Plain Province includes sediments such as inter-layered sand, gravel, and clay, as well as chalk and limestone deposited by seas that once covered the southern part of Alabama. Coastal Plain sediments are relatively young compared with the rocks of the other provinces and are mostly unconsolidated, which means they have not been hardened into rocks. The occurrence and availability of groundwater in the Coastal Plain is high; some Coastal Plain wells yield up to several thousand gallons per minute. In most parts of the Coastal Plain wells yield more than 50 gallons per minute.

Residents of the Coastal Plain, while comprising only 44 percent of the State's population, account for approximately 63 percent of the total groundwater use. The per capita use is high because of agricultural use. More than 70 percent of Alabama's total agricultural water use occurs in the Coastal Plain (ADEM 2006a).

Piedmont Province

The Piedmont is the southernmost exposure of the Appalachian Mountains and stretches all the way to Pennsylvania. The ancient crystalline rocks of the Piedmont are igneous and metamorphic. Rocks in the Piedmont do not hold much water compared to the Coastal Plain. Most of the porosity in the Piedmont aquifers is from fractures in the rock. Soil and weathered rock near the surface may also hold water. Water yields from both the fractures and the thin layer of weathered material are low. Generally, wells in the Piedmont yield enough water for domestic use but not enough for large towns or commercial use. In Alabama, fractured aquifers are most important in Coosa, Tallapoosa, and Chambers Counties.

Figure 3.3-6. Groundwater Provinces of Alabama.

Source: ADEM 2006b.

About 7 percent of Alabama's population lives in the Piedmont, accounting for 5 percent or less than 10 million gallons per day of the State's groundwater consumption. The terrain is unsuitable for large scale agriculture and only 3.5 percent of Alabama's agricultural water use takes place here. There are no large cities in the Piedmont except for Anniston, which uses water from Coldwater Spring, one of the largest springs in the State (ADEM 2006a).

Valley and Ridge Province

The Valley and Ridge province is made up folded and faulted limestone, dolomites, sandstones, and shale. It marks the southern end of the Appalachian Mountains. The province is characterized by northeast-southwest trending ridges and valleys. Sandstones and chert layers are resistant to erosion and for the ridges, whereas the easily eroded limestone and dolomites underlie the valleys. The limestone and dolomite develop conduit flow and karst features such as sink holes. These aquifers are relatively susceptible to groundwater contamination from surface sources.

Generally, valleys are better places to locate wells. The aquifer in the Valley and Ridge province may be dominated by porous, conduit, or fracture flow depending on the rock type. Groundwater is abundant with limestone, dolomite, and sandstone aquifers capable of producing more than 100 gallons per minute. A few wells yield as much as 1,600 gallons per minute. The Valley and Ridge province accounts for 14 percent (56 million gallons per day) of the State's total groundwater use and, although the water use per person approaches the State average, agricultural water use is low (8 percent of the State total).

The limestone aquifers in the Valley and Ridge province feed many springs including Coldwater Spring, which has an average discharge of 31.2 million gallons per day. Few springs approach the flow rate of Coldwater Spring; however, large springs are common in the Valley and Ridge because of conduit flow in limestone and dolomite aquifers. Trussville, in Jefferson County, is the largest single consumer of groundwater in the Valley and Ridge province. The cities of Attalla and Leeds also use groundwater to supply all of their water needs (ADEM 2006a).

Cumberland Plateau

The Cumberland Plateau in north central Alabama is underlain by flat-lying interbedded sandstone, shale, and limestone. The Pottsville Formation, which consists of interbedded sandstone and shale is the major aquifer in the Cumberland Plateau, but generally has low yields averaging 20 gallons per minute. The Bangor Limestone and the Hartselle Sandstone also supply groundwater in parts of the province. Water from the Pottsville Formation contains enough iron in places to stain fixtures and affect the taste of the water, and water from the Bangor and the Hartselle is hard water. Springs in the Cumberland Plateau are common, yielding 10 to 100 gallons per minute of water from limestone, sandstone, and shale.

The Cumberland Plateau contains 18 percent of Alabama's population and accounts for 12 percent of the State's total water consumption, 9 percent of the total groundwater use, and 12 percent of the total agricultural water use. Groundwater supplies in the Cumberland Plateau cannot sustain the needs of a large town. The towns of Edridge in Walker County and Hodges in Franklin County depend on groundwater to supply their needs (ADEM 2006a).

Highland Rim

The Highland Rim is characterized by limestone, dolomite and chert rock units. Dissolution along fractures in the rocks has created a subsurface conduit system of caves, tunnels, and channels. Karst features such as sinkholes, springs, and streams that disappear into the ground are common. The major aquifers in the province are the Fort Payne-Tuscumbia, the Bangor Limestone and the Hartselle Sandstone. The Fort Payne-Tuscumbia aquifer yields high capacity wells producing from 100 to 1000 gallons per minute and serves more than 100,000 public water supply system customers. Springs are abundant and typically yield more than 100 gallons per minute. The Highland Rim includes two of Alabama's largest springs, Tuscumbia Big Spring and Huntsville Big Spring. The Bangor Limestone and Hartselle Sandstone supply minor amounts of groundwater, mostly from wells producing 10 gallons per minute or less.

Thirteen percent of Alabama's population lives in the Highland Rim, accounting for 12 percent of Alabama's total water use. Only 9 percent of the State's total groundwater consumption occurs in the

Highland Rim. Part of the reason for the low groundwater use is the Tennessee River system, which provides plentiful surface water to users throughout the province. Agricultural water use has increased dramatically in the past few years because the practice of irrigation is becoming more widespread (ADEM 2006a).

Florida

Drinking Water

Groundwater is one of Florida's most valuable natural resources. Usable quantities of potable groundwater can be obtained throughout the EFCRP boundaries. About 93 percent of Florida's population depends on groundwater for drinking water. Florida ranked fifth in the nation in the use of fresh groundwater in 1995. Because of its abundance and availability, groundwater is the principal source of freshwater for public supply and domestic (rural) and industrial uses. Of the total freshwater used in Florida in 1995, 60 percent was groundwater (Conover 1973).

Hydrologists have estimated that the total quantity of fresh groundwater in Florida is more than a quadrillion gallons—about one-fifth as much as in all of the five Great Lakes, 100 times that in Lake Mead on the Colorado River, and 30,000 times the daily flow to the sea of Florida's 13 major coastal rivers (Conover 1973).

Hydrogeology

Nearly all of Florida's groundwater originates from precipitation. Annual recharge to groundwater ranges from near zero in some perennially wet, lowland areas to greater than 20 inches per year or more in well-drained upland areas. In much of the State, most of this recharge moves through the surficial sands and discharges downward to deeper aquifers (groundwater reservoirs) or laterally to nearby lakes and streams (USGS 2006c).

The EFCRP area is underlain virtually everywhere by aquifers capable of yielding at least small quantities of potable water to wells. Aquifers are defined on the basis of rock types, geologic confinement, and groundwater flow. In the EFCRP area, three aquifer systems are used for water supply: the surficial aquifer system, the intermediate aquifer system, and the Floridan aquifer system (Figure 3.3-7). Two aquifers within the surficial aquifer system—the sand and gravel and the Biscayne aquifers—are important sources of supply where they occur (USGS 2006c).

The surficial aquifer system in the EFCRP area consists mostly of unconsolidated sand and includes the sand and gravel and the Biscayne aquifers and all the undefined aquifers present at the land surface. The surficial aquifer system is used by a few small municipalities as well as by large numbers of individual households. The sand and gravel and Biscayne aquifers are separately recognized parts of the surficial aquifer system that consist of distinct rock types. The Biscayne aquifer is the major source of water in EFCRP area (USGS 2006c).

The intermediate aquifer system is located between the surficial aquifers and the Floridan aquifer system in a portion of the EFCRP area. The intermediate aquifer system is an important source of supply in the EFCRP area. The Floridan aquifer system underlies the entire State of Florida, including the EFCRP area and portions of Alabama, Georgia, and South Carolina and has been called "Florida's rain barrel" (Parker 1951).

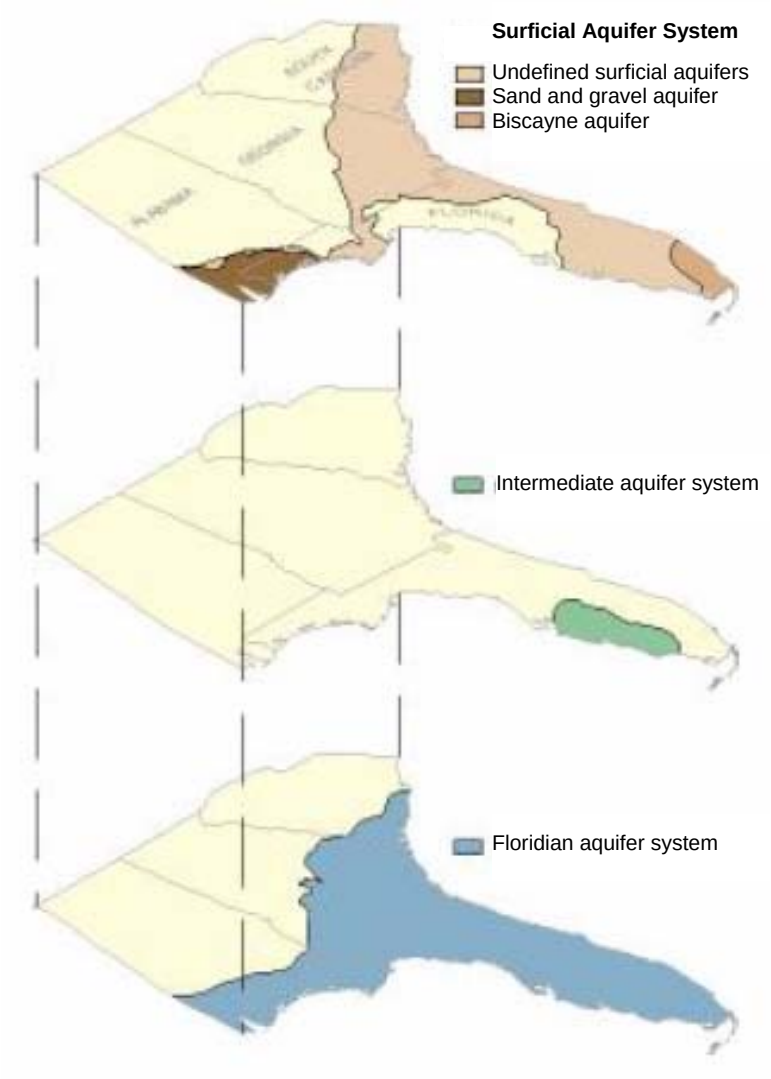


Figure 3.3-7. Sequence of Aquifers within the EFCRP area.

Source: USGS 2006c.

Louisiana

Drinking Water

Nearly 3.9 million people, or 88 percent of Louisiana's total population in 2000, used approximately 760 million gallons per day (Mgal/d) of water provided by public suppliers. Of the 760 Mgal/d, approximately 350 Mgal/d was from groundwater sources, and about 400 Mgal/d was from surface water sources.

All of the major aquifers or aquifer systems in Louisiana were tapped as sources of public-supply water. In northern Louisiana, the chief source of groundwater is the Sparta aquifer, which produces 1l percent of the groundwater used for public supply in the State. In southwestern Louisiana, the Chicot aquifer system is the major source of groundwater, and in southeastern Louisiana the Evangeline equivalent and Jasper equivalent aquifer systems supply 20 and 18 percent of groundwater, respectively.

Hydrogeology

The EFCRP area is underlain by three main aquifers: Chicot Aquifer System, Sparta Aquifer, and Southern Hills Aquifer System (Figure 3.3-8). The Chicot aquifer system is the most extensively

utilized aquifer in the State. It extends from the Atchafalaya River in the east into Texas in the west. The Chicot aquifer system consists of thick beds of coarse sand with layers of gravel. The aquifer system contains freshwater to the base of the aquifer in the northern three-quarters of the aquifer system. The southern quarter of the aquifer system, the freshwater-saltwater interface ranges from less than 400 feet below land surface in the Atchafalaya River basin to more than 700 feet below Vermilion Bay and Marsh Island (LGMC 2002).

The Sparta Aquifer is an important source of groundwater for northern Louisiana and southern Arkansas. The aquifer is located mainly between the Red River Valley and Mississippi River Valley and extends from the Louisiana-Arkansas State line southward into Winn Parish. The aquifer is mainly very fine to medium sand, interbedded with thin layers of clay and lignite. The overlying clays of the Cook Mountain Formation and the underlying clays of the Cane River Formation confine it (LGMC 2002).

The Southern Hills aquifer system refers to the collective aquifers extending from slightly west of the Mississippi River eastward to the Mississippi State line along the Pearl River, and south of the east-west portion of the Mississippi-Louisiana State line. Aquifers within the system are recognized independently and are locally divided. They consist of units within the gulfward dipping and thickening wedge of sediments from Pleistocene to Miocene in age (LGMC 2002).

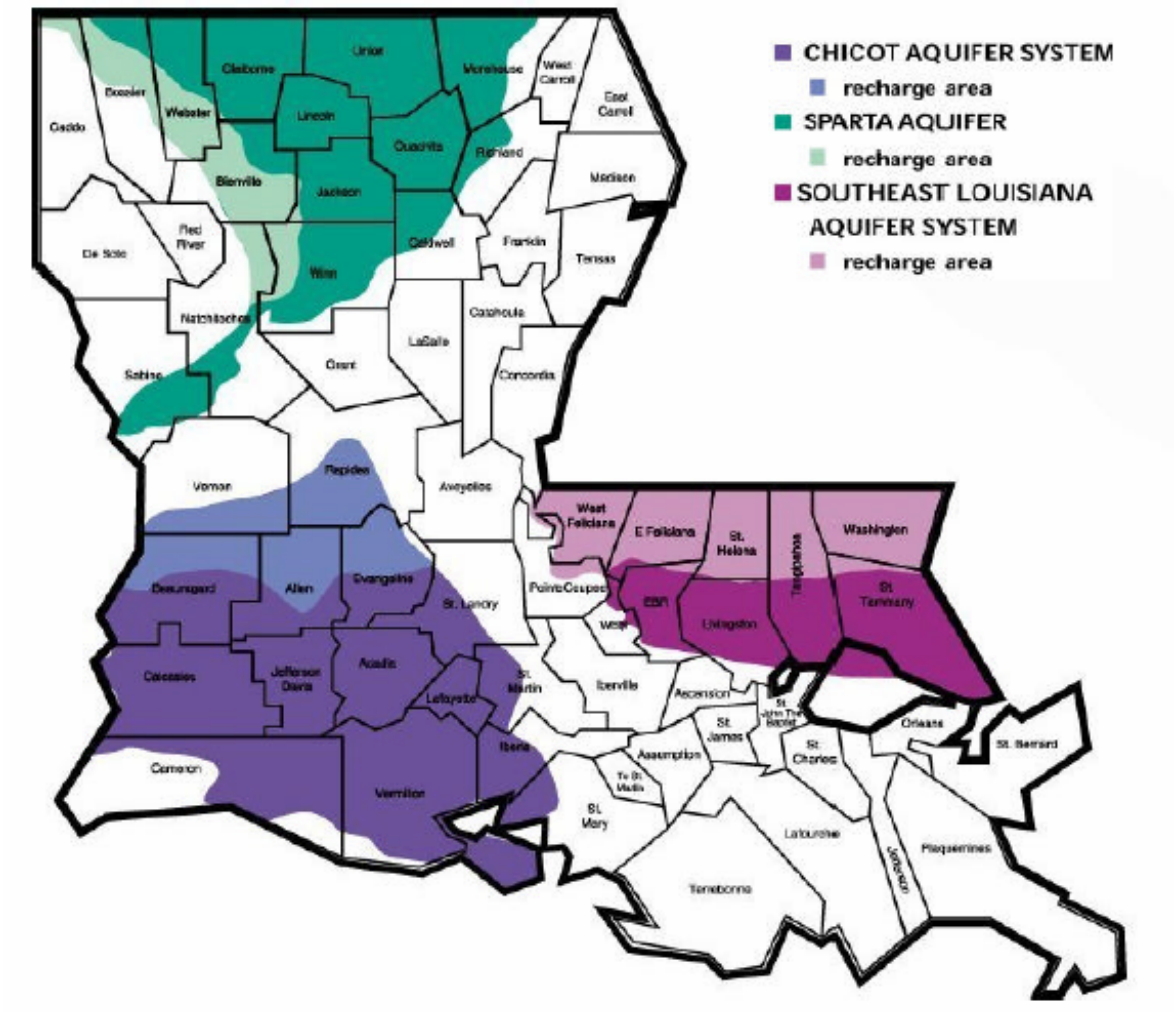


Figure 3.3-8. Louisiana's three main aquifers.

Source: LDNR 2006b.

Mississippi

Drinking Water

Groundwater supplies 80 percent of all the freshwater used in Mississippi and it is estimated that close to 3 billion gallons of groundwater are pumped from the aquifers of Mississippi each day. This water is used for drinking, manufacturing, irrigation, and energy generation. Furthermore, more than 93 percent of the potable water supply is extracted from water wells that tap into available aquifers, and out of 1,535 public water systems, only three utilize surface water for treatment (USGS 2006a).

Hydrogeology

The major aquifers in the Mississippi portion of the EFCRP area are highly varied in composition, consolidation, and hydraulic character. The majority of Mississippi aquifers consist of unconsolidated to poorly consolidated Coastal Plain strata of gravel, sand, clay, and minor limestone of Cretaceous to Holocene age. Other aquifers consist of indurated limestone, dolomite, shale, sandstone, chert, and novaculite of Paleozoic age that are either flatlying or gently to highly folded and contorted and that may be faulted and fractured. These aquifers are combined into four aquifer systems (Figure 3.3-9) (USGS 2006b).

The surficial aquifer system consists of alluvial aquifers and includes one major and three minor aquifers. In terms of water use and areal extent, the most important aquifer is the highly productive Mississippi River Valley alluvial aquifer. The minor aquifers include the Arkansas River, the Ouachita-Saline Rivers, and the Red River alluvial aquifers. The Arkansas River alluvial aquifer is not as widespread as the other two aquifers, but locally is an important water source (USGS 2006b).

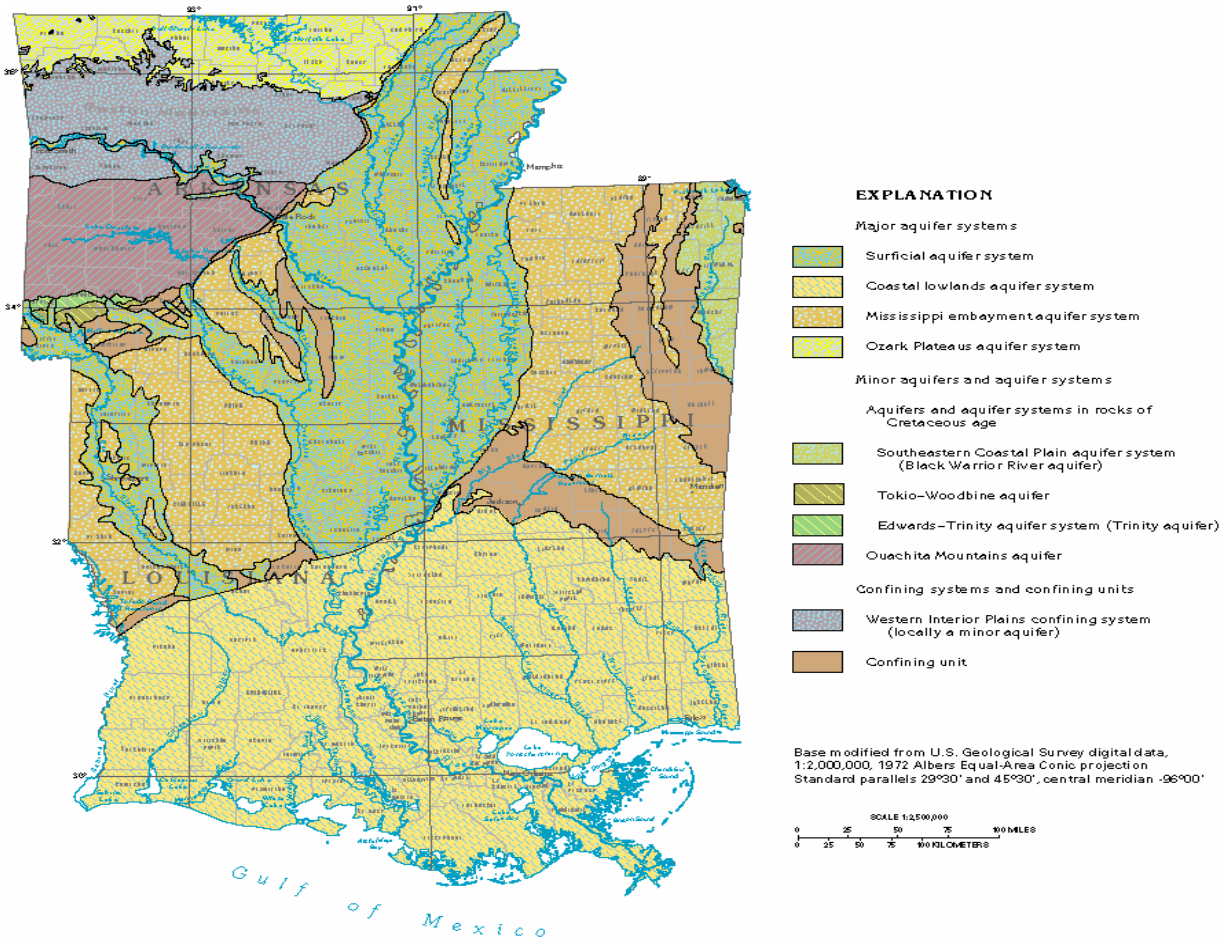


Figure 3.3-9. Major Aquifer Systems of Mississippi.

Source: USGS 2006b.

Parts of three Coastal Plain aquifer systems, the coastal lowlands, the Mississippi embayment, and the Southeastern Coastal Plain are located in the Mississippi portion of the EFCRP area. Aquifers and confining units within each of the three Coastal Plain aquifer systems thin landward to a featheredge and thicken with depth as they extend toward the Gulf of Mexico into the deep subsurface. Most Mississippi Coastal Plain aquifers contain freshwater downgradient well beyond the extent of their outcrop. All of the Coastal Plain aquifers and aquifer systems are comprised predominantly of poorly consolidated to unconsolidated clastic sedimentary rocks. In general, the most permeable Coastal Plain aquifers consist of sand and some gravel and are separated by silt, clay, marl, or chalk confining units (USGS 2006b).

North Carolina

Drinking Water

Approximately half of the 8.5 million residents of North Carolina rely on groundwater as a source of drinking water, making it an invaluable resource. Virtually all private residential drinking water supplies depend upon groundwater, as do over one million of the State's citizens that use community water systems. In many rural counties, more than 90 percent of the citizens rely on groundwater as their sole source of drinking water (NCDENR DWQ 1999).

The groundwater throughout the State is generally high quality and potable (NCDENR DWQ 1999). Within the proposed EFCRP area of the western Coastal region, the Total Dissolved Solids content ranges from approximately 100 to 300 mg/L. In the eastern part of the Coastal region, the mineral content of the water increases as its distance from the brackish coast decreases (NCDENR DWQ 1999).

Hydrogeology

Aquifers in North Carolina are highly varied in their character and water-producing capabilities. Several of these aquifers underlie large geographic areas and therefore form principal aquifers, which are significant sources of potable groundwater for agricultural or industrial uses throughout the State and, more specifically, the proposed EFCRP area. Principal aquifers include Cretaceous, Tertiary limestone, Tertiary sand, and the surficial aquifer (which includes the Sandhills), all of which are located within the EFCRP area (NCDENR DWQ 1999).

Texas

Drinking Water

Groundwater sources supplied 56 percent of the 13.5 million acre-feet of water used in the State in 1992. More than 75 percent of the 7.6 million acre-feet of groundwater pumpage was for irrigated agriculture, with municipal use accounting for almost 17 percent of the total pumpage. Due to its widespread availability and relatively low cost, groundwater accounts for about 69 percent of the total water used for irrigation and about 41 percent of the water used for municipal needs (TWDB 1995).

Hydrogeology

The Texas Water Development Board (TWDB) has identified and characterized nine major (Figure 3.3-10) and 20 minor aquifers (Figure 3.3-11) in the State based on the quantity of water supplied by each (TWDB 1995). A major aquifer is generally defined as supplying large quantities of water in large areas of the State. Minor aquifers typically supply large quantities of water in small areas or relatively small quantities in large areas. The two major aquifers located in the EFCRP area are the Gulf Coast and Carrizo-Wilcox aquifers. The minor aquifer located in the area is the Sparta aquifer.

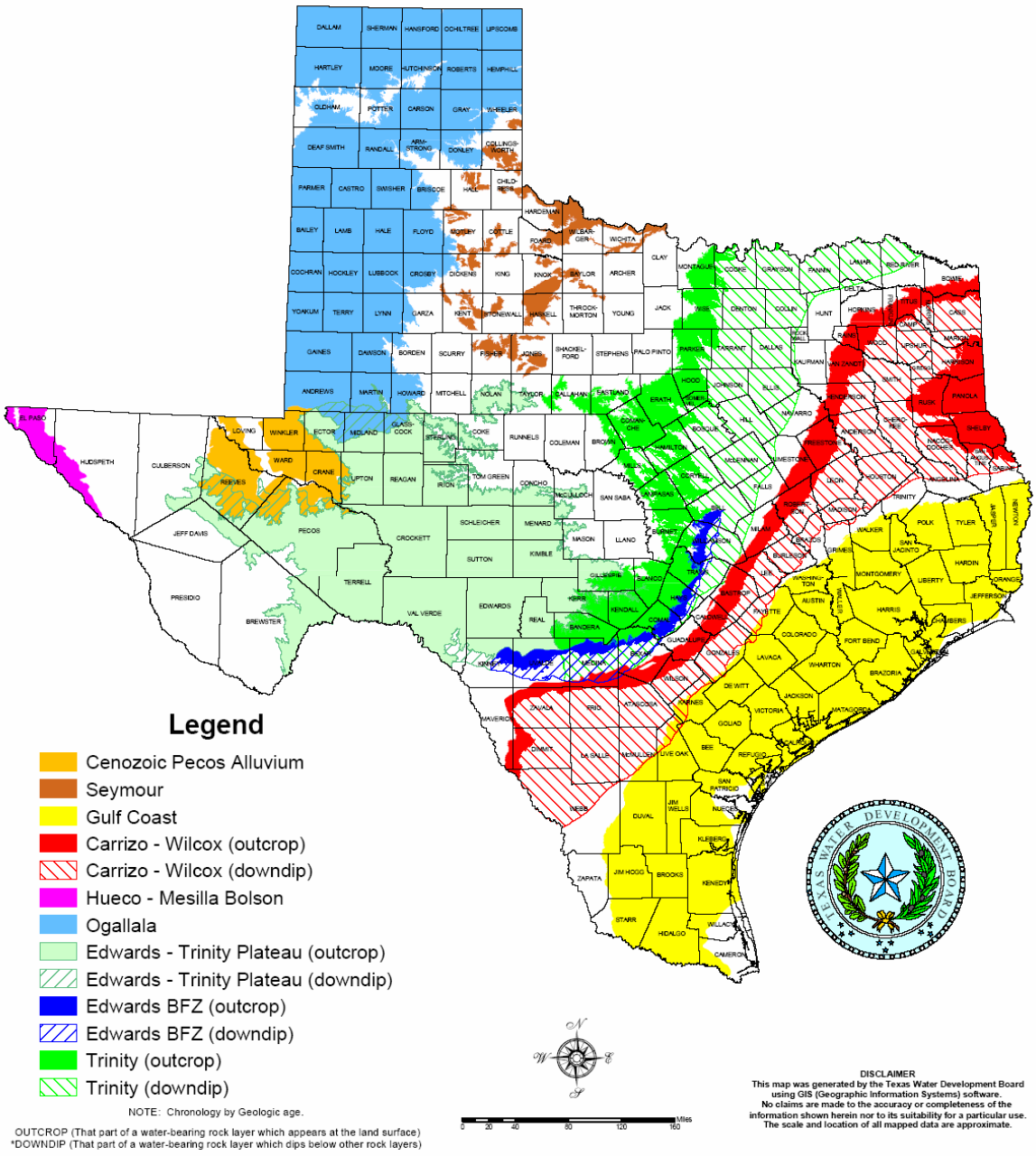


Figure 3.3-10. Major Aquifers of Texas.
Source: TWDB 2006.

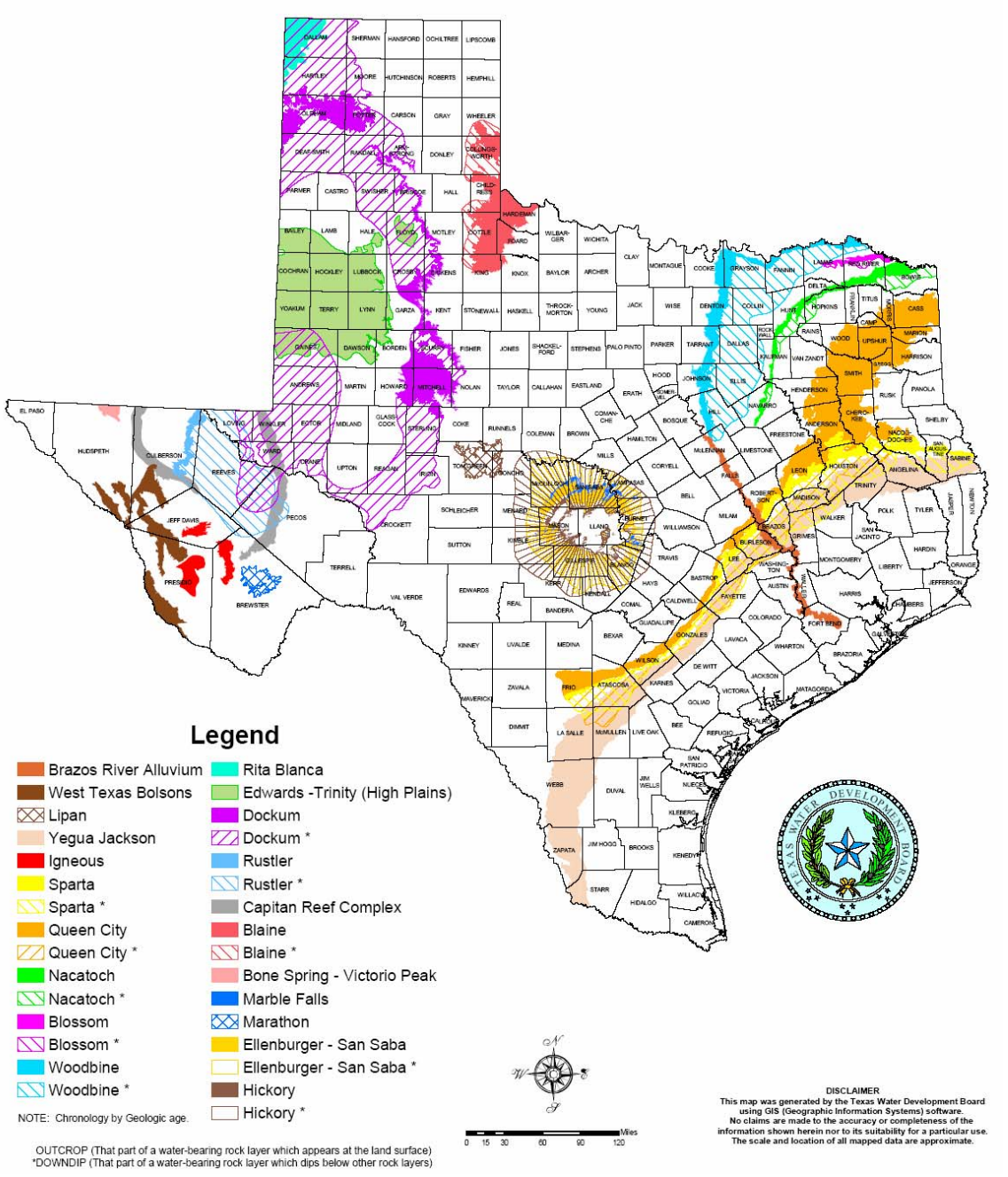


Figure 3.3-11. Minor Aquifers of Texas.
Source: TWDB 2006.

The Carrizo-Wilcox aquifer is one of the most extensive aquifers in Texas, furnishing water to wells in a wide belt extending from the Rio Grande northeastward into Arkansas and Louisiana. The aquifer consists, for the most part, of hydrologically connected ferruginous, cross-bedded sand with clay, sandstone, silt, lignite, and gravel (TDWR 1979).

Geologically, the Gulf Coast aquifer ranges in age from Miocene to Holocene and, for the purposes of this PEA, it is considered as composed of the Catahoula, Oakville, Lagarto, Goliad, Willis, Lissie, and Beaumont Formations, as well as overlying surficial deposits. The Gulf Coast aquifer consists of alternating beds of clay, silt, sand, and gravel which are hydrologically connected and form a large,

leaky artesian aquifer system. Its principal water-bearing units are the Goliad, Willis, and Lissie Formations (TDWR 1979).

The Sparta aquifer of Eocene age extends from the Frio River in Frio County northeastward to the Texas-Louisiana State line at the east edge of Sabine County. The Sparta aquifer is composed mainly of sands and interbedded clays which dip south and southeast from the outcrop area. It ranges in thickness from 100 feet to approximately 300 feet (TDWR 1979).

3.3.3 SOLE SOURCE AQUIFERS

The Sole Source Aquifer (SSA) Protection Program is authorized by section 1424(e) of the SDWA, which states:

> *If the Administrator determines, on his own initiative or upon petition, that an area has an aquifer which is the sole or principal drinking water source for the area and which, if contaminated, would create a significant hazard to public health, he shall publish notice of that determination in the Federal Register. After the publication of any such notice, no commitment for Federal financial assistance (through a grant, contract, loan guarantee, or otherwise) may be entered into for any project which the Administrator determines may contaminate such aquifer through a recharge zone so as to create a significant hazard to public health, but a commitment for Federal assistance may, if authorized under another provision of law, be entered into to plan or design the project to assure that it will not so contaminate the aquifer.*

SSA designations help increase public awareness on the nature and value of local groundwater resources by demonstrating the link between an aquifer and a community's drinking water supply. Often, the realization that an area's drinking water originates from a vulnerable underground supply can lead to an increased willingness to protect it (EPA 2006e).

3.3.3.1 Affected Environment

While SSAs are not located within the EFCRP boundaries in North Carolina, Alabama, or Texas, three SSAs are located within the EFCRP boundaries in Florida, Mississippi, and Louisiana. The SSAs are as follows:

- Biscayne Aquifer - Florida
- Chicot Aquifer System - Louisiana
- Southern Hills Aquifer System – Louisiana and Mississippi

Florida

Biscayne Aquifer System

The Biscayne aquifer underlies an area of about 4,000 square miles and is the principal source of water for all of Dade and Broward Counties and the southeastern part of Palm Beach County in southern Florida (Figure 3.3-12). During 1985, an average of about 786 Mgal/d was withdrawn from the Biscayne aquifer for all uses; pumpage in 1990 was somewhat greater. About 70 percent of the water was withdrawn for public supply. Major population centers that depend on the Biscayne aquifer for water supply include Boca Raton, Pompano Beach, Fort Lauderdale, Hollywood, Hialeah, Miami, Miami Beach, and Homestead. The Florida Keys also are supplied primarily by water from the Biscayne aquifer that is transported from the mainland by pipeline (USGS 1990). Because the Biscayne aquifer is

highly permeable and lies at shallow depths everywhere, it is readily susceptible to contamination (USGS 1990).

Water in the Biscayne aquifer is under unconfined, or watertable, conditions, and the water table fluctuates in direct and rapid response to variations in precipitation. The aquifer extends beneath Biscayne Bay, from whence it was named, and the Atlantic Ocean. The aquifer is highly permeable where it forms part of the floor of the bay and the ocean, and contains saltwater there. Some of this saltwater has migrated inland in response to the lowering of inland groundwater levels adjacent to canals constructed for drainage of low-lying areas and near large well fields (USGS 1990).

Louisiana

Chicot Aquifer System

The Chicot Aquifer System underlies an area of about 9,000 square miles in southwestern Louisiana (Figure 3.3-13) and is the principal source of fresh groundwater supplies in the region. Approximately 540 million gallons per day were withdrawn from the aquifer system in Southwestern Louisiana in 2000 (USGS 2004).

The presence of saltwater has been documented in the Chicot Aquifer System beneath coastal parishes, in some areas where the aquifer system merges with the stratigraphically adjacent Atchafalaya Aquifer, and in isolated bodies of saltwater near Lake Charles, Iowa, and south of Abbeville, Louisiana. Seasonal pumping for rice irrigation has altered flow direction in the Chicot Aquifer System and can induce lateral or upward movement of saltwater (USGS 2004).

The Chicot Aquifer System is composed of deposits of silt, sand, and gravel separated by units of clay and sandy clay. The system dips and thickens toward the south and southeast. The sand units grade southward from coarse sand and gravel to finer sediments and become increasingly subdivided by clay units. Eastward, toward the Atchafalaya River area, the Chicot Aquifer System is overlain by and hydraulically connected to the Atchafalaya Aquifer (USGS 2004).

Figure 3.3-12 Location of Biscayne Aquifer and Southern Hills Aquifer System.
Source: EPA 2006e

Figure 3.3-13. Location of Chicot Aquifer and Southern Hills Aquifer Systems.

Source: EPA 2006e

Recharge to the Chicot Aquifer System is from infiltration of rainfall, vertical leakage, and lateral flow. Recharge from rainfall occurs in areas where the system crops out in northern Allen, Beauregard, and Evangeline Parishes and in southern Rapides and Vernon Parishes. In these areas, precipitation infiltrates sandy soil and moves slowly downdip toward points of discharge. Recharge from vertical leakage occurs through overlying and underlying confining units. Recharge by lateral movement of water occurs from the Atchafalaya Aquifer (USGS 2004).

Louisiana and Mississippi

Southern Hills Aquifer System

The Southern Hills Aquifer System, the primary source of water for public and domestic use in the northern 10 parishes of southeastern Louisiana, and 14 counties in southwestern Mississippi. The aquifer system is comprised of a gulfward dipping and thickening wedge of sediments that generally range in age from Pleistocene or Pliocene at the top to Miocene at the base. The system extend from the northern limit of the recharge area in the vicinity of Vicksburg, Mississippi, southward approximately to the Baton Rouge fault in the Baton Rouge area and the southern part of the eastern Florida Parishes of southeastern Louisiana (Figures 3-3-12 and 3.3-13) (USGS 1983).

In southeastern Louisiana, the aquifer system has been divided into as many as 13 aquifer units that are recognized to decrease in number northward where aquifer units coalesce because many of the separating clay layers disappear or are no longer capable, or where younger formations in the geologic sequence pinch out in the updip section. Although the system has been locally divided into many aquifer units, these aquifers are recognized to be interdependent, collectively forming the Southern Hills Aquifer System (USGS 1983).

Water in the aquifer system is almost exclusively a soft sodium bicarbonate type. In southeastern Louisiana, dissolved solids concentrations average about 210 milligrams per liter. In southwestern Mississippi, the Citronelle Aquifer has an average dissolved solids concentration of 51 milligrams per liter. In southern Mississippi, the Miocene Aquifer System has a median dissolved solids concentration of 170 milligrams per liter (USGS 1983).

3.3.4 COASTAL RESOURCES

Coastal zones include the coastal waters and the adjacent shore land strongly influenced by each other and in proximity to the shorelines of the coastal States (NOAA 2005). Coastal ecosystems are ecologically significant areas of high biodiversity containing some of the Nation's most productive wildlife habitats, valuable fisheries, and recreational opportunities (FWS 2005). These diverse ecosystems include shorelands, dunes, offshore islands, barrier islands, headlands, estuaries, and freshwater wetlands (FWS 2005). Coastal zones comprise less than 10 percent of U.S. land area but support a significant portion of the Nation's migratory songbirds (85 percent), fish and shellfish (77 percent), waterfowl (75 percent), shorebirds (92 percent) and T&E species (45 percent) (FWS 2005). Coastal zones are managed under the Federal Coastal Zone Management Act.

3.3.4.1 Affected Environment

The southeastern U.S. coastline represents a diverse mix of freshwater and estuarine habitats, nearshore and barrier islands, wetlands, marshes, mangrove swamps, and oceanic communities. The area serves as important habitat for plants, waterfowl, reptiles, mammals, fish, and invertebrates, including several recreational and commercial fisheries (EPA 2005). Approximately 34 percent of North American fish species and 90 percent of the native mussel species designated as endangered, threatened, or of special concern are found in the Southeast (SARP 2006).

Eligible counties for EFCRP include coastal areas in North Carolina, on the eastern shore of Florida, and the Gulf Coast from southern Florida to Galveston, Texas, including coastal areas in Alabama, Mississippi, and Louisiana. The central and southern Atlantic Coast is characterized by barrier and drowned valley coasts. The coastal Atlantic plain features nearly continuous barriers interrupted by inlets, large embayments with drowned river valleys, and extensive wetlands and marshes. Much of the southeast coast of Florida has been filled, dredged, and reshaped to support development. The Florida Keys are remnants of coral reefs, with live reefs and mangrove islands extending north and west into the Everglades and lower Gulf Coast (COE 2001).

Barrier islands are common on southern Florida's Gulf Coast, with many lakes, marshes, and mangroves. Farther north, barrier islands give way to extensive marshes. The Gulf Coast extends east to west along the shores of Alabama and Mississippi, where sand islands form barrier islands. The Mississippi River delta has strongly influenced the formation of coastal habitats, including marshland and mud flats, with numerous shallow lakes and intertwining channels. Aquatic plants in the marshes support a vast assemblage of waterfowl. The coasts of Western Louisiana and eastern Texas are dominated by barrier islands, including some of the longest barrier islands in the world. Marshy deltas extend into large lagoons and estuaries (COE 2001).

Alabama

Alabama has 607 miles of coastline, and the coastal zone extends inland to the continuous 10-foot elevation contour in Baldwin and Mobile Counties (NOAA 2006, State Coastal Zone Boundaries 2004). Alabama's marine area is important for commercially and recreationally valuable fisheries, as well as other finfish, crustaceans, shellfish, marine mammals, sea turtles, seabirds, and waterbirds. Mobile Bay, at the mouth of the Mobile Basin, is the nation's sixth largest watershed by area and fourth largest in terms of discharge volume. Ecosystems associated with Mobile Bay include barrier islands, tidal marshes, cypress swamps, bottomland hardwoods, Submerged Aquatic Vegetation (SAV) and oyster reefs (ADCNR 2005).

The Mobile Delta estuary is made up of a series of rivers, shallow bays and numerous interconnecting marshes and streams. The current distribution of SAV is unknown in the estuaries of the Mobile Delta, but includes shoal grass (*Halodule wrightii*), southern naiad (*Najas guadalupenis*), wild celery

(*Vallisneria spiralis*), slender pondweed (*Potamogeton pusillus*), *Nitella spp.* and widgeon grass (*Ruppia maritima*). Shoal grass is the dominant seagrass in Alabama (ADCNR 2005).

Weeks Bay is a small estuarine embayment, off of Mobile Bay. Weeks Bay is fringed with marsh (*Spartina* spp. *and Juncus* spp.) and swamp (oak, maple, cypress and others). Forested wetlands form an extensive strip between floodplain swamps and upland pine-oak forest. Weeks Bay is a critical nursery for fish, crustaceans and shellfish, is classified as an Outstanding Alabama Water, and is designated a Habitat Area of Particular Concern by the Gulf of Mexico Fishery Management Council (GMFMC 1998). In addition, it is part of the National Estuarine Research Reserve System (NERRS) managed by the National Oceanic and Atmospheric Administration (NOAA) (NERRS 2006). A summary of NERRS estuaries in the project area is provided later in this section.

A brown pelican at Weeks Bay estuary. Photo courtesy of NOAA.

Alabama's coastal zone includes marine benthic (including submerged seagrasses), pelagic and surface water ecosystems. Alabama's marine area also contains nearly 1,260 square miles approved for the construction of artificial reefs through a cooperative program between the Army Corps of Engineers and the Alabama Department of Conservation and Natural Resources (ADCNR). Artificial reefs have been built in up to 2,760 feet of water and up to 56 miles offshore, consisting of vessels, concrete rubble, oil platforms, obsolete military tanks, boxcars, airplanes, barges, oyster shells, rock, and other materials. In addition to approximately 215 offshore reefs, the ADCNR has constructed 13 inshore artificial reefs within Mobile and Bon Secour Bays and Mississippi Sound. These reefs provide vertical relief and attract a vibrant new marine community, including snapper, grouper, sponges, and corals, to Alabama's coastal zone (ADCNR 2005).

Florida coastal marsh. (FSA 2006)

Florida

Florida has one of the longest coastlines in the U.S. with over 8,400 miles of coastline (NOAA 2006). Local governments eligible to receive coastal management funds are limited to those Gulf and Atlantic coastal cities and counties which include or are contiguous to State water bodies where marine species of vegetation constitute the dominant plant community. Florida's seaward boundary in the Gulf of Mexico is three marine leagues (nine nautical miles) and is three nautical miles in the Atlantic (State Coastal Zone Boundaries 2004). Florida has nearly 5 million acres of State and Federal aquatic preserves under the management of the Coastal and Aquatic Managed Areas division of the Florida Department of Environmental Protection (FDEP). Along Florida's shores, salt marshes and mangrove forests, along with off-shore seagrass meadows and coral reefs provide important habitats to numerous species. Estuaries provide nursery areas for at least 70 percent of Florida's important recreational and commercial fishes, shellfish, and crustaceans (FDEP 2006b).

Both mangrove forests and salt marshes tend to occur within estuaries and on the inner banks of barrier islands. Mangroves are one of Florida's true natives. The estimated 469,000 acres of mangrove forests

in Florida contribute to the overall health of the State's southern coastal zone. This ecosystem traps and cycles various organic materials, chemical elements, and important nutrients. Mangroves also provide protected nursery areas for fishes, crustaceans, and shellfish, which in turn support Florida's important recreational and commercial fisheries (FDEP 2006c).

Salt marshes form along the margins of many north Florida estuaries. Gulf coast salt marshes occur along low energy shorelines, at the mouth of rivers, and in bays, bayous, and sounds, particularly from the Florida panhandle south to Tampa Bay and in the coastal area known as "Big Bend" from Apalachicola Bay to Cedar Key. South of Cedar Key salt marshes begin to be replaced by mangroves as the predominant intertidal plants. On the Atlantic coast, salt marshes occur from Daytona Beach northward. Salt marshes provide nursery areas for fishes, shellfish, and crustaceans, buffer the impact of storms on upland areas, and act as filters. Tidal creeks meander through the marshes transporting valuable nutrients as well as pollutants from upland development (FDEP 2006c).

A sea turtle cruises a seagrass meadow in Florida. Photo courtesy of Florida Keys NMS.

Seagrass meadows provide important nursery grounds for many species of juvenile fish because of the cover that they give against larger predators. Seven species of marine seagrasses are found in Florida waters, including abundant shoal-grass (*Halodule wrightii*), widgeon-grass *(Ruppia maritime)*, turtle-grass (*Thalassia testudinum*), and manatee-grass (*Syringodium filiforme*). The other three are species of *Halophila*: star grass (*Halophila engelamannii*), paddle grass (*Halophila decipiens*), and Johnson's seagrass (*Halophila johnsonii*). These small, fragile seagrasses are sparsely distributed in Florida and only limited information about them exists (FDEP 2006c).

Louisiana

The Louisiana coastal zone includes the Mississippi Delta and the Chenier Plain. Louisiana's coastal zone varies from 16 to 32 miles inland from the Gulf coast and generally follows the Intracoastal Waterway running from the Texas-Louisiana State line to take in Lake Pontchartrain and end at the Mississippi-Louisiana border (State Coastal Zone Boundaries 2004). According to National Oceanographic and Atmospheric Administration (NOAA) (2006), there are 7,721 miles of coastline and the largest continuous stretch of coastal wetlands in North America. Wetlands trap high concentrations of sediments and nutrients, converting them into biologically useful materials. In addition, coastal estuaries and wetlands serve as nurseries for many of the nation's fish and shellfish (CFCL 2002).

Mississippi Delta. Photo courtesy of NOAA.

Every year, the Louisiana coastal area, one of the world's most productive ecosystems, loses as much as 20 to 25 square miles of land. The processes and activities that have contributed to this conversion include long

term erosion and land subsidence caused, in part, by compaction of Mississippi River Delta sediments and by large storms, rising sea levels, changes in human population, energy development, flood control, and maintenance of navigation channels. As wetlands, estuaries, and barrier islands vanish, the State loses important natural buffers protecting New Orleans and other populated coastal areas from storms and flooding (USGS 1999).

The Mississippi Delta is influenced by events occurring many miles upstream, including dam building, forest clearing, and heavy nutrient runoff from Midwest farmlands. The Mississippi River Basin drains 41 percent of the continental U.S and brings nutrient rich runoff from 31 States and two Canadian provinces through Louisiana's coastal zone and into the Gulf of Mexico (CFCL 2002). Since the 1930s, one million acres of the nation's coastal land has been lost in Louisiana, an extreme land loss rate that threatens nearly 40 percent of our nation's coastal wetlands. The Coast 2050 report, prepared in 1998 by the Breaux Task Force and the State Wetlands Authority, outlined basic strategies for a landscape scale effort to halt the destruction of this valuable coastal resource (LDNR 1998).

The coastal zone is also influenced by tides and marine storms that flood the coastal zone and deposit sea salt in coastal soils. Alterations to the Lower Mississippi River, including levees, blockages of former drainage systems, large and small water control structures, canals, and channelization to support shipping, have all greatly influenced Louisiana's coastal wetlands. Biologically, the coast is also open and is dominated, at least seasonally, by migratory animals, fishes, shellfishes, and birds that move in and out of the coastal estuaries and wetlands (USGS 2006).

Mississippi

Mississippi's coastal zone includes 359 miles of coastline in Hancock, Harrison, and Jackson counties, which are the three counties adjacent to the coast, as well as all adjacent coastal waters. Included in this definition are the barrier islands of the coast (NOAA 2006, State Coastal Zone Boundaries 2004).

Mississippi's marine coastline contains 46,000 acres of wetlands and water bottoms. The southern county boundaries abut Mississippi Sound, a 113 square mile estuary with a 100 square mile watershed and 17 square miles of tidal marsh. Further to the south lies the Gulf of Mexico, one of the most biologically diverse and productive bodies of water in the world. The high biological productivity of this region is an important contributing factor to Mississippi's substantial seafood industry (MMNS 2005).

Marsh habitat in Mississippi's Grand Bay estuary. Photo courtesy of NOAA.

Petit Bois, Horn, Ship (East and West) and Cat Islands in Mississippi and Dauphin Island in Alabama form a chain of barrier islands that form the south shore of Mississippi Sound. The islands serve as the boundary between the marine and estuarine systems of Mississippi's coastal wetlands (MMNS 2005).

Waters north of the islands are considered estuarine. Habitats include subtidal and intertidal areas. Estuarine areas that are partially enclosed by the mainland include embayments, lakes and tidal streams. Barrier island ponds or lagoons fit within this group. Over 300 Mississippi tidal creeks and riverine bayous cover approximately 5,500 acres. Coastal areas are also served by eight tidally influenced rivers that extend through estuarine habitat for over 85 miles and cover an estimated 4,500 acres. Of the total surface area of Mississippi Sound, 25 percent is classified as nearshore habitat, less than two meters deep, and 75 percent as offshore habitat (MMNS 2005).

Salt, brackish and intermediate marshes and salt pannes account for most of the intertidal marsh habitat of Mississippi, which totals almost 70,000 acres. Fire has been an important factor influencing the vegetation of the marshes, estuarine shrublands, and maritime flatwoods. Seagrass beds formerly covered an estimated 19,000 acres, but recent estimates indicate that only a fraction of the original beds exist today. Impacts on intertidal and seagrass communities include hurricane damage, declines in water quality, and destruction of the beds by channel maintenance, dredging, commercial fishery trawling, recreational fishing activities, and even damage from anchor dragging by recreational watercraft (MMNS 2005).

Marine habitats beyond the barrier islands occur within the western third of the Mississippi- Alabama continental shelf. The shelf extends southward along a gradual sloping plain of unconsolidated sand, muddy sand, and mud substrates for a distance of approximately 100 miles. A large diversity of species inhabit the marine waters and reside in or on the bottom substrates within the Mississippi - Alabama Continental Shelf, including over 370 species of fish and an abundance of mollusks, polychaetes, crustaceans, and echinoderms.

However, the loss of tidal marsh habitats and overfishing, coupled with the limited amount of reef habitat and the long time required for many commercial reef fish to reach maturity, have made overfishing a problem. In addition, oil spills and other pollutants that persist in the open seas decrease the quality of marine habitats (MMNS 2005). Additionally, the influx of people is creating severe demand for infrastructure, including sewage treatment systems, the lack of which poses a serious threat to water quality and fishery production (MSU 2006).

North Carolina

North Carolina's coastal zone includes 3,375 miles of coastline in the 20 counties that in whole or in part are adjacent to, adjoining, intersected by or bounded by the Atlantic Ocean or any coastal sound(s). Within this boundary, there are Areas of Environmental Concern (AEC) subject to thorough regulatory controls, including: coastal wetlands, estuarine waters, public trust areas, estuarine shorelines, ocean beaches, frontal dunes, ocean erosion areas, inlet lands, small surface water supply watersheds, pubic water supply wellfields, and fragile natural resource areas. Also in the coastal zone are land uses which have potential to affect coastal waters even though they are not located in AECs (NOAA, 2006, State Coastal Zone Boundaries 2004).

Estuary along North Carolina's coast. Photo courtesy of NOAA.

North Carolina's coastal fisheries are among the most productive in the U. S. because of the wide variety of habitats available, the largest estuarine system (2.3 million acres) of any single Atlantic coast State, the location of North Carolina at the transition between mid-Atlantic and south Atlantic regions, and a management system that supports active citizen participation (NCWRC 2005).

North Carolina's estuarine and marine waters are key spawning, nursery, and feeding areas for most of State's important coastal fishery species. Six distinctive fish habitats support North Carolina's coastal fish and fisheries: wetlands, water column, submerged aquatic vegetation, soft bottom, shell bottom, and ocean hard bottom (NCDMF 2006).

Riparian wetlands border vital nursery areas and filter pollutants from overland runoff, while protecting shorelines and producing detritus for export to other habitats. In North Carolina, many commercial fisheries species inhabit wetlands, including young blue crab, shrimp, and flounder. Predators, such as

adult seatrout, red drum, and flounder forage at the edge of marshes and river herring spawn along the swampy borders of coastal rivers and creeks (NCDMF 2006).

Shell bottom, created by living shellfish species, protects shorelines from erosion while water filtration by oysters, clams, and other shellfish clears the water column for growth of submerged aquatic vegetation. At least 12 economically important fishery species, such as blue crab, sheepshead, and stone crab, and many other non-fishery species, use shell bottom as a nursery habitat. Larger benthic feeding fish, like drums, black sea bass, and southern flounder forage on and around shell bottom habitat, and small resident species, like toadfish, gobies, and grass shrimp find refuge and spawning sites among the shells (NCDMF 2006).

North Carolina plays a key role in the life cycle of many migratory shorebirds, primarily in beach, dune, estuarine, and coastal marsh habitats. The Gulf Stream is a critical region for pelagic birds in North Carolina between the months of May and October due to an up-welling of nutrient-rich waters. Key pelagic species within this region include the black-capped petrel and other tubenoses. Cold inshore waters are a critical zone during wintertime. Key pelagic species associated with this region include gannets, loons, and alcids (NCWRC 2005).

Texas

Texas' coastal zone contains 367 miles parallel to coastal waters and wetlands generally within one mile of tidal rivers (NOAA 2006). The boundary encompasses all or portions of 18 coastal counties. Texas' seaward boundary is three marine leagues (nine nautical miles) (State Coastal Zone Boundaries 2004).

Nearly two-thirds of the State's Gulf shoreline is protected in parks, wildlife refuges and natural areas off-limits to development. The barrier islands, estuaries, marshes, embayments, and other aquatic resources provide habitat for many species, including blue crabs, oysters, pelicans, shrimp, whooping cranes, and the rare Kemp's ridley sea turtle (TGLO 2005). The coastal habitats in this region are similar to those in other Gulf Coast States.

Aransas Pass on the Texas Gulf Coast. Photo courtesy of NOAA.

Coastal waters are critical to the economy and ecology of Texas. Almost three-fourths of the fish harvested in the Gulf of Mexico are species that depend on estuaries and wetlands for mating and spawning. Estuaries provide habitat for more than 80 species of animals and plants, including shrimp, oysters, crabs, blue crabs, and finfish. One of the most important water resources is the Gulf Intracoastal Waterway, an integral part of a transportation network for moving commodities from the Gulf Coast to Maine, which also serves as an important habitat resource for birds and aquatic life (TCPS 2006).

Development in the coastal zone has resulted in the loss and degradation of coastal habitat. Wetlands, for example, have rapidly been converted into agricultural and urban lands, while bays and estuaries are among Texas' most threatened waters. A relatively recent and alarming occurrence in Texas bays has been the outbreak of harmful algal blooms, known as red and brown tides along the shore. Finally, hazardous and industrial waste spills, illegal and legal dumping of garbage, and offshore drilling by oil and gas refineries have all affected the water quality of the Gulf of Mexico and its beaches. Pollution is also likely responsible for a 3,000-square-mile "dead zone" off the Texas-Louisiana coast, where no aquatic life lives or spawns. To combat these threats to Texas' coastal water resources, the State of

Texas, through coastal and wetland protection programs, as well as the federally-funded National Estuaries Program, has dedicated funding and enacted regulations to attempt to preserve and recover coastal resources (TCPS 2006).

3.3.4.2 Coastal Barrier Resources

The Coastal Barrier Resource Act (CBRA), signed into law in 1982, prohibits Federal expenditures for development of designated undeveloped coastal barriers and their associated aquatic habitat, including wetlands, estuaries, and inlets. In response, the U.S. Department of Interior established the Coastal Barrier Resource system to identify and map the boundaries of coastal barriers (FWS 2006a).

The EFCRP area includes numerous designated coastal barriers along the Atlantic and Gulf Coasts. The project area includes coastal barriers in all six eligible States. EFCRP counties with designated coastal barriers are listed in Table 3.3.1.

Table 3.3.1. Counties with designated Coastal Barriers in the EFCRP area.

Alabama			
	Baldwin	Mobile	
Florida			
Bay	Dade	Indian River	Palm Beach
Brevard	Dixie	Lee	Santa Rosa
Broward	Escambia	Levy	Sarasota
Charlotte	Franklin	Martin	St. Lucie
Collier	Gulf	Monroe	Walton
Louisiana			
Cameron	Jefferson	Plaquemines	Terrebonne
Iberia	Lafourche	St Bernard	Vermillion
Mississippi			
Hancock	Harrison	Jackson	
North Carolina			
Brunswick	Dare	New Hanover	Pender
Carteret	Hyde	Onslow	
Texas			
Brazoria	Galveston	Jefferson	

Source: FWS 2006b.

3.3.4.3 Economic Value

The Gulf of Mexico is a productive environment. In 2004, the estimated commercial value of U.S. domestic landings in the Gulf was over $667 million (NMFS 2006). The Gulf is ranked as the top region in the country for seafood harvest in both poundage and monetary value. Much of the productivity of this region is believed to have its origins in the productivity of the nearshore marshes and seagrasses, because these habitats serve as nurseries for juveniles, and/or simply because they are the source of vast amounts of carbon and nutrients (MMNS 2005).

Shrimp ready for market. Photo courtesy of NOAA.

Louisiana's coastal zone is particularly valuable to its State and local economy. Over 95 percent of the commercially harvested fish in the Gulf of Mexico spend part of their lives in Louisiana's coastal zone. Louisiana's commercial and recreational fishing industries contribute over $3 billion to the State's economy alone. On a national level, one-third of the commercial fish harvested in the lower 48 States comes from Louisiana's coastal zone (CFCL 2002).

Shellfish is a valuable Gulf of Mexico commodity. Thirty-two of Texas's 48 classified estuary segments, as well as the Gulf of Mexico as a whole, are classified as oyster waters. About 30,000 commercial fishermen each year catch almost 100 million pounds of coastal fish and shellfish worth an estimated $270 million (TCPS 2006).

North Carolina's coastal zone also supports viable commercial and recreational fisheries. Over 134 million pounds of commercial species were landed in 2004, with over 24 million pounds in recreational catch (NCDMF 2006a).

Recreation provides a large economic contribution in coastal Texas. The total contribution to the State's economy from the nearly 850,000 sport fishing enthusiasts is over $2 billion per year. These habitats also attract 30,000 to 40,000 coastal waterfowl hunters, photographers, swimmers, campers, bird-watchers, boaters, and sightseers, generating an additional $3 billion per year. All told, coastal destinations account for 30 percent of travel in Texas, which translates into some $10 billion per year, at least part of which is based upon healthy bays and estuaries (TCPS 2006).

3.3.4.4 National Estuarine Research Reserve System

The National Estuarine Research Reserve System (NERRS) is a network of protected areas established for long term research, education, and stewardship. This partnership program between NOAA and the coastal States protects more than one million acres of estuarine land and water, which provides essential habitat for wildlife; offers educational opportunities for students, teachers, and the public; and serves as living laboratories for scientists (NERRS 2006). There are five estuary systems in the EFCRP area.

Weeks Bay Reserve, Alabama

The Weeks Bay Reserve is located near Mobile Bay's eastern shore in Baldwin County, approximately 40 miles southeast of Mobile, Alabama, and 50 miles west of Pensacola, Florida The reserve property lies in and around Weeks Bay and the tributaries of the Fish and Magnolia rivers. The reserve includes 6,016 acres that encompasses the water bottoms of Weeks Bay, Fish River, Magnolia River, and a small

portion of Mobile Bay, and includes over 1,600 acres of swamp, marsh, and upland areas (NERRS 2006).

The Weeks Bay Reserve includes over 6,000 acres of coastal wetlands that provide rich and diverse habitats for a variety of fish, crustaceans and shellfish, as well as many unique and rare plants. The lead State agency is the ADCNR. The reserve lands also include upland and bottomland hardwood forests, freshwater marsh (*Typha, Cladium*), submerged aquatic vegetation (*Ruppia, Valisneria*) and unique bog habitats (*Sarracenia, Drosera*). Weeks Bay is a critical nursery for shrimp, bay anchovy, blue crab and multitudes of other fish, crustaceans and shellfish that support robust commercial fisheries providing $450 million per year for Alabama (NERRS 2006).

Apalachicola Reserve, Florida

The reserve is located in Franklin County, on the Florida panhandle, approximately 90 miles southeast of Tallahassee, and 80 miles east of Panama City. Apalachicola Bay is one of the most productive estuarine systems in the Northern Hemisphere. The reserve protects the region's biological diversity, as well as the economic value of the natural resources and pristine conditions. Between 60 to 85 percent of the local population make their living directly from the fishing industry, most of which is done in reserve waters. Seafood landings from the Apalachicola Reserve are worth $14-16 million dockside annually. At the consumer level, this represents a $70-$80 million industry. The lead State agency is FDEP (NERRS 2006).

Rookery Bay Reserve, Florida

The reserve (110,000 acres) is five miles south of Naples, Florida. The lead State agency is FDEP. Located at the northern end of the Ten Thousand Islands on the gulf coast of Florida, Rookery Bay National Estuarine Research Reserve represents one of the few remaining undisturbed mangrove estuaries in North America. The Rookery Bay and Ten Thousand Islands ecosystem is a prime example of a nearly pristine subtropical mangrove forested estuary. Rookery Bay Reserve is located in the West Florida subregion of the West Indian Biogeographic Region. The mission of the reserve is to provide a basis for informed coastal decisions through land management, restoration, research, and education. The reserve works in partnership with local communities to promote coastal stewardship (NERRS 2006).

Grand Bay Reserve, Mississippi

The reserve is located in Jackson County in southeast Mississippi between Pascagoula and the Alabama State line. The Grand Bay Reserve (18,400 acres) is one of the most biologically productive estuarine ecosystems in the Gulf of Mexico region, supporting several rare or endangered plant and animal species, numerous important marine fishery resources, diverse habitat types and archaeological sites. The reserve encompasses coastal bay, expansive saltwater marshes, maritime pine forest, pine savanna, and pitcher plant bogs. It supports extensive and productive oyster reefs and seagrass habitats. It also serves as a nursery area for many of the Gulf of Mexico's important recreational and commercial marine species, such as shrimp, blue crab, speckled trout, red fish. The lead State agency is MDMR (NERRS 2006).

North Carolina Reserve

The reserve (10,000 acres) is comprised of four sites located near Corolla (Currituck Banks), Beaufort (Rachel Carson) and Wilmington (Masonboro Island and Zeke's Island). The lead State agency is NDENR. North Carolina's estuarine system is the third largest in the country, encompassing more the two million acres. This system is of prime economic importance to the coastal area—90 percent of the commercial seafood species caught in the State spends at least part of their lives in an estuary. The North Carolina NERR was established to preserve these fragile natural areas and the variety of life they support (NERRS 2006).

3.3.5 WETLANDS

Wetlands are some of the most productive and dynamic habitats in the world. The physical, chemical, and biological interactions within wetlands are often referred to as wetland functions. These functions include surface and subsurface water storage, nutrient cycling, particulate removal, maintenance of plant and animal communities, water filtration or purification, and groundwater recharge. Similarly, the characteristics of wetlands that are beneficial to society are called wetland values. Some examples of wetland values include reduced damage from flooding, water quality improvement, and fish and wildlife habitat enhancement.

A description of the common types of wetlands found in all six of the EFCRP States follows. These are general descriptions that are applicable to all of the States. Wetland status and trends for each of the States is included in affected environment.

Marine Wetlands

Marine intertidal wetlands include beaches, bars, and flats alternately exposed and flooded by tidal action, including the splash zone, of the open ocean (FWS 2006a).

Estuarine Wetlands

Estuarine intertidal emergent wetlands include coastal marshes that are flooded periodically by tidal waters with salinity of at least 0.5 parts per thousand. Three types of estuarine marshes are locally recognized throughout the region. They are commonly called saltmarsh, brackish marsh and, along the Gulf of Mexico, intermediate marsh. These types are separated based on degrees of salinity, as reflected by the vegetation. Common plant species of the estuarine marshes include smooth cordgrass, black needlerush, seashore saltgrass, and saltmeadow cordgrass. Extensive saltmarshes occur in South Carolina and Georgia; brackish marshes in North Carolina, Florida and Louisiana; and intermediate marshes in Louisiana (FWS 2006a).

Mangroves, Everglades National Park (FWS 2006a).

Estuarine intertidal forested/shrub wetlands are dominated by woody vegetation and are periodically flooded by tidal waters. This category primarily encompasses the mangrove-dominated wetlands of peninsular Florida and Louisiana. Principal species of mangrove communities include red mangrove, white mangrove, and black mangrove. Of these species, only black mangroves are found along coastal Louisiana. The most extensive mangrove forests are located along the southern tip of Florida (FWS 2006a).

Estuarine intertidal unconsolidated shores include sand bars, mudflats and other nonvegetated or sparsely vegetated habitats called saltflats. Saltflats are hypersaline environments that generally occur

near the interface of saltmarsh and upland habitats. Sparse vegetation of the saltflats may include glassworts and saltwort. This category also includes intertidal sandbars and mudflats (FWS 2006a).

Marshes

Marshes are defined as wetlands frequently or continually inundated with water, characterized by emergent soft-stemmed vegetation adapted to saturated soil conditions. Marshes are dominated by grasses, sedges, and rushes, and are often interspersed with patches of open shallow water. The types of marshes include fresh, intermediate, brackish, and salt marshes. The different types of marsh generally occur in bands parallel to the shoreline. Each salinity regime and habitat type supports a specific community of plants and the associated wildlife and fish that depend upon them for food. All types receive most of their water from surface water, and many marshes are also fed by groundwater. Nutrients are plentiful and the pH is usually neutral leading to an abundance of plant and animal life (ULL 2006 and EPA 2006b).

Freshwater Marsh

Freshwater marshes occur farthest inland. They are dependent upon rainfall, runoff, and seasonal flooding for their water supply. Some plants commonly found in freshwater marsh are maidencane, bulltongue, alligatorweed, cattails, and spikerush. Fresh marshes are home to a broad range of animals such as frogs, turtles, ducks, alligators, muskrats, mink, otters, egrets, herons, and hawks (ULL 2006).

This category includes all freshwater wetlands dominated by rooted erect soft-stemmed plants. Most habitats in this category are freshwater marshes vegetated by plants such as cattail, arrowhead, and pickerelweed. Also included are wet prairies, wet meadows, and pitcher plant bogs, each of which may be vegetated by a diverse assemblage of non-woody plant species (FWS 2006a).

Also included are freshwater wetlands vegetated by floating or submerged vegetation. Typical of the plant species found within this category are floating vascular plants such as duckweed and mosquito fern; and rooted vascular plants such as spatterdock, water-lilies, pondweeds, and hornworts (FWS 2006a).

Intermediate Marsh

Seaward of freshmarsh areas are intermediate marshes. Intermediate marshes are found where slightly salty water mixes with fresh water. These marshes are characterized by a diversity of species, many of which are found in freshwater marsh and some of which are found in brackish marsh. Plants found in these marshes can tolerate slightly salty water and include a mixture of spikerush, three-corner grass, arrowhead, cordgrass, wiregrass, roseau cane, deer pea, and water hyssop. Depending upon the season, waterfowl, wading birds, marsh hawks, and fur bearers are commonly found here. Intermediate marshes provide nursery habitat for brown shrimp, blue crab, gulf menhaden, and a variety of other commercially and recreationally valuable fishery resources (ULL 2006).

Brackish Marsh

Brackish marsh is usually found between salt marsh and intermediate marsh. This area is affected by tidal action as well as water movement from freshwater marsh. It is typically dominated by cordgrass or wiregrass. Plant diversity and soil organic matter is higher than salt marsh. Blue crab, shrimp, speckled trout, and redfish flourish in brackish marshes as do muskrats, raccoons, mink, otters, and other mammals (ULL 2006).

Salt Marsh

The salt marsh occurs closest to and along the shoreline. Salt marshes have the greatest salt concentration and these marshes are most affected by the wind and tide. The Gulf regularly floods salt marshes, creating conditions where oyster grass is common, but few other plant species can survive.

Redfish, speckled trout, blue crabs, and shrimp move in and out of the salt marsh at different stages of their life cycles (ULL 2006).

Forested Wetlands

Most southern forested wetlands fall in the broad category of bottomland hardwoods, characterized and maintained by a natural hydrologic regime of alternating annual wet and dry periods and soils that are saturated or inundated during a portion of the growing season (USGS 2006a).

Bottomland hardwood forests are generally found in floodplains and the ebb and flow of floodwater shapes the forest floor into ridges, swales, or flats. These elevational differences influence the duration of flooding or soil saturation, which, in turn, affect the type and abundance of plants that can grow. As a result, bottomland hardwood forests contain a diversity of trees, shrubs, herbaceous species, and vines that grow together in different vegetation assemblages depending on soil type, water depth, velocity, and flood duration (TPW 1997).

Elm, ash, hackberry, several species of oak, hickory, and red maple dominate bottomland hardwood forests. Common understory may include swamp dogwood, hawthorns, red mulberry, giant cane, deciduous holly, wax myrtle, pokeweed, and dwarf palmetto. Spiderworts, seaside goldenrods, pennyworts, green dragon, smartweeds, and maiden ferns may also be present along with vines such as pepper-vine, poison ivy, trumpet-creeper, rattan vine, and greenbriar (ULL 2006).

Bottomland hardwood wetlands provide abundant food, nesting sites, resting areas, and escape cover for many wildlife species. Many fish species use spring-flooded bottomlands as spawning and feeding locations (NCDCM 2006a). Animals found in forested wetlands include wood ducks, mallards, eastern wild turkeys, swamp rabbits, gray and fox squirrels, raccoons, river otters, beavers, red-eyed vireos, alligator snapping turtles, and cottonmouth water moccasins (TPW 1997).

Bottomland hardwood forested wetlands provide a number of ecological and economical values. Bottomlands anchor soil, prevent soil loss from scouring, and filter various pollutants from water. Pesticides readily adhere to clay and organic particles, and these wetlands are sinks for oil, nitrogen, phosphorus, sewage, fly ash and other particulates. In addition, these forested wetlands provide important timberland and the variety of timber types found in the bottomlands is a valuable, renewable resource (ULL 2006 and TPW 1997).

Pitcher Plants. Photo Courtesy of ULL 2006.

Swamps

Swamps are characterized by saturated soils during the growing season, and standing water during certain times of the year. The highly organic soils of swamps form a thick, black, nutrient-rich environment for the growth of water-tolerant trees such as cypress, Atlantic white cedar, and tupelo. Some swamps are dominated by shrubs, such as buttonbush or smooth alder. Plants, birds, fish, and invertebrates such as freshwater shrimp, crayfish, and clams require the habitats provided by swamps. Many rare species, such as the endangered American crocodile depend on these ecosystems as well (EPA 2006b).

Bogs

A bog is a wetland formed where the soil is saturated, strongly acidic, and low in nutrients such as nitrogen, phosphorus, and calcium. The unique and demanding physical and chemical characteristics of bogs result in the presence of plant and animal communities that demonstrate many special adaptations to low nutrient levels, waterlogged conditions, and acidic waters, such as carnivorous plants (EPA 2006b and ULL 2006).

Hillside seepage bogs are found at the bottom of hillsides in pine forests. These bogs form when the rainwater soaks down through the soils of the hilltops, but cannot penetrate the heavy clay and rock layers beneath the surface. Water flows across this layer until it seeps back to the surface at the base of the hill to form the bog (ULL 2006).

Bogs are also commonly located in pine flatwood savannahs. Savannahs differ from hillside bogs in that they are generally level, and they normally dry out during the growing season. Savannahs are the most biologically diverse of the bogs and support many rare species (ULL 2006).

Carnivorous plants are the most conspicuous plants of the bogs and include the yellow pitcher plant, the parrots pitcher plant, the sundew, bladderwort, and the butterwort. Bogs in the Southeast are often called pitcher plant bogs because of the abundance of yellow pitcher plants. Other plants include beautiful wildflowers such as yellow fringed orchids, ladies' tresses, Sabine coneflowers, Calopogens or grass pinks, rose pagonias, and bog buttons, as well as various grasses, rushes, and sedges. Non-flowering plants include grasses, rushes, and sedges, two species of club moss, and, in some hillside bogs, sphagnum moss. Pine trees such as the longleaf pine, the loblolly pine, and the slash pine, border the edges of the bogs. These trees, because of their acidic nature, are responsible for the acidity of bogs, rather than sphagnum moss, which is more dominant in other parts of the world and normally determines the acidic nature of bogs (ULL 2006 and FWS 2006a).

Fire suppression is one of the biggest threats to bogs. Frequent fires, are essential to a rich and healthy bog. The fire removes dead grass and plants, increases or replenishes certain nutrients, and stimulates early spring growth. Fire also restricts the spread of woody plants. Bogs are also threatened by agricultural conversion and urban development. Other threats to the bogs include overgrazing, foot traffic, motor vehicles, herbicide application, and over collecting by both professional botanists and plant fanciers (ULL 2006).

Pocosins

These evergreen shrub and tree dominated landscapes are found on the Atlantic Coastal Plain from Virginia to northern Florida, though most are found in North Carolina. Usually, there is no standing water present in pocosins, but a shallow water table leaves the soil saturated for much of the year. They range in size from less than an acre to several thousand acres located between and isolated from old or existing stream systems in most instances (EPA 2006b).

Because pocosins are found in broad, flat, upland areas far from large streams, rain provides most of their water. Pocosins are found on waterlogged, nutrient poor, acidic soils. The soil itself is a mixture of peat and sand containing large amounts of charcoal from periodic burnings. These natural fires occur because pocosins periodically become very dry in the spring or summer. The fires are ecologically important because they increase the diversity of shrub types in pocosins (EPA 2006b).

The most common plants are evergreen trees (loblolly bay, red bay, and sweet bay), and evergreen shrubs (titi, fetterbush, and zenobia). Pocosins provide important habitat for many animals, including some endangered species like the red-cockaded woodpecker. They are especially important as the last refuge for black bears in coastal Virginia and North Carolina, and the red wolf has recently been reintroduced in North Carolina pocosins. Large pocosins are a refuge for wilderness animals, such as black bear and bobcat. Carolina bays are critical habitat for many uncommon amphibians and reptiles.

Long leaf pine savanna. Photo Courtesy of NCDCM 2006a

Pine savannas are host to numerous rare plants, such as insectivorous species, and to the endangered red-cockaded woodpecker (NCDCM 2006a and EPA 2006b).

3.3.5.1 Affected Environment

Regional Overview of the Southeastern States (including Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee)

The Southeast makes up only 16 percent of the surface area of the conterminous U. S. yet accounts for about 47 percent (48.9 million acres) of the total wetland area and 65 percent of the forested wetland area. Wetlands cover 16 percent of the region's area, compared to a five percent overall coverage in area for the lower 48 States (USGS 2006a and FWS 2006a).

From the mid-1970s to the mid-1980s, the average annual net loss of wetlands in the Southeast was 259,000 acres and wetland losses within the region accounted for 89 percent of the net national wetland losses for the period (Figure 3.3-14). Estuarine (saltwater) wetland acreages remained stable throughout most of the region except for coastal Louisiana, where substantial losses were identified. However, freshwater wetlands declined dramatically and forested wetlands such as bottomland hardwood swamps and cypress sloughs declined by 3.1 million acres, with heaviest losses in the Gulf-Atlantic Coastal Flats of North Carolina and in the Mississippi Alluvial Plain in Arkansas, Mississippi, and Louisiana (FWS 2006a).

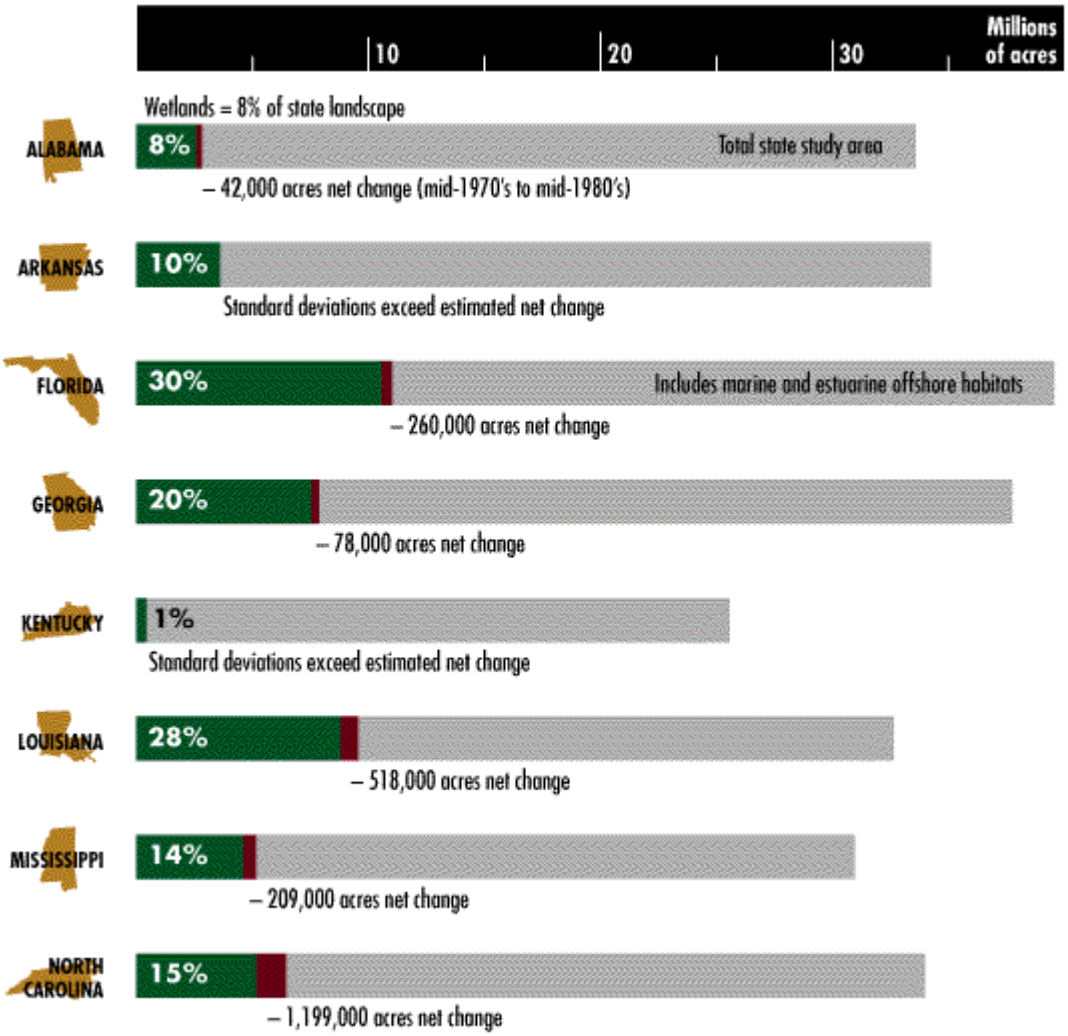


Figure 3.3-14. Wetland losses by State between the mid-1970s through the mid- 1980s. EFCRP States are Alabama, Florida, Louisiana, North Carolina, and Mississippi. Source: FWS 2006a.

The most dramatic wetland loss in the entire nation has occurred in the forested wetlands of the Lower Mississippi River Alluvial Floodplain (LMRAF). This vast wetland extends nearly 621 miles from the confluence of the Mississippi and Ohio rivers to the Gulf of Mexico and originally covered more than 25.0 million acres. About 19.8 million acres of this area were forested wetlands in Arkansas, Louisiana, and Mississippi. Recent estimates reveal that fewer than 4.9 million acres of forested wetlands remain in the LMRAF, and the remaining portions of the original area are extremely fragmented (Figure 3.3-15) and have lost many of their original functions. For example, the bottomland hardwood- riparian wetlands along the Mississippi River once stored at least 60 days of floodwater and now they store about 12 days of floodwater (EPA 2006a and USGS 2006a).

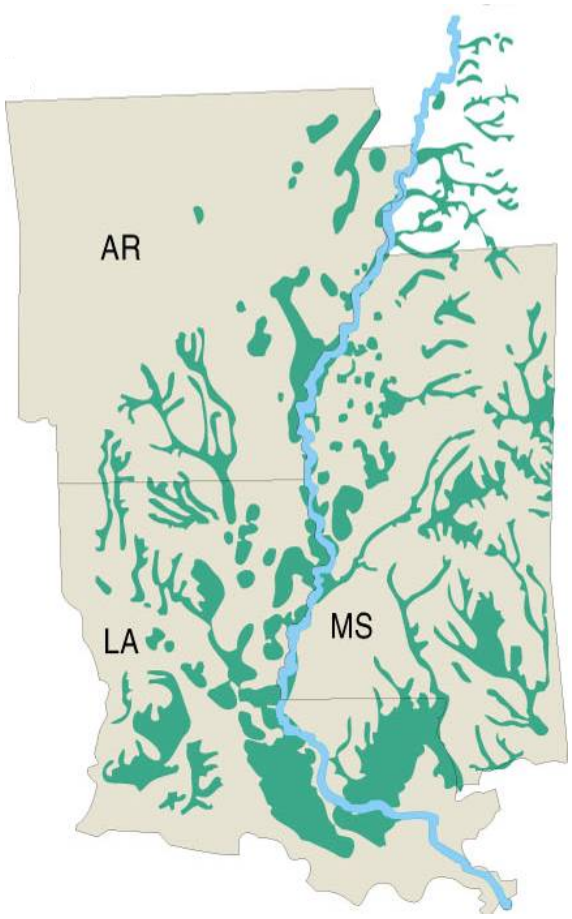


Figure 3.3-15. Distribution of forested wetlands along the Lower Mississippi River: recent extent based on 1982 data. Source: USGS 2006a

Recognition of the scale and effects of bottomland hardwood losses has resulted in interest in restoration techniques. Serious restoration began in the mid-1980s, when State and Federal agencies began reforesting former agricultural lands. The pace of reforestation picked up rapidly following the establishment of CRP and later the Wetland Reserve Program (WRP), two Federal conservation programs. The combined efforts of the agencies and these two conservation programs have resulted in the planting of about 160,615 acres of bottomland hardwood forests in the southern U.S. since 1985. Most restoration has occurred in the LMRAF (USGS 2006a).

Alabama

Approximately 3.5 million acres of wetlands exist in Alabama, but development, agriculture, draining, and other human activities have destroyed more than half of the estimated 7.5 million acres that were present before European settlement. Major causes of wetland loss or alteration have been agricultural and silvicultural conversions in the interior, dredging on the coast, industrial, commercial, and residential development, erosion, subsidence, and natural succession of vegetation (USGS 2006b).

The types of wetlands found in the State are varied and include salt marsh, forested swamps, and bogs. Most of the State's forested wetlands are bottomland forests in alluvial floodplains. Coastal waters support extensive salt marshes. The tidally influenced Mobile-Tensaw Delta north of Mobile Bay is the State's largest wetland at 100,000 acres, ranging from 5 to 10 miles wide along its 40-mile length (ADCNR 2005).

Florida

Florida has about 11 million acres of wetlands, more than any of the other 47 conterminous States. The abundance of wetlands in Florida is due primarily to the low, flat terrain and plentiful rainfall. Most of Florida's wetlands are forested freshwater habitats on stream floodplains, in small depressions and ponds, and covering wet flatwoods. The Everglades, in southern Florida, is a large freshwater marsh that once received surface- and groundwater flows from the Kissimmee River-Lake Okeechobee Basin but which now depends on water releases from canals and water-retention areas. Florida has lost nearly one-half of its wetlands, primarily to agricultural drainage. The State protects wetlands by regulating development in wetland areas, acquiring wetlands and land adjacent to wetlands, and requiring local governments to produce long-range plans for wetland protection (USGS 2006b).

Florida wetlands generally include swamps, marshes, bayheads, bogs, cypress domes and strands, sloughs, wet prairies, riverine swamps and marshes, hydric seepage slopes, tidal marshes, mangrove swamps, and other similar areas. Florida wetlands generally do not include longleaf or slash pine flatwood (FDEP 2006).

Louisiana

Louisiana's wetlands extend as much as 80 miles inland and along the coast for about 185 miles and are a major source of income providing revenues from harvesting of fish and shellfish, trapping, and recreation. Most of the State's wetlands are freshwater swamps, but the area of coastal marsh is substantial. Louisiana has 25 percent of the forested wetlands and 40 percent of the coastal wetlands in the 48 contiguous States but accounts for 80 percent of wetlands losses. Wetlands once covered more than one-half of the area that is now Louisiana, but wetland acreage has declined to less than one-third of the State's land surface over the last 200 years. Louisiana's 3 million acres of wetlands experience a loss at the rate about 18,000 acres per year. Not all the wetlands are receding; in fact some wetlands are stable, and others are growing. But, at the present net rate of wetlands loss, Louisiana will have lost this crucial habitat in about 200 years (USGS 2006b, USGS 2006c, and USGS 2006d).

About 1,000 to 1,500 square miles of Louisiana's coastal wetlands have been converted to open water during the past half century. The processes and activities that have contributed to this conversion include long term erosion and land subsidence (sinking of the land) caused, in part, by compaction of Mississippi River Delta sediments and by large storms that strike the area about every five years, rising sea levels, changes in human population, energy development, flood control, and maintenance of navigation channels. As wetlands, estuaries, and barrier islands vanish, the State loses important natural buffers protecting New Orleans and other populated coastal areas from storms and flooding (USGS 2006d).

Mississippi

Wetlands occupy more than 13 percent (approximately 3.9 million acres) of Mississippi. Bottomland forests, swamps, freshwater marshes, and coastal marshes account for most of Mississippi's wetland acreage. Wetlands in Mississippi are a key part of the Lower Mississippi Valley Joint Venture program for the restoration of Mississippi Flyway waterfowl populations. Nearly three-fifths of the State's wetlands have been primarily converted to agriculture. USFS inventories indicate that between 0.7 and 1.0 percent of Mississippi's oak-gum-cypress forest type is lost annually in the LMRAF (USGS 2006a and USGS 2006b).

North Carolina

About 5.7 million acres (17 percent) of North Carolina is wetland. The Coastal Plain contains 95 percent of the State's wetlands. Before colonization by Europeans, North Carolina had about 11 million acres of wetlands. Nearly one-third of the wetland alterations in the Coastal Plain have occurred since the 1950s, with most resulting from conversion to managed forests and agriculture. North Carolina continues to

lose wetlands at an alarming rate and an estimated 1.2 million acres of wetlands were lost between the mid 1970s and 1980s (NCWRC 2006, FWS 2006a, and USGS 2006b).

Texas

Wetlands cover about 7.6 million acres of Texas comprising 4.4 percent of the State's area. The most extensive wetlands are the bottomland hardwood forests and swamps of East Texas, the marshes, swamps, and tidal flats of the coast, and the playa lakes of the High Plains (USGS 2006b). In Texas, wetlands are divided into different regions and the regions of East Texas and Gulf Coast cover the EFCRP counties (TPW 1997).

East Texas contains a mosaic of wetland types including forested wetlands, shrub swamps, marshes, oxbow lakes, and bogs. Forested wetlands, the most common wetland type in East Texas, are dominated by bottomland hardwood forests. Bottomland hardwood forests with 1.2 million acres are confined to six major river courses in East Texas and an additional 3 million acres within the tributaries of these rivers, yielding a total hardwood acreage of approximately 4,231,000 acres (TPW 1997).

The Gulf Coast contains a diversity of salt, brackish, and intermediate and fresh wetlands, including wet prairies, forested wetlands, barrier islands, tidal flats, estuarine bays, and bayous and rivers. Coastal prairies also contain rice fields, which can provide excellent wintering waterfowl habitat. Saline and brackish marshes are most widely distributed south of Galveston Bay, while intermediate marshes are the most extensive marsh type east of Galveston Bay. The lower coast has only a narrow band of emergent marshes, but has a system of extensive bays, lagoons and small, near-shore ponds, which are critical freshwater sources to diving ducks that feed in saline and hypersaline lagoons (TPW 1997).

Although wetlands in Texas comprise less than five percent of the State's total land area, Texas is one of nineteen States that has exhibited the most significant losses of wetland ecosystems (TPW 1997). Texas has lost about one-half of its original wetlands as a result of agricultural conversions, overgrazing, urbanization, channelization, water-table declines, construction of navigation canals, and other causes (USGS 2006b).

In East Texas, bottomland forests have been impacted by mining and petroleum extraction, urban development, reservoirs, agriculture, lack of forest management, pollution, and minor floodplain modifications. A comparison to pre-settlement estimates indicates a 63 percent loss of the original bottomland component. Future declines in bottomland hardwood forests are expected from continued land use changes. Over 600,000 acres of bottomland hardwood forests are estimated to have been lost from the construction of reservoirs alone (TPW 1997).

Coastal wetlands have also declined throughout the EFCRP area. Nearly one in three acres of coastal freshwater emergent marshes have been lost (net loss of 235,100 acres of the 800,000 acres in 1955) while 11 percent of the coastal freshwater forested wetlands have disappeared since 1955 (net loss of 97,000 acres of the 890,000 acres) (TPW 1997).

3.3.6 FLOODPLAINS

Floodplains are defined as lowlands or relatively flat areas adjoining inland or coastal waters, including areas subject to a one percent or greater chance of flooding in any given year (NRCS 2005c).

In accordance with the EO 11988 and prior to any action, Federal Emergency Management Agency (FEMA) floodplain maps will be reviewed to determine if the proposed action is located in or will affect a 100- or 500-year floodplain. Soil survey maps, aerial photography, and topographical maps should be used where no FEMA maps are available.

3.3.6.1 Affected Environment

Alabama

As of 2003, FEMA estimated that more than 62 percent of Alabama's floodplain maps were more than 10 years old. In 2004, Alabama developed a five-year plan for updating and modernizing floodplain maps and for improving floodplain management efficiency. A component of this five-year plan is the establishment of a website that will provide all floodplain management stakeholders access to updated digital floodplain maps (FEMA 2006 and ADECA 2006).

Florida

The State of Florida has over 17 million residents and 80 percent of them live or conduct business along or near its coastline. A significant portion of the remaining residents live or conduct commerce near many of the State's historical rivers and other inland floodplains (FDEM 2006).

Louisiana

Louisiana could be described as the floodplain of the nation. The unique topography of Louisiana is a virtual nervous system of rivers, lakes, lagoons, reservoirs, bayous, and coastal estuaries. Louisiana waterways drain two-thirds of the continental U. S.. Precipitation in New York, the Dakotas, Idaho, and the Province of Alberta, finds its way to Louisiana's coastline. Pre-existing high land is often the result of natural levees developing along the banks of historical or present day waterways. Despite massive improvements to reduce the impacts of severe weather in the last 100 years, flooding is a constant threat (FEMA 2006a).

In response to Hurricane Katrina, FEMA is currently reviewing new floodplain maps for Louisiana and Mississippi, but these new maps are not finalized. As a result, new construction permitted prior to the release of these new floodplain maps could potentially be below revised FEMA 100-year floodplain map elevations (USHR 2006).

Mississippi

With more than 5.2 million acres classified as a floodplain, Mississippi has the fifth greatest number of floodplain acres in the nation. The State ranks eighth in the nation for the number of repetitive loss structures (MEMA 2006 and MEMA 2006a).

In response to Hurricane Katrina, FEMA is currently reviewing new floodplain maps for Louisiana and Mississippi, but these new maps are not finalized. As a result, new construction permitted prior to the release of these new floodplain maps could potentially be below revised FEMA 100-year floodplain map elevations (USHR 2006).

North Carolina

The State of North Carolina, through FEMA's Cooperating Technical Partnership initiative, has been designated as a Cooperating Technical State (CTS). The North Carolina CTS Floodplain Mapping Program will include conducting flood hazard analyses and producing updated, digital floodplain maps. Through this program, basin plans used to complete updated digital floodplain maps will be developed. Basin plans have been developed for all of the river basins within the EFCRP area and with the exception of the Cape Fear basin, these basin plans have been finalized.

As of February 2006, the following counties in the EFCRP have final updated floodplain maps: Carteret, Craven, Hyde, Pamlico, Jones, and Onslow. Counties with preliminary updated floodplain maps include Brunswick, Dare, New Hanover, and Pender. These maps are available through North Carolina's Floodplain Mapping Program website (NCFMP 2006).

Texas

Flood prone areas have been identified in most counties, cities, and towns in Texas and millions of building and structures are located in mapped flood prone areas. Approximately 12 percent of Texas's land area is mapped floodplain. However, many waterways have not been mapped and, as of 2003, more than 72 percent of Texas's floodplain maps were more than 10 years old. Outdated maps may not accurately reflect flood hazard conditions, which change in response to community development and natural processes (TFMA 2006 and FEMA 2006b).

3.4 SOIL RESOURCES

Soil is a natural body comprised of solids (minerals and organic matter), liquid, and gases that occurs on the land surface, occupies space, and is characterized by one or both of the following: horizons, or layers, that are distinguishable from the initial material as a result of additions, losses, transfers, and transformations of energy and matter *or* the ability to support rooted plants in a natural environment (NRCS 2006).

The upper limit of soil is the boundary between soil and air, shallow water, live plants, or plant materials that have not begun to decompose. The lower boundary that separates soil from the non-soil underneath is most difficult to define. Soil consists of the horizons near the earth's surface that, in contrast to the underlying parent material, have been altered by the interactions of climate, relief, and living organisms over time (NRCS 2006).

3.4.1 Affected Environment

Given the regional scope of EFCRP, this PEA employs the NRCS LRR and MLRA Handbook to describe the existing soil environment as related to resource area, rather than State jurisdictional boundaries (NRCS 2006). Maps and descriptions of each of the LRRs and MLRAs within EFCRP boundaries are presented in Section 3.1.

3.4.1.1 East and Central Farming and Forest LRR

The EFCRP area within the East and Central Farming and Forest LRR contains three MLRAs, including the Highland Rim and Pennyroyal, Southern Appalachian Ridges and Valleys, and Sand Mountain (NRCS 2006).

The soils in these MLRAs are mainly Ultisols, Inceptisols, Udults, Ultisols, and, to a lesser extent, Udepts. They have an udic soil moisture regime, a thermic or mesic soil temperature regime, are dominantly well drained, strongly acid, and highly leached, and have a clay-enriched or siliceous mineralogy. They range from shallow on sandstone and shale ridges to very deep in valleys and on large limestone formations (NRCS 2006).

The major soil resource concerns within these MLRAs are water erosion, sheet and rill erosion on pasture, land slippage, streambank erosion, gullying, surface compaction caused by livestock trampling, maintenance of the content of organic matter and productivity of the soils, and management of soil moisture (NRCS 2006).

3.4.1.2 Mississippi Delta Cotton and Feed Grains LRR

Four MLRAs within the Mississippi Delta Cotton and Feed Grains LRR are located in the EFCRP area: Southern Mississippi River Alluvium, Arkansas River Alluvium, Red River Alluvium, and Southern Mississippi River Terraces (NRCS 2006).

The dominant soil orders in these MLRAs are Alfisols, Vertisols, Inceptisols, and Entisols. The soil temperature regime is thermic in most of the MLRAs. It is hyperthermic, however, south of Baton Rouge, Louisiana. The soils in the MLRAs dominantly have an aquic soil moisture regime, smectitic clay mineralogy, and mixed sand and silt fraction mineralogy. The soils are very deep, dominantly poorly drained and somewhat poorly drained, and dominantly loamy or clayey (NRCS 2006).

The major soil resource concerns within these MLRAs are control of surface water, management of soil moisture, and maintenance of the content of organic matter and productivity of the soils (NRCS 2006).

3.4.1.3 South Atlantic and Gulf Slope Cash Crops, Forest, and Livestock LRR

The South Atlantic and Gulf Slope Cash Crops, Forest, and Livestock LRR encompassing the EFCRP area include five MLRAs: the Southern Coastal Plain, Western Coastal Plain, Southern Mississippi Valley Loess, Alabama and Mississippi Blackland Prairie, and Southern Piedmont (NRCS 2006).

The dominant soil orders in these MLRAs are Ultisols, Entisols, Alfisols, Vertisols, and Inceptisols. The soils in these areas dominantly have a thermic soil temperature regime, an udic or aquic soil moisture regime, and a siliceous, smectitic, carbonatic, kaolinitic, or mixed mineralogy. They generally are very deep, somewhat excessively drained to poorly drained, and loamy or clayey (NRCS 2006).

The major soil resource concerns within these MLRAs are water erosion, maintenance of the content of organic matter and productivity of the soils, control of surface water, artificial drainage, the increasing conversion of prime farmland and farmland of statewide importance to urban uses, and management of surface compaction and soil moisture. Water erosion is a hazard in sloping areas that are bare because of tree harvesting (NRCS 2006).

3.4.1.4 Atlantic and Gulf Coast Lowland Forest and Crop LRR

The EFCRP area within this LRR includes six MLRAs: Gulf Coast Prairies, Gulf Coast Saline Prairies, Gulf Coast Marsh, Eastern Gulf Coast Flatwoods, Western Gulf Coast Flatwoods, and Atlantic Coast Flatwoods, (NRCS 2006).

The dominant soil orders in these MLRAs are Alfisols, Mollisols, Vertisols, Entisols, Inceptisols, Histosols, Spodosols, and Ultisols. The soils have a hyperthermic and thermic soil temperature regime, an aquic, udic, and ustic soil moisture regime, with a smectitic, siliceous, kaolinitic, or mixed mineralogy. The soils are generally deep, and drainage ranges from well drained in very gently sloping and gently sloping soils in convex areas to very poorly drained in soils in enclosed depressions (NRCS 2006).

The major soil resource concerns within these MLRAs are wind erosion, water erosion, maintenance of the content of organic matter and tilth of the soils, surface compaction, and management of soil moisture. Increasing salinity is a problem in some areas. When areas are bare after a tree harvest, water erosion is a hazard on sloping land (NRCS 2006).

3.4.1.5 Florida Subtropical Fruit, Truck Crop, and Range LRR

Four MLRAs within this LRR are located in the EFCRP area: South-Central Florida Ridge, Southern Florida Flatwoods, Florida Everglades and Associated Areas, and Southern Florida Lowlands (NRCS 2006).

The dominant soil orders in these MLRAs are Entisols, Alfisols, Spodosols, Histosols, and Ultisols. The soils in these areas dominantly have a hyperthermic soil temperature regime, an udic or aquic soil moisture regime, and siliceous or carbonatic mineralogy. They are very shallow to very deep, excessively drained to very poorly drained, and loamy or sandy (NRCS 2006).

The major soil resource concerns within these MLRAs are wind erosion, maintenance of the content of organic matter and productivity of the soils, and management of soil moisture (NRCS 2006).

3.5 AIR QUALITY

Under the Clean Air Act (CAA), EPA sets limits on pollutant levels allowed in the air in the U.S. This ensures that all Americans have the same basic health and environmental protections. Pursuant to Title I of the CAA, EPA has established national ambient air quality standards (NAAQSs) to limit levels of criteria pollutants, including carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, and sulfur dioxide. A geographic area that meets or does better than the primary standard is called an attainment area; areas that don't meet the primary standard are called nonattainment areas. A single geographic area may have acceptable levels of one criteria air pollutant but unacceptable levels of one or more other criteria air pollutants; thus, an area can be both attainment and nonattainment at the same time (EPA 2006a).

A State Implementation Plan (SIP) is an enforceable plan developed at the State level that explains how the State will comply with air quality standards according to the CAA. A SIP must be submitted by the State government of any State that has areas that are designated in nonattainment of Federal air quality standards (EPA 2006a).

Forests provide benefits to air quality by removing carbon dioxide (CO_2), a major greenhouse gas, from the atmosphere and storing it in its biomass (i.e. trees, vegetation). This process of removing carbon from the atmosphere and storing it in carbon pools is called carbon sequestration. Carbon pools in forestry include tree biomass (roughly 50 percent carbon), soils, and wood products. A carbon pool is a sink if, over a certain time interval, more carbon is removed and stored in the pool than is being released. Forestry practices, such as prescribed burning, can also release the stored CO_2 and other greenhouse gases to the atmosphere and forests can become a source of CO_2 emissions (EPA 2006x).

3.5.1.1 Prescribed Burning

Prescribed burning is a land treatment used under controlled conditions to accomplish natural resource management objectives. It is one of several land treatments used individually or in combination with chemical and/or mechanical methods (EPA 2006b). This practice is common throughout the EFCRP area. In Alabama, for example, close to a million acres of land is prescribed burned by landowners each year; in Florida an average of almost 2 million acres are treated each year (AFC 2006a and FDF 2006).

Prescribed burning. Photo courtesy of MDMR 2006.

Prescribed fire is a cost-effective and ecologically sound tool for forest, range, and wetland management. Its use reduces the potential for destructive wildfires and thus maintains long term air quality. Also, the practice removes logging residues, controls insects and disease, improves wildlife habitat and forage production, increases water yield, maintains natural succession of plant communities, and reduces the need for pesticides and herbicides (EPA 2006b).

Prescribed Burning and Air Quality

The major air pollutant of concern is the smoke produced. Smoke from prescribed fires is a complex mixture of carbon, tars, liquids, and different gases. This source of open combustion produces particles ranging widely size, depending to some extent on the rate of energy release of the fire. The major pollutants from wildland burning are particulates, carbon monoxide, and volatile organics (EPA 2006b).

The biggest health threat from smoke comes from fine particles. These microscopic particles can get into eyes and respiratory system, where they can cause health problems such as burning eyes, runny nose, and illnesses such as bronchitis. Fine particles also can aggravate chronic heart and lung diseases, and are linked to premature deaths in people with these conditions (AIRNow 2006).

State Regulations for Prescribed Burning

Each of the EFCRP States allow private landowners to use prescribed burning as a forestry management option. Each State has specific ordinances that regulate prescribed burning on private forestland. These ordinances are summarized in Chapter 6.0, Mitigation Measures.

3.5.2 Affected Environment

Several EFCRP counties are listed as nonattainment areas and air quality in these counties do not meet NAAQSs (Figure 3.5-1). All counties with nonattainment status are listed for the criteria pollutant 8-hour (hr) ozone. Jefferson County, Alabama is also a nonattainment area for particulate matter less than 2.5 micrometers in diameter (PM-2.5). PM-2.5 and ozone pollutants are described below. Table 3.5.1 is a summary of nonattainment counties in the EFCRP area.

Table 3.5.1. Nonattainment counties in the EFCRP area.

State	Nonattainment Counties in EFCRP		Criteria Pollutant
Alabama	Jefferson		8-hr ozone PM-2.5
Florida	None		
Louisiana	Ascension East Baton Rouge Iberville West Baton Rouge Livingston		8-hr ozone
Mississippi	None		
North Carolina	North Carolina has nonattainment counties, however none are EFCRP counties		
Texas	Brazoria Chambers Fort Bend Galveston Hardin	Harris Jefferson Liberty Montgomery Orange	8-hr ozone

Source: EPA 2006c.

PM is a complex mixture of extremely small particles and liquid droplets made up of a number of components including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. The size of particles is directly linked to their potential for causing health problems. EPA is concerned about particles that are 10 micrometers in diameter, which is a size that generally passes through the throat and nose and enters the lungs. Once inhaled, these particles can affect the heart and

lungs and cause serious health effects (EPA 2006d). EPA groups particle pollution into two categories (EPA 2006d):

- "Coarse particles," such as those found near roadways and dusty industries, range in size from 2.5 to 10 micrometers in diameter.
- "Fine particles," such as those found in smoke and haze, have diameters smaller than 2.5 micrometers. These particles can be directly emitted from sources such as forest fires, or they can form when gases emitted from power plants, industries, and automobiles react in the air. These are known as the pollutant PM 2.5

Ozone is a gas composed of three atoms of oxygen. Ozone occurs both in the Earth's upper atmosphere and at ground level (AIRNow 2006a). Ozone can be good or bad, depending on where it is found (AIRNow 2006a):

- **Good Ozone.** Ozone occurs naturally in the Earth's upper atmosphere approximately 6 to 30 miles above the Earth's surface where it forms a protective layer that shields us from the sun's harmful ultraviolet rays. This beneficial ozone is gradually being destroyed by manmade chemicals. An area where the protective "ozone layer" has been significantly depleted, for example, over the North or South Pole, is sometimes called "the ozone hole."
- **Bad Ozone.** In the Earth's lower atmosphere, near ground level, ozone is formed when pollutants emitted by cars, power plants, industrial boilers, refineries, chemical plants, and other sources react chemically in the presence of sunlight. Ozone at ground level is a harmful air pollutant.

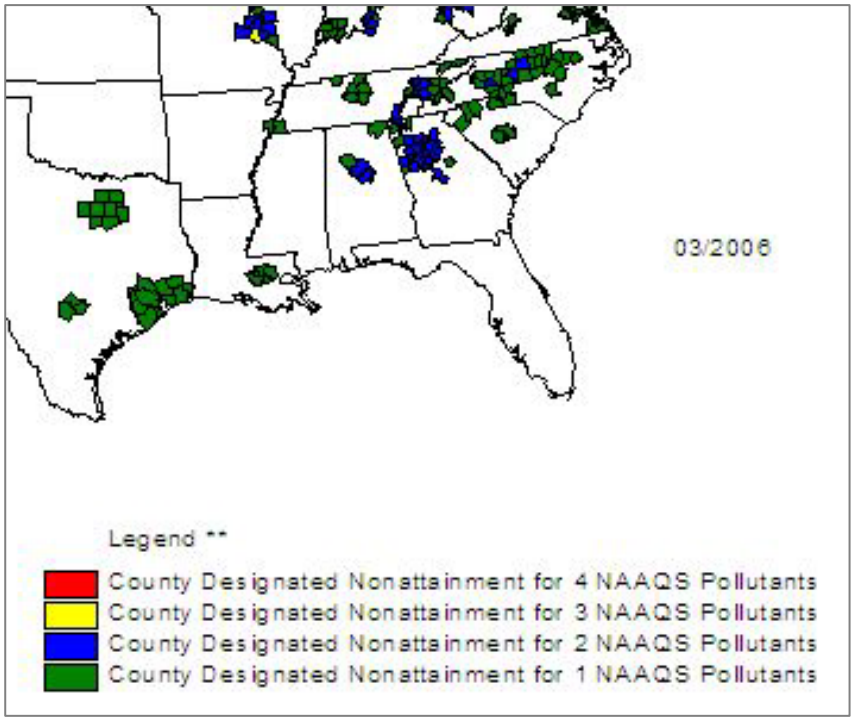


Figure 3.5-1. Counties designated as non-attainment for CAA's NAAQS, current as of March 2006 (EPA 2006c).

3.6 RECREATION

3.6.1 Affected Environment

While the profession of forestry often focuses much of its time and talent on stand inventories, game habitat, water production, forest health, and commodity interests, rising nontraditional, aesthetic (i.e., recreational) demands are beginning to assume a dominance over traditional forest resource demands (Cordell and Tarrant 2002).

In a recent study of outdoor recreation in the U. S., 94.5 percent of Americans 16 years of age or older indicated that they participated in at least one form of outdoor recreation in the year prior to the interview (Cordell 2004). Outdoor activities that could occur on forest lands include camping, hunting, fishing, snow and ice activities, boating, and outdoor adventure activities (such as hiking, backpacking, and horseback riding). Approximately one-third of the respondents from the South fished and/or participated in outdoor adventure activities (with hiking and off-road driving as the most popular). Approximately 23 percent of the respondents from the South camped (USDA 2006).

3.6.2 Affected Environment

3.6.2.1 Recreation Demand

Forest-based recreation and eco-tourism also are flourishing. Americans, especially Southerners, have long shown their love for outdoor activities, like camping and hunting in forested areas, but a whole new set of forest-based recreation activities is gaining interest. Bird-watching, environmental education and other "eco-tourism" opportunities are springing up throughout the South and competing with traditional forms of forest-based recreation (Hubbard 2001).

National Forests in the Southern Region are the second most heavily used of the nine USFS regions (Abt, Winter, and Huggett 2002). Recreation pressures on public land are substantial because only 4.6 percent of Federal land and 12 percent of State park and forest lands are in the South, which has about 33 percent of the Nation's population. In addition, since privately owned land dominates southern forests, forest-based recreation is largely concentrated on relatively scarce public land (Cordell and Tarrant 2002).

Outdoor recreation is one of the primary reasons for NIPF ownership in the South. Other reasons include rural area residence, land investment growth, farm or domestic use, enjoyment of natural resources, and estate purposes (Cordell and Tarrant 2002). In a 1996 study, only 5 to 6 percent of southern private timberland owners identified recreation as a primary or secondary reason for land ownership. In addition, only 7 percent of all owners chose recreation as a future expected benefit of land ownership. However, in a 2000 study, 21 percent of North Carolina landowners indicated that recreation, such as hunting, camping, fishing, and birdwatching, was one reason for owning forest land (Wicker 2003).

Corporate private owners (45 percent) typically provide recreation access by leasing their land to clubs, counties, or others. Individual owners (55 percent) usually have little to none of their land open to the public limiting recreation access to private land to the owners themselves, their families or friends, and lessees. About 7 percent of the individually owned forest land (just over 13 million acres) is open for public recreation by people not connected in some way with the owner. In addition, the trend of allowing public recreational access to private land is decreasing (Cordell and Tarrant 2002).

Increasing demands for off-road vehicle use, hunting, fishing, and other of the more consumptive recreational activities may bring about even more private land closure. Many individuals and families are purchasing land for their own personal recreational pursuits. These owners are even less likely to open their land to others for recreational pursuits (Cordell and Tarrant 2002).

3.6.2.2 Fishing and Wildlife-Related Recreation

Recreation activities with the greatest potential for future demand on private land include hunting and fishing, wildlife observation, and hiking. According to National Private Landowners Survey, hunting was the number one activity pursued on private land and it is expected that demand for high-quality lease hunting on private land will remain high. Trends also suggest there may be increased opportunity for leasing private land for warm and cold water fishing and camping (Teasley et al. 1997).

Over 23 million people indicated that they participated in hunting, fishing, and/or wildlife watching activities in 2001. This number may be inflated because one person could have participated in more than one activity. Nevertheless, the amount of participants in these wildlife-related activities in the States of the EFCRP is high (see Table 3.6-1). Texas had the most participants in one of these wildlife activities, most likely because of the relative size of the State. However, Florida, approximately a fifth the size of Texas, had almost as many participants. Wildlife watching was the activity in which most participated; only Louisiana had more participants who fished (FWS et al. 2001).

Table 3.6-1. Participants[1] in fishing, hunting, and wildlife watching activities in 2001, in thousands.

	AL	FL	LA	MS	NC	TX	TOTAL
Fishing	851	3,104	970	586	1,287	2,372	**9,170**
Hunting	423	226	333	357	295	1,201	**2,835**
Wildlife Watching	1,016	3,240	935	631	2,168	3,240	**11,230**
Total	**2,290**	**6,570**	**2,238**	**1,574**	**3,750**	**6,813**	**23,235**

[1] 16 years old and older.
Source: FWS et al. 2001.

Fisheries

The diversity of vegetation and habitat in the region provide a highly productive habitat for a range of species. For example, over 240 fish species use the Mississippi River and its tributaries and/or their associated floodplains (MMNS 2005). Inland fishing in many areas occurs in oxbow lakes, rivers, and bayous. The species of fish in the area include bass (including largemouth and spotted), black drum, bluegill, bowfin, bream, bullhead, carp, catfish, catfish (including blue, channel, and yellow), crappie, flounder, gar, red drum, red fish, sea trout, sheepshead, shellcracker, snook, specked grout, and tarpon (NRCS 2006). Section 3.1.1.1 contains further information about regional fisheries.

3.6.2.3 Recreation Economy

Few forest-based recreation activities generate direct income for landowners, although hunting leases on private land do bring some income. The major economic impact is the money spent in local communities by recreation participants. This includes the costs of transportation, purchases of equipment and supplies, and purchases of lodging and restaurant services (Abt, Winter, and Huggett 2002).

The percentages of all southern jobs that are in the hotel and lodging and the eating and drinking place sectors have increased in all States of the EFCRP project area. The State with the highest percentage of jobs in the tourism-recreation sector was Florida. In 1997, outdoor recreation-based tourism contributed between 0.64 and 2.88 percent of southern jobs and between 0.51 and 2.51 percent of Gross Regional Product (GRP), with public lands providing over half of this contribution (Abt, Winter, and Huggett 2002).

Wildlife Activity Expenditures

One type of outdoor recreation is wildlife related activities, including fishing, hunting, and wildlife watching. A national survey was conducted to determine the economic benefits of these activities to individual States in 2001. The results of this survey indicated that over $20 billion was spent on wildlife-related activities in 2001 in the six States included in the EFCRP project area (Table 3.6-2). Florida received the highest economic benefits with over $6 billion in revenue and almost one-third of that coming from residents from other States (FWS et al. 2001).

Table 3.6-2. Expenditures on wildlife related activities in EFCRP States and by nonresidents, in thousands of dollars.

	AL	FL	LA	MS	NC	TX	TOTAL
Expenditures on activity							
Fishing	723,467	4,083,409	703,373	210,697	1,118,028	1,950,902	**8,789,876**
Hunting	663,576	394,229	446,204	3,690,293	438,059	1,513,881	**7,146,242**
Wildlife Watching	626,400	1,575,481	168,420	303,447	826,882	1,282,943	**4,783,573**
Total	**2,013,443**	**6,053,119**	**1,317,997**	**4,204,437**	**2,382,969**	**4,747,726**	**20,719,691**
Expenditures by nonresidents of the State							
Fishing	156,997	771,425	75,640	25,170	325,848	119,027	**1,474,107**
Hunting	66,598	23,737	19,864	71,955	7,769	86,278	**276,201**
Wildlife Watching	22,929	401,128	33,593	37,181	122,360	81,167	**698,358**
Total	**246,524**	**1,196,290**	**129,097**	**134,306**	**455,977**	**286,472**	**2,448,666**

Source: FWS et al. (2001).

Recreation Counties

The USDA Economic Research Service has classified each county in the U.S. based on several economic and social characteristics. The “nonmetropolitan recreation county” is one classification that measures empirical recreation activity, including levels of employment and income in tourism-related industries and the presence of seasonal housing. In 2002, 311 nonmetropolitan recreation counties were identified in 43 States. The majority of the counties tended to be concentrated in the West, the Upper Great Lakes, and the Northeast (Reeder and Brown 2005). In the EFCRP project area, 13 counties were designated as recreation counties (ERS 2005) (Table 3.6-3).

Table 3.6-3. Nonmetropolitan recreation counties in the EFCRP project area.

State	County
Alabama	Baldwin
Florida	Franklin, Gadsen, Miami-Dade
Louisiana	Allen, Avoyelles
Mississippi	Tunica, Warren
North Carolina	Carteret, Dare, Hyde, Pamlico
Texas	Sabine

Source: ERS 2005.

3.7 SOCIOECONOMICS

This PEA will present regional information on the socioeconomic conditions of the Southeastern U. S. relevant to the implementation of EFCRP and the potential impacts of the proposed project on these conditions.

3.7.1 Affected Environment

This Section will address the regional timber economy of the South before the affects of the hurricanes, including a discussion on the importance of the forest industry to each State in the EFCRP project area. Forestry-related employment of the region will also be discussed. Poverty information for the counties in the EFCRP project area will be addressed. Section 4.7.2 will discuss the affects of the hurricanes on the forests and forest-related industries. The devastation of the 2005 hurricane season affected much more than the regions forests, such as infrastructure, housing, and tourism. However, this PEA will not discuss the hurricanes' economic impacts outside of the forest-industry context.

3.7.1.1 Regional Timber Economy

The Southern Forest Resource Assessment was a multi-agency information gathering effort led by the USFS's Southern Region Research Station. This Assessment designated "the South" as a region from Virginia to East Texas and included all areas of the EFCRP project area (see Figure 3.7-1). Unless otherwise indicated, references to the South or the southern region will include all areas in Figure 3.7-1 (Wear and Greis 2002).

The South produces a highly diverse complement of forest products. Both hardwoods and softwoods are used for lumber, plywood, composite boards, poles, paper, and other products. Forestry and wood products are an important component of the economy of southern region and the U.S. Nearly 60 percent of the Nation's wood output since the 1990s has originated from the South. This one region of the U.S. produces more wood products than any other single nation (Wear and Greis 2002).

Currently, the South is the leading timber producing region in the country (exceeding production in the Northeast, Lake States, and Pacific Northwest), and one of the most important timber producing regions of the world (Carter and Jokela 2002) (see Figure 3.7-2).

Figure 3.7-1. The Southern Region, as designated by the Southern Forest Resource Assessment.

Source: Wear and Greis (2002).

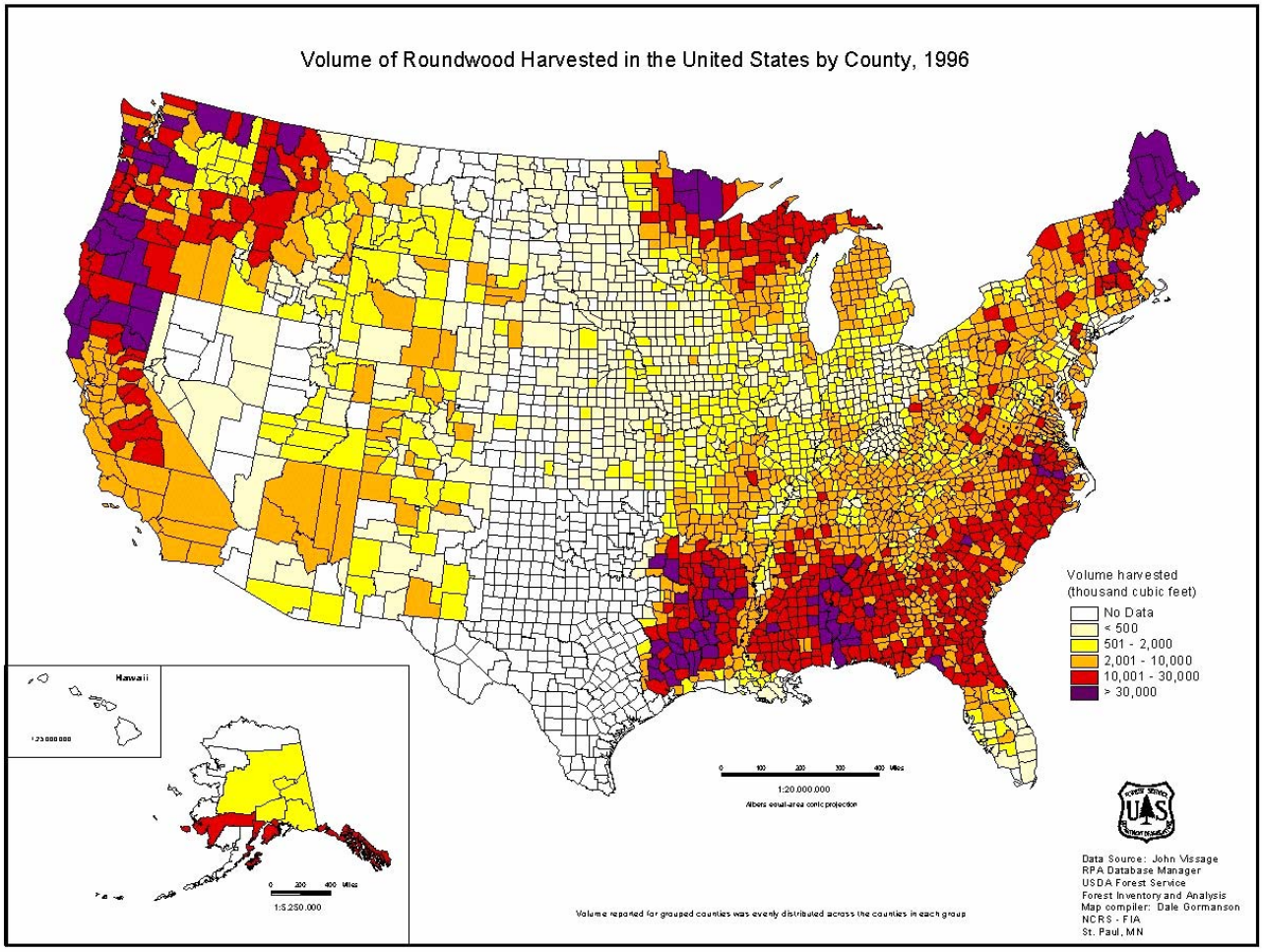


Figure 3.7-2. Volume of harvest timber in the U.S. by county, 1996.

Source: FIA (2006).

Forestry and wood product manufacturing are important to the region's economy, contributing six percent of GRP in 1997 (Abt et al. 2002). Timber ranks among the top three agriculture crops in all of the 13 Southern States and is the highest valued crop in eight of these States (SRDC 1999). In 1997, wood products sectors contributed 1.93 percent of jobs, accounted for 2.31 percent of the South's gross regional product (GRP). This production equates to over 770,000 direct jobs to the southern economy, $120 billion in total industry output, and over $40 billion in GRP (Abt et al. 2002). Timber harvesting and management for timber production are prevalent in all parts of the region, but especially on the Atlantic Coastal Plain from South Carolina to northern Florida and the Gulf of Mexico Coastal Plain from northern Florida to eastern Texas (Wear and Greis 2002) (Table 3.7-1).

Table 3.7-1. Summary of forest land, NIPF, and employment information for States in the EFCRP project area.

	Acres of Forest	Acres of NIPF	Percent of Forests in NIPF	Number of NIPF Landowners	Forest-based Employment	Economic Impact to State (Rank)
Alabama	22,900,000	18,000,000	78.60%	440,000	70,000	First
Florida	16,564,365	6,317,000	38.14%	257,000	na[1]	Third
Louisiana	13,855,000	10,020,000	72.32%	334,400	na	na
Mississippi	19,500,000	13,878,000	71.17%	313,000	151,000	Second
North Carolina	18,710,000	14,287,340	76.36%	740,900	144,100	Second
Texas	29,000,000	26,600,000	91.72%	250,000	79,500	Third

[1] Not available from this source.
Source: USFS (2006).

The forest industries of timber harvesting and wood products manufacturing yield the largest direct revenue from forests in the South. Timber produces a large share of land-based revenues in rural areas and influences forest conditions. Although timber harvesting changes the structure of forests by removing trees, strong timber markets have also encouraged landowners to keep land in forest cover, to convert agricultural land to forest uses, and to otherwise invest in silvicultural activities (Wear and Greis 2002).

In 1997, private timber harvests represented over 90 percent of the value of all timber harvests. Private harvests had a value of $5,138 million and public timber harvests had a value of $478 million, with $96 million from national forests. Tracking the forward-linkage (downstream processing) effects of both public and private harvests through the economy resulted in 2.2 million jobs and $104.6 billion of GRP (Table 3.7-2), amounting to approximately 5.5 percent of jobs and 6.0 percent of GRP in the South (Abt et al. 2002).

Table 3.7-2. Total impacts (direct + indirect + induced) of wood products output levels in the 13 southern States in 1997.

Sector	Employment	Employee Compensation[1]	Value Added*	Total Industry Output*	Gross Regional Product*
Public Timber	8,854	$223	$422	$777	$422
Timber	110,527	$1,679	$4,905	$10,081	$4,181
Logging	99,750	$2,462	$5,246	$11,967	$4,982
Sawmills	688,768	$18,614	$32,035	$70,909	$29,924
Wood Furniture	530,916	$14,509	$23,096	$50,557	$21,545
Pulp and Paper	771,430	$26,355	$47,041	$107,283	$43,584
Total	**2,210,245**	**$63,842**	**$112,745**	**$251,574**	**$104,638**
Percent of Southern Production	5.53%	5.83%	8.98%	7.50%	6.03%

[1] In millions
Source: Abt et al. (2002).

The ownership of forest land provides income to landowners as a return to capital through harvesting, or through selling the land, or possibly through hunting leases (Abt et al. 2002). Other community impacts include the dollars infused into the economy from seedling purchases, site preparation and reforestation activities, timber stand improvement, severance taxes, logging expenditures and equipment, and many "indirect multiplier effects" (Hubbard 2001).

Alternative forest products--such as pine straw, Shiitake mushrooms, woodwork, Christmas trees, herbs and medicinals, and others--also provide economic opportunities for landowners and communities. For example, pine straw raking often results in hundreds of dollars per acre every four or five years (Hubbard 2001).

Other economic benefits to landowners and the surrounding area come from participation in recreational activities. Outdoor recreation is increasing regionally and nationally. Money spent in the area by recreation participants has increased and diversified the regional economy. Some forest landowners have increased their income by imposing hunting fees or offering hunting leases. In 1997, outdoor recreation-based tourism contributed between 0.64 and 2.88 percent of southern jobs (Abt et al. 2002). A detailed discussion of recreation and recreation economics is found in Section 3.6, Recreation.

Regional Employment

In 1997, 39.3 percent of U.S. wood products jobs were concentrated in the South, although the percent of jobs that are in wood products sectors in the various States vary widely (Figure 3.7-3). Despite the increase of wood products manufacturing from 1969 to 1999, the total wood products workforce has stayed fairly constant, indicating that increases in production have been offset by increases in labor productivity (Abt et al. 2002).

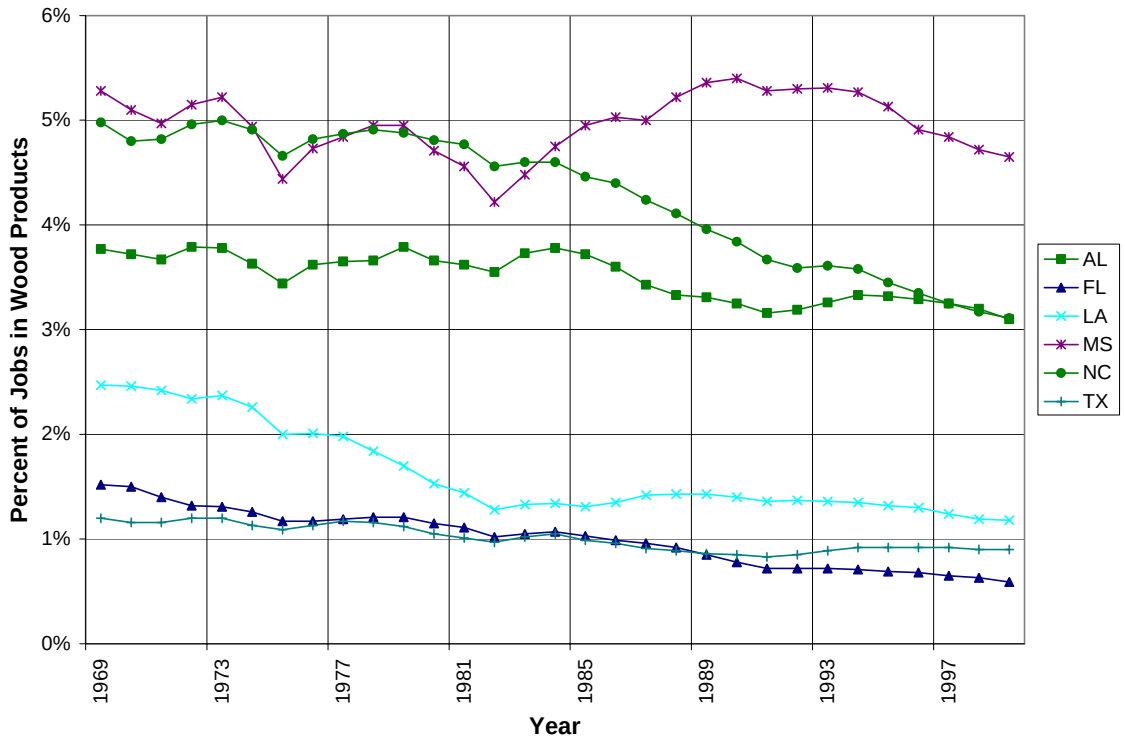


Figure 3.7-3. Percentage of all jobs in wood products sectors for the six States in the EFCRP project area, 1969 to 1999.

Source: Abt et al. (2002).

In 1997, the wood products sectors provided over 770,000 direct jobs, or 5.5 percent, to the southern residents, with public lands providing only 8.5 percent (Abt et al. 2002). In payroll, the forest industry supplied these forestry and wood products' workers with more than $15 billion in wages and salaries in 1996 (this figure does not include furniture and fixtures which could add up to 20 percent more). In a majority of the States in the South, paper-based manufacturers had the larger payrolls (vs. lumber/wood products) with Mississippi, North Carolina and Texas having higher payrolls in the lumber and wood products sector. This $15 billion infusion into the Southern economy has multiplier effects that doubles or triples its impact (SRDC 1999).

There are more than 16,000 forest industry businesses (sawmills, pulp mills, forestry consulting firms, etc.) in the South. Timber resources are especially important to rural areas of the South, where timber producers are often the number-one manufacturing employer. These are direct forestry and forest industry employment figures and do not include many of the related forestry services (equipment suppliers, etc.). By some estimates, these "multiplier effect" jobs total more than 1.2 million in the South alone. They also do not include employment in the forest-related fields of recreation, wildlife, conservation, etc. These figures are often difficult to ascertain but would increase current forest industry estimates (SRDC 1999).

Regional Reforestation Costs

Forest landowners, including NIPF landowners, are often reforesting and/or replanting their land, usually because a timber harvest has occurred. Each State in the EFCRP project area has a forestry agency that maintains tree seedling nurseries to sell large amounts of hardwood and softwood seedlings for commercial, wildlife, and other environmental benefits. As an example of the prices of seedlings for reforestation, Table 3.7-3 lists the prices of loblolly and/or slash pine (softwood) and longleaf pine (hardwood) for each State's nursery (AFC 2006b, FSF 2006b, LDF 2006a, MFC 2006a, NCDFR 2006b, TFS 2006b).

Table 3.7-3. Price per 1000 seedlings (hardwood and softwood) from forestry agencies in the six EFCRP States, 2005 prices.

State	Softwood (Loblolly and/or Slash)	Hardwood (Longleaf)
Alabama	$35-$44 bareroot	Not available
Florida[1]	$35-$37 bareroot	$70-$75 bareroot
Louisiana	$35-$42 bareroot	$75 bareroot
Mississippi	$38-$47 bareroot	$150 container
North Carolina	$43-$49 bareroot	$92 container
Texas	$38-$48 bareroot $135 container	$166 container

[1] 2006 prices

Sources: AFC 2006b, FSF 2006b, LDF 2006a, MFC 2006a, NCDFR 2006b, TFS 2006b.

The density at which seeding are planted varies, depending on landowner objectives and cost sharing requirements. The density per acre ranges from 300-725 trees per acre (Reed 2006, Vanderveer 2006).

The cost of reforestation include more than the price of seedlings. In a study of reforesting longleaf pine ecosystems in the Southern U.S., Brockway et al. (2005) found the cost to establish longleaf pine vary according to conditions and the type and amount of site preparation needed. Typical costs range between $914 and $1,828 per acre, depending on site conditions and whether bareroot or container

seedlings were used. This range reflected the current costs for site preparation, seedlings, and planting. To control competing vegetation, increase survival, and stimulate early growth, an additional $210 to $247 per acre could be spent for herbicide application. This study also found that the average internal rate of return for such an investment ranges from 8 to 12 percent to the landowner (Brockway et al. 2005).

3.7.1.2 State Timber Economy

Mississippi

Mississippi contains 19.5 million acres of forestland that cover approximately 62 percent of the State. The majority of this forest land (almost 13.9 million acres) is owned by NIPF landowners (USFS 2006). The forest products industry makes a major contribution to Mississippi's economy (Munn and Tilley 2005), providing one in four manufacturing jobs with a total economic impact that has often exceeded $11 billion annually over the past decade. Ten percent of all jobs in Mississippi are in the forest products sector. In any year, timber will be among the top three most valuable agricultural crops in 65 to 70 counties (MSU 2006a).

In 2001, the value of Mississippi's timber harvest at the point of first processing was $1.07 billion dollars. The direct effect of the industry was substantial. Landowners received $801 million for their standing timber. Logging firms employed 6,621 people and paid $187 million in wages. Value-added benefits exceeded $394 million. The total effect (i.e. direct, indirect, and induced) of logging on Mississippi's economy was even greater. In 2001, 11,021 jobs were related to timber harvesting activities with wages totaling $297 million. Logging generated an estimated $1.13 billion addition to Mississippi's total industry output and $568 million in value-added to Mississippi's economy. Miscellaneous services, wholesale and retail trade, resource services, and financial and real estate are among those sectors that benefit substantially from the indirect and induced effects created by the logging industry based on employment. However, the sector's overall importance was much greater. Timber harvesting and transportation are essential for solid wood products, pulp and paper, and wood furniture manufacturing—three sectors that make up the remainder of the industry in the State (Munn and Tilley 2005).

The forest products industry is responsible for approximately 50 percent of the total effects due to food and fiber-related production and processing. In 2001, the combined impact of all sectors of the forest products industry on Mississippi's economy was dramatic. The average annual wage in forestry related occupations was $34,656; $6,254 greater than the average annual wage in Mississippi (Munn and Tilley 2005).

The forest products industry varies substantially between regions in Mississippi (Table 3.7-4). In absolute terms, the forest products industry has the greatest regional impact in north Mississippi. The primary industry is wood furniture manufacturing, employing almost 21,000 and generates over $645 million in value-added. In central Mississippi, solid wood products accounts for over one-third of the employment with over 4,000 employed. Pulp and paper products account for more than one-third of the value-added at $235.56 million. In south Mississippi, solid wood products manufacturing accounts for almost half the employment with over 5,000 employed. In the Delta, the forest products industry plays only a minor role in the regional economy (Munn and Tilley 2005).

Table 3.7-4. Regional forest-related economic differences in Mississippi.

	Direct Employees	Direct Value Added	Direct + Indirect + Induced Employees	Direct + Indirect + Induced Value Added	State and Local Taxes
North	26,000	$965 million	51,000	$1.98 billion	$125 million
Central	11,000	$676 million	29,000	$1.23 billion	$105 million
South	12,000	$860 billion	29,000	$1.47 billion	$118 million
Delta	< 5,000	$260 million	10,000	$538 million	$46 million
TOTAL	54,000	$2.752 billion	119,000	$3.315 billion	$394 billion

Source: Munn and Tilley (2005).

Alabama

Two-thirds of the State of Alabama, or 22.9 million acres, is covered in forest land; 78.6 percent of these forest lands are owned by NIPF landowners (USFS 2006). Forestry is considered one of the State's most important industries, generating $13 billion for the State's economy (AFA 2006). Over 70,000 workers are directly employed by forest industries (USFS 2006) and over 170,000 residents are estimated to be employed directly or indirectly. The forest industry generates approximately $4.2 billion in wages each year (AFA 2006).

In 2003, timber ranked second in production of all agricultural commodities and accounted for 15 percent of all commodities in Alabama. The direct value of harvesting and logging operations was approximately $236 million to the Alabama economy. Five counties in the EFCRP project area, Clarke, Hale, Monroe, Conecuh, and Choctaw, were the top five producers of primary timber products in the State in 2003 (AFC 2003). In 2004, forestry was the leading industry impacting the State (USFS 2006).

The manufacturing of wood products is also important to Alabama's economy. There are over 1,100 forest manufacturing operations in the State (AFA 2006). In 2000, forestry manufacturing amounted to approximately 18 percent of the total manufacturing in Alabama, and directly employed 57,683 people (not counting private consultants and government employees) with a payroll of nearly $2 billion. In addition, Alabama's forests supported approximately $5.2 billion value added and $12.2 billion in value of shipments to the economy in 2003 (AFC 2003).

The amount paid to landowners for their standing timber is called stumpage. An estimate of the total value of Alabama's stumpage sold in 1989 was $365,975,000, with $262,284,000 (72 percent) received by farmers and other non-industrial private owners (Bliss and Muehlenfeld 1995). The total estimated value of 2003 stumpage harvested in the State was $531 million, with approximately 77 percent of the total stumpage value was harvested from farm and non-farm, NIPF lands (AFC 2003).

Another important measure of the value of the forest crop is its value at the first processing point. This is the value of the logs delivered to a sawmill, pulp mill, or similar processing plant. It reflects the value of harvesting and transporting the timber as well as the value of the stumpage. In 1989, the value of all delivered forest products in the State was estimated to be over $757 million. Cash receipts from delivered forest products exceed those of all other agricultural crops combined and make timber the second ranking agricultural commodity that year (Bliss and Muehlenfeld 1995).

Louisiana

Forests cover 48 percent, approximately 13.8 million acres, of Louisiana's land area. Over 72 percent of the forest land is owned by NIPF landowners (USFS 2006). Fifty-nine of Louisiana's 64 parishes contain land capable of producing sufficient timber to support forest industry activities as well as provide habitat for wildlife, recreation, scenic beauty, and all the other environmental benefits timberlands provide (LDAF 2006).

In 1999, forestry accounted for 69 percent of the total value of all plant commodities grown in Louisiana. Forestry contributes 55 percent of the value of Louisiana's land-based industries, which includes all plants, animals, and fresh water and marine fisheries. Timber is manufactured throughout the State into building materials, paper and chemical products, furniture, fixtures and other products. Manufacturing residues are recovered for mulch, bedding, fuel and other products. Sawmills, panel plants, paper and pulp mills, chip mills, peeling plants, treating facilities and secondary manufacturers such as furniture companies, millwork and cabinet manufacturers are prevalent in Louisiana (LDAF 2006).

Timberland owners had 1.3 billion board feet of sawtimber and 6.25 million cords of pulp and chip-n-saw wood harvested in 1999. The resource supports 180 primary and 750 secondary wood-using industries that position Louisiana's forest industries as the second largest manufacturing employer in the State. In 1999, 25,514 people were employed in forest manufacturing with an estimated 8,000 employees harvesting and transporting timber. Manufacturing employees earned $927 million in 1998. Timber harvesting contractors and their employees earned $555 million in 1998 (LDAF 2006).

The economic impact of forestry and wood-using industries to the State economy in 1999 was $4.4 billion. Forest landowners received $680 million from sale of their timber, which provided $20.8 million of severance taxes. Each log truck provides an average of $835 in local, State and Federal taxes (LDAF 2006).

Texas

Forestry and wood products are an important element of Texas' economy, particularly in East Texas where timber is the primary agricultural commodity and wood-based producers are the primary manufacturing employers in area (Michael et al. 2006). In addition to producing timber and providing an income to landowners, loggers, and sawmills, the Texas forest sector also produces many value-added forest products such as millwork, wood kitchen cabinets, prefabricated wood buildings, wood furniture, and various paper products (Xu 2002).

The forest industry in Texas paid more than $2.3 billion in wages and salaries in 1996. Texas paper-based manufacturers had the largest payroll with more than $935 million. This represents an average annual salary of approximately $33,000 (Michael et al. 2006). The annual total economic impact of the Texas forest sector was $22.1 billion in 1999, $9.9 billion of which were value-added. In the same year, the Texas forest sector generated 169,200 jobs and created $6.0 billion in labor income (Xu 2002). Currently, there are more than 61,000 Texans are involved in harvesting timber and manufacturing wood and paper products (TPWD 2006a) and total forest-based employment totals 79,500 (USFS 2006).

The forest sector in East Texas produced $6.1 billion of goods and services in 1999. It generated $2.2 billion in value-added, 32,600 jobs and $1.2 billion in labor income (Xu 2002). The total estimated output impact of the East Texas forest sector was $10.9 billion of output in 1999, $4.9 billion of which was value-added impact. The total employment impact of the East Texas forest sector was 77,300 jobs. The East Texas forest sector provided $2.9 billion in payroll in 1999 for the region (Xu 2002). Forestry professionals currently estimate that over $7 billion worth of products originate in the forest of 43 East Texas counties (TPWD 2006).

Virtually all forestry and logging industries and the great majority of the primary forest product manufacturing industries in Texas are located in East Texas. East Texas produced 47 percent of the total

industry output from the Texas forest sector in 1999. The output from primary solid wood products industry in East Texas accounted for 88.7 percent of all primary solid wood manufacturing in Texas. The output from the primary paper and paperboard products in East Texas accounted for 81.5 percent of the total primary paper and paperboard industry output in Texas (Xu 2002).

Conversely, most of the secondary forest product manufacturing facilities in Texas are located outside of East Texas. In 1999, only 29.2 percent of the State's total output for secondary solid wood products industry was from East Texas. East Texas' share dropped to 11.4 percent for secondary paper & paperboard products industry (Xu 2002).

Florida

Florida is an important contributor to the southern U.S. timber-based economy. In particular, north Florida has a vibrant and thriving timber-based economy. In many north Florida counties, the value of the timber harvest far exceeds the value of all other agricultural crops combined, including livestock (Carter and Jokela 2002).

In 2002, approximately 132,000 people were employed by the timber industry in Florida, with 60,000 direct employees (Carter and Jokela 2002). The majority of forestry-related employees in Florida are employed in the paper manufacturing sector (Hodges et al. 2005). Although the timber harvest is concentrated in north Florida, secondary processing facilities can be found throughout the State. For example, Dade County in southern Florida has almost 14,000 direct and indirect employees attributable to the timber-based economy, far more than the statewide county average (Carter and Jokela 2002). Annual earnings in the forest industry averaged around $35,000 per worker (Hodges et al. 2005).

The actual value of timber harvested is about $450 million per year. The value of manufacturing output and value added exceeds $7 billion per year (Carter and Jokela 2002).

The forest products manufacturing sector in Florida contributed value added of $2.8 billion on shipments valued at $6.6 billion, and made capital expenditures of $256 million. The total value of shipments remained steady during the period of 1997 through 2001, in spite of the recession in the U.S. economy (Hodges et al. 2005).

North Carolina

North Carolina's forest land is of great economic value. Forestry is the second largest industry in the State, contributing nearly $30 billion annually to the State's economy and providing 144,000 jobs for North Carolinians (NCDFR 2006a).

In 1996, the total employee compensation in the wood-based industries was $3.2 billion with the average wood based industry annual wage was $30,800. Industrial output was $13.5 billion for the forest products industry in 1996. Value added for the forest products industry was $4.9 billion. From 1977 to 1996, the wood-based industries grew more slowly than the rest of the State's economy. Nonmarket values estimates could equal or exceed the estimates of direct market values from forest products (Schaberg 2006).

3.7.1.3 Regional Poverty

Poverty rates in the South have declined by one-third over the past 30 years. The gap between the South and the country as a whole has narrowed, but the South still experiences a slightly higher rate (Abt et al. 2002).

Over 40 percent of the U.S. rural population lives in the South, (Jolliffe 2004) with higher poverty and lower income than more urbanized regions. Some areas are still highly dependent on a single industry, including timber, lumber, furniture, and pulp and paper. Many rural areas are still part of the old economy based on manufacturing and resource extraction. Recent growth in southern rural areas was

led by industrial machinery and equipment manufacturing, followed by food and then wood processing. This contrasts with urban areas, where consumer and producer services led recent growth (Abt et al. 2002).

The USDA Economic Research Service defines "a county in persistent poverty" if 20 percent of its residents were poor as measured by each of the last four censuses, 1970, 1980, 1990, and 2000 (ERS 2004). The rural South has the greatest prevalence of both poverty and persistent poverty. More than one in six persons in the region are poor and more than one in four live in persistent poverty counties (Jolliffe 2004). In 2003, 386 counties in the U.S. were classified with persistent poverty, of which 109 were in the EFCRP project area (ERS 2004). These counties make up 41 percent of the counties of the EFCRP project area (Figure 3.7-4).

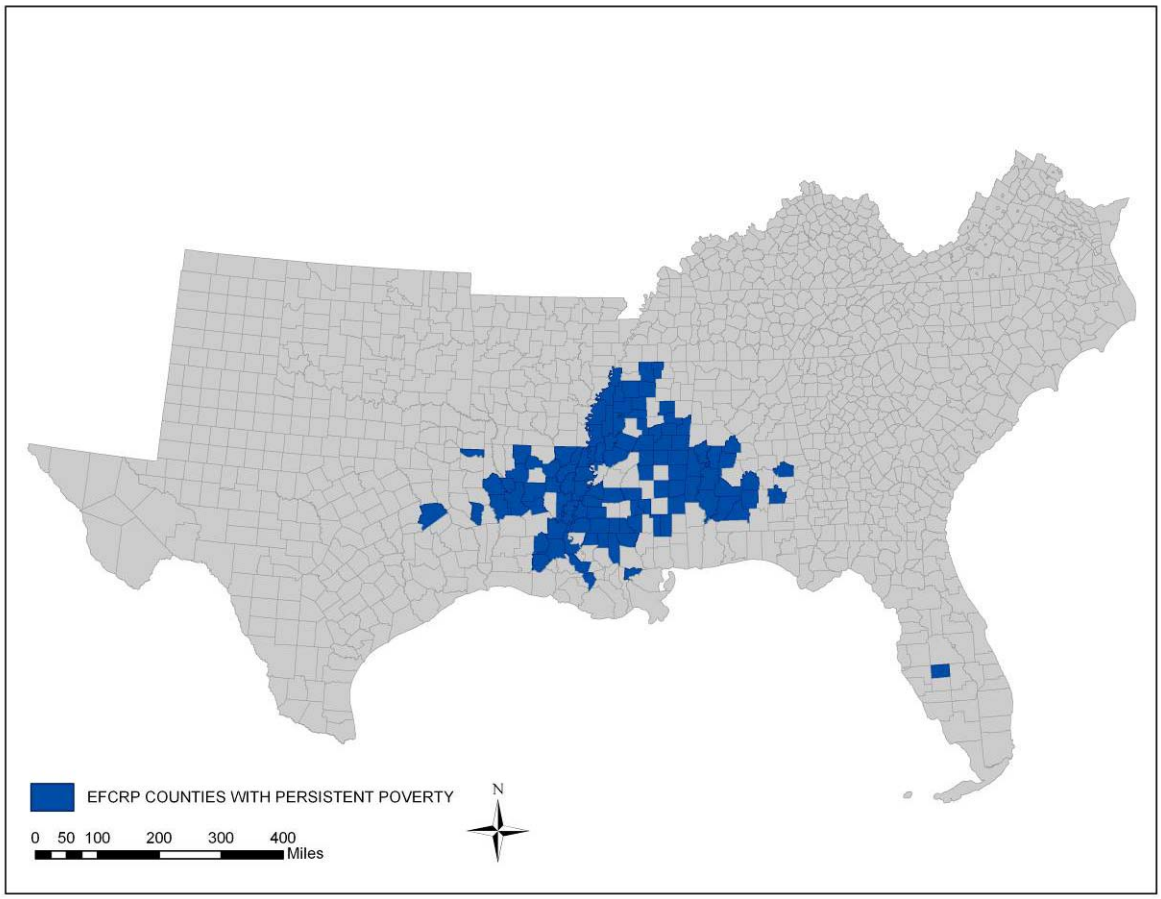


Figure 3.7-4. Poverty persistent counties in the EFCRP project area.

Source: ERS (2004).

3.8 ENVIRONMENTAL JUSTICE

Environmental justice considerations ensure that all populations are provided the opportunity to comment on issues before decisions are rendered. Environmental justice allows all people to share in the benefits of, and not be excluded from or affected in a disproportionately high and adverse manner by, government programs and activities affecting human health or the environment. Departmental Regulation 5600-2, issued December 15, 1997, provides direction to agencies for integrating environmental justice considerations into USDA programs and activities in compliance with EO 12898.

3.8.1 Affected Environment

3.8.1.1 Minority Populations

The States of the EFCRP project area are occupied by a racially diverse population (Table 3.8-1) (USCB, 2006).

Table 3.8-1. The racial diversity of the six States eligible for EFCRP funds by percent of population.

	Alabama	Florida	Louisiana	Mississippi	North Carolina	Texas
White persons (a)	71.1	78.0	63.9	61.4	72.1	71.0
Black or African American persons, percent (a)	26.0	14.6	32.5	36.3	21.6	11.5
American Indian and Alaska Native persons (a)	0.5	0.3	0.6	0.4	1.2	0.6
Asian persons (a)	0.7	1.7	1.2	0.7	1.4	2.7
Native Hawaiian and Other Pacific Islander (a)	> .05	0.1	> .05	> .05	> .05	0.1
Persons reporting some other race (a)	0.7	3.0	0.7	0.5	2.3	11.7
Persons reporting two or more races	1.0	2.4	1.1	0.7	1.3	2.5
White persons, not of Hispanic/Latino origin	70.3	65.4	62.5	60.7	70.2	52.4
Persons of Hispanic or Latino origin (b)	1.7	16.8	2.4	1.4	4.7	32.0

(a) Includes persons reporting only one race.
(b) Hispanics may be of any race, so also are included in applicable race categories.
Source: USCB 2006.

3.8.1.2 Minority Forest Landowners

In 1994, an estimated 4.7 million individual owners held the largest share of private southern timberland. Individual NIPF owners compose the core of this group, with almost 95 percent of all private timberland owners in the South. In 1999, these landowners controlled 63 percent of the total private timberland acreage (Wicker 2003).

Little research has been done assessing the amount of forest land owned by minority or historically disenfranchised groups. In 1987, a study profiled was done on the NIPF owners in the "Midsouth," an area encompassing Eastern Oklahoma, Arkansas, and Tennessee, as well as Alabama, Louisiana, Mississippi, and Eastern Texas found that private timberland owners in the Midsouth were overwhelmingly white males. Of noncorporately-owned private land in the area, 79 percent was owned by males and 94 percent of the landowners were white. This study found that female ownership was largest in Alabama where women owned nearly 21 percent of the nearly 13 million noncorporate acres.

Blacks owned less than one million acres in any State except Mississippi (Rosson and Doolittle 1987) (Table 3.8-2).

Table 3.8-2. Estimated number of privately owned, noncorporate acres by owner's race.

	Alabama		Louisiana		Mississippi		East Texas	
	acres in thousands	percent	acres in thousands	percent	acres in thousands	percent	acres in thousands	percent
White	12,287.80	93.66%	4,398.10	92.68%	8,062.80	88.96%	3,434.20	91.17%
Black or African American	783.7	5.97%	347.5	7.32%	1000.4	11.04%	332.6	8.83%
Other	48.3	0.37%		> .05 %		> .05 %		> .05 %

Source: Rosson and Doolittle (1987).

Although Gan and Kollison (1999) reported data about a limited number of minority NIPF owners in two southeastern Alabama counties, no recent statistics are available regarding overall minority ownership characteristics of private forest landowners in EFCRP States However, because African-Americans constitute the largest group of minority rural landowners in the South, they probably remain the largest group of minority NIPF owners (Wicker 2003).

3.8.1.3 Migrant Farm Labor

The South produced 77 percent of the country's pulpwood harvest in 2001. To accommodate the type of tree required for pulpwood, forests in the region have become the most intensely managed in the world. Activities such as tree planting, thinning, and herbicide application are essential to maintaining this industry (Cassanova and McDaniel 2005).

For a variety of reasons, since the 1990s, the majority of these intense management activities (including reforestation, herbicide application, pine-straw raking, thinning, and harvesting operations) on private land are accomplished by private contractors who employ workers through the H2-B guest worker program (McDaniel and Cassanova 2005). The H2-B program is designed to assist nonagricultural industries facing labor shortages. Workers from countries such as Mexico, Brazil, Guatemala, and Honduras are working in southern forests through the H2-B program (Cassanova and McDaniel 2005). An estimated 84 percent of the on-the-ground management work is done by H2-B guest workers (Casanova 2003).

The H2-B program requires employers to request visas for their employees. From 1996 to 2001, a total of 360,074 visas were requested from 18,981 different employers. During this time, the southeast region requested the majority of these visas, approximately 100,000 visas. In addition, forestry led all other employment sectors in visa requests, requesting over 20 percent of all the visas during this time period. The maximum number of visas requested by a single employer was 1,530 by a forest labor contractor in the Southeast (Cassanova and McDaniel 2005).

Three of the largest hand tree-planting contractors in the Southeast account for 430,000 hand-planted acres in 2001, or 53 percent of the total acreage reported by all contractors in a 2002 survey. All three contractors report using 100 percent H-2B work crews (McDaniel and Cassanova 2005).

3.8.1.4 Health and Safety

Throughout the 2005 hurricane season, the winds blew down, snapped off, and damaged trees across the land area. Down and damaged trees impede access for fire suppression and fuels treatments, recreation, and access to forest lands and streams. The buildup has also created an increased risk of wildland fire

within the wildland/urban interface. Downed and damaged trees also pose increased safety risks for forest recreation and salvage workers.

Health and safety is an environmental justice issue because:

- Many forest workers are from the H-2B guest worker program, the health and safety of these workers is an environmental justice issue.
- Much of the land and trees destroyed in the 2005 hurricane season occurred in areas with low-income and minority populations.

Some remedial tree removal has taken place across public roadways, including State and county road systems, and around utility corridors. Other remedial removal has occurred on access roads and driveways to private homes. Most of these actions were conducted to restore State and county services to those affected by the hurricanes. Few of these actions were conducted to salvage timber or pulpwood value.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 BIOLOGICAL RESOURCES

4.1.1 WILDLIFE AND VEGETATION

4.1.1.1 Level of Impact

This section presents the analysis of the effects of each alternative on wildlife and vegetation in the project area. Impacts to wildlife and vegetation will have a temporal component that describes the duration of the effect. Impacts may also be beneficial or adverse, and impacts to wildlife and vegetation may vary in intensity. Table 4.1.1 establishes the criteria for the level of impact on the resource.

Table 4.1.1. Definition of criteria used to determine the duration of effect, type of effect, and level of effect of EFCRP alternatives on wildlife and vegetation.

Duration of Effect	Type of Effect	Level of Effect
Short term: Impacts to a biological resource's condition, use, or value experienced during implementation of program, generally not exceeding than 3 years.	**Beneficial:** An effect that would improve the habitat's condition, use, or value compared to its current condition, use, or value for wildlife.	**Minor:** A perceptible localized impact on habitat condition, use, or value that has little direct consequence for wildlife.
Long term: Impacts to a biological resource's condition, use, or value experienced as result of program, generally lasting 3 or more years.	**Adverse:** An effect that would result in degradation of a biological resource's condition use, or value compared to its current condition, use, or value for wildlife.	**Moderate:** A measurable impact on habitat condition, use, or value that has a localized consequence for wildlife.
		High: A measurable impact on habitat condition, use, or value that is large and/or widespread and could have permanent consequences for wildlife.

4.1.1.2 Alternative A – No Action

Under Alternative A, EFCRP funding will not be available for the implementation of the nine CPs, which will impact wildlife and vegetation resources. The impacts of not implementing each CP are summarized in Table 4.1.2 and described in further detail below.

Table 4.1.2. Summary of the impacts of Alternative A on affected biological resources.

Affected Environment: Biological Resources	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Upland Hardwood	CP 35I Mixed Existing	CP 35C & CP 35D New and Existing Bottomland Hardwood
Wildlife and Vegetation in LRRs1	Short term highly adverse impacts in all LRRs would result from the increase in fire fuel and	Short term highly adverse impacts in all LRRs would result from the increase in fire fuel and	Short term highly adverse impacts in all LRRs would result from the increase in fire fuel and	Short term highly adverse impacts in all LRRs would result from the increase in fire fuel and	Short term highly adverse impacts in all LRRs would result from the increase in fire fuel and

	potential for pest and disease outbreak from downed trees. Long term highly adverse impacts on wildlife, particularly in LRRs P and T where longleaf pine was abundant, would result if longleaf pine is not restored due to the potential for undesirable species to recolonize damaged areas.	potential for pest and disease outbreak from downed trees. Long term highly adverse impacts on wildlife in all LRRs would result if hardwood forests are not restored due to the potential for undesirable species to recolonize damaged areas.	potential for pest and disease outbreak from downed trees. Long term highly adverse impacts on wildlife, particularly in LRRs N, O, and T where softwoods were abundant, would result if forests are not restored due to the potential for undesirable species to recolonize damaged areas.	potential for pest and disease outbreak from downed trees. Long term highly adverse impacts on wildlife in all LRRs would result if mixed wood forests are not restored due to the potential for undesirable species to recolonize damaged areas.	potential for pest and disease outbreak from downed trees. Damaged bottomland hardwood in LRRs O, P, and T, and particularly U, would not be restored, resulting in highly adverse long term impacts to wildlife due to the potential for undesirable species to recolonize damaged areas.
Fisheries	Short term minor beneficial impacts to fisheries may result from downed trees in streams, which may offer specialized habitat and increase stream productivity due to the decay of excess organic debris. Short term moderate adverse impacts to fisheries may result from increased sedimentation in wetlands and swamps due to the lack of adequate stabilizing vegetation. Long term highly adverse impacts to fisheries may result from degraded water quality in waterways adjacent to or within damaged forests resulting from increased sedimentation due to erosion of soils.				Short term moderate adverse impacts to fisheries may result from increased sedimentation in wetlands and swamps due to the lack of adequate stabilizing vegetation. Long term moderately adverse impacts to fisheries may result from the loss of bottomland hardwood forests, which improve water quality by filtering nutrients, processing organic wastes, and reducing sedimentation.
Forestry	Short term highly adverse impacts would result from the increase in fire fuel and potential for pest and disease outbreak from downed trees. Long term highly adverse impacts to vegetation and wildlife would result if damaged areas are recolonized by undesirable or slow-growing, low quality species that offer little wildlife or timber value. Impacts may be widespread due to the effects of forest fragmentation in which high quality undisturbed habitat is embedded within a matrix of lower quality disturbed habitat.				
Invasive Species	Short term and long term highly adverse impacts would result from the proliferation of invasive				

	species under Alternative A. Downed trees will increase the potential for exotic pest outbreak and damaged areas may be recolonized by fast growing, low habitat quality invasive plants.

[1]LRR:

N: The East and Central Farming and Forest LRR

O: Mississippi Delta Cotton and Feed Grains LRR

P: South Atlantic and Gulf Slope Cash Crops, Forest, and Livestock Region.

T: Atlantic and Gulf Coast Lowland Forest and Crop Region.

U: Florida Subtropical Fruit Truck Crop and Range Region.

Hurricanes cause loss of wetlands, large areas of tree damage and defoliation, and saltwater intrusion among other things. In 2005, hurricanes downed trees and destroyed habitat throughout the Southeastern U.S. The USFS estimated over five million acres in Mississippi, Alabama, and Lousiana have been damaged. This acreage accounts for nearly 30 percent of the total timberland in the affected region, of which 90 percent occurred on private lands (Sheikh 2005). In Mississippi alone, nearly 1.2 million acres of forestland were damaged as a result of Hurricane Katrina (MSU 2006).

Taking no action to repair forest damage caused by hurricanes would potentially result in moderate to high adverse impacts on wildlife and vegetation. Dead and damaged trees provide fuels for wildfire. The increased amount of fuel available following the hurricane may cause large, hot fires, which may burn out of control and severely damage both wildlife habitat and timber harvest through the destruction of the upper canopy, as opposed to controlled surface fires that impact only the understory. Long term, high, adverse impacts would result from loss of mature pine and hardwoods due to high intensity fires fueled by downed and damaged trees in areas with extensive hurricane damage.

Downed wood is also a catalyst for forest insects and diseases, including the SPB and the black turpentine beetle. Outbreaks of pests and disease in the Southeastern U.S. have caused massive damage to forest stands, often decimating acres of forest that once provided valuable wildlife habitat. If pests and disease are established in damaged forests, long term, high, adverse impacts may result from the degradation of vegetation and loss of wildlife habitat.

If damaged patches are recolonized naturally, stands of low quality wildlife habitat, including invasive species, or slow-growing inferior species from the understory may become established. Increased sunlight as a result of the opened canopy promotes the invasion of exotic plants such as Chinese tallow or cogongrass. The community that may be established under the no action alternative will likely not be high quality hardwood and longleaf pine species. Damaged areas that once supported valuable hardwood, bottomland, and pine forests would be replaced by slow-growing or exotic species, which may negatively impact wildlife such as woodpeckers, warblers, vireos, deer, black bears, and others (Dickson 2003). Long term, high, adverse impacts on wildlife will result from the loss of hardwood, pine, and bottomland forest due to the growth of invasive and lower quality species in damaged areas.

The loss of habitat and growth of lower quality species in damaged patches may essentially fragment the forest, resulting in a patchwork of low and high quality habitat. The impacts of forest fragmentation due to the mix of high quality, undamaged patches, and lower quality, damaged patches are expected to have long term, high, adverse consequences of wildlife and vegetation. Fragmentation has caused local extinctions, declines in species richness, changes in microclimate, and increased levels of predation (Begon et al. 1990). Forest fragmentation has been implicated as the cause of major declines in some bird populations by causing decreased reproductive success. In some cases, forest fragments acted as population sinks, in which populations inhabiting the low quality patch required immigration from higher quality habitat to sustain population levels (Robinson et al. 1995). In high quality, undamaged areas with a diverse assemblage of hardwood and pine species, elevated wildlife concentrations may lead to increased competition for food and resources, resulting in stress on the populations (USGS 2005).

Trees damaged and toppled by Hurricane Katrina.

Fish kills due to the hurricanes were primarily associated with low water quality and an influx of saline waters. These impacts are likely to be short term, and populations are expected to rebound when water quality and salinity return to pre-hurricane conditions (Adams 2005). However, Alternative A would not restore bottomland hardwood vegetation lost during the hurricanes, which may adversely impact water quality. Bottomland hardwoods improve water quality by filtering nutrients, processing organic compounds, and reducing sedimentation, which in turn benefits inland and coastal fisheries (EPA 2006h). A long term minor to moderate adverse impact of Alternative A on inland and coastal fisheries may result from the lack of adequate bottomland hardwood forests through impacts on water quality.

If EFCRP is not implemented to replant forest vegetation, long term impacts on wildlife and vegetation may result from changes in the pre-hurricane assemblage of vegetation. Impacts are expected to be widespread and may permanently alter the forest community for wildlife species. The loss or change of vegetation types from high quality hardwood, bottomland, and pine forests to a mix of invasive and slow-growing inferior species will change the wildlife species composition causing some species to increase and some to decrease in abundance. These lower quality communities may provide habitat for cosmopolitan species, which may increase competition with endemic wildlife, and offer little habitat value for wildlife species of environmental concern. Alternative A would not contribute to achieving any of the EFCRP objectives and would result in long term, adverse impacts on wildlife and vegetation as described in section 3.1.

4.1.1.3 Alternative B – Preferred Action

Alternative B will implement nine CPs with varied impacts on wildlife and vegetation resources. The impacts of each CP are summarized in Table 4.1.3 and described in further detail below.

Table 4.1.3. Summary of the impacts of Alternative B on affected biological resources.

Affected Environment: Biological Resources	CP 35A & CP 35B New and Existing	CP 35E & CP 35F New and Existing	CP 35G & CP 35H New and Existing	CP 35I Mixed Existing	CP 35C & CP 35D New and Existing

	Longleaf Pine	Softwood	Upland Hardwood		Bottomland Hardwood
Wildlife and Vegetation in LRRs1	Short term minor adverse impacts in all LRRs may result from surface disturbance associated with site preparation, although impacts would be reduced with CP 35B as less preparation is required. Long term highly beneficial impacts on wildlife, particularly in LRRs P and T where longleaf pine was abundant, would result if longleaf pine planted in damaged areas, minimizing the potential for invasive and lower quality species to colonize.	Short term minor adverse impacts in all LRRs may result from surface disturbance associated with site preparation, although impacts would be reduced with CP 35F as less preparation is required. Long term highly beneficial impacts on wildlife, particularly in LRRs N, O, and T where softwoods were abundant, would result if forests are restored in damaged areas, minimizing the potential for invasive and lower quality species to colonize.	Short term minor adverse impacts in all LRRs may result from surface disturbance associated with site preparation, although impacts would be reduced with CP 35H as less preparation is required. Long term highly beneficial impacts on wildlife in all LRRs would result if hardwood forests are restored in damaged areas, minimizing the potential for invasive and lower quality species to colonize.		Short term minor adverse impacts in all LRRs may result from surface disturbance associated with site preparation, although impacts would be reduced with CP 35D as less preparation is required. Damaged bottomland hardwood in LRRs O, P, and T, particularly U, would be restored, resulting in highly beneficial long term impacts to wildlife in damaged areas, minimizing the potential for invasive and lower quality species to colonize and improving water quality.
Fisheries	Short term minor adverse impacts to fisheries may result from increased sedimentation due to surface disturbance during site preparation, although impacts would be reduced with existing CPs as less preparation is required. Long term moderately beneficial impacts to fisheries may result from improved water quality in waterways adjacent to or within damaged forests resulting from increased stability of streambanks and reductions in soil erosion.				Short term minor adverse impacts to fisheries may result from increased sedimentation during site preparation, although impacts would be reduced with CP 35D as less preparation is required. Long term highly beneficial impacts to fisheries may result from the restoration of bottomland hardwood forests, which

		improve water quality by filtering nutrients, processing organic wastes, and reducing sedimentation.
Forestry	Short term minor adverse impacts may result from surface disturbance and prescribed burns during site preparation, although impacts would be reduced with existing CPs as less preparation is required. Long term highly beneficial impacts to vegetation and wildlife would result from the preferential planting of certain species where wildlife and timber harvest would receive the greatest benefit using the NRBI. Removal of downed trees and site preparation will minimize the potential for damaging outbreaks of harmful pests and diseases.	
Invasive Species	Short term and long term highly beneficial impacts would result from the re-establishment of native vegetation, which would minimize the potential for invasive plants to colonize. Removal of downed trees and site preparation will minimize the potential for damaging outbreaks of exotic pests.	

[1]LRR:

N: The East and Central Farmong and Forest LRR

O: Mississippi Delta Cotton and Feed Grains LRR

P: South Atlantic and Gulf Slope Cash Crops, Forest, and Livestock Region.

T: Atlantic and Gulf Coast Lowland Forest and Crop Region.

U: Florida Subtropical Fruit Truck Crop and Range Region.

The preferred alternative would result in long term, highly beneficial impacts to wildlife and vegetation through improvements in wildlife habitat associated with the restoration of longleaf pine (CP35A and CP 35B), bottomland hardwood (CP 35C and CP 35D), softwood (CP 35E and CP 35F), upland hardwood (CP 35G and CP 35H), and mixed existing (CP 35I).

Longleaf pine forests, which were heavily damaged by the hurricanes, would be replanted or managed for revegetation in damaged areas under CP 35A and CP 35B. Longleaf pine is characterized by high species diversity, with up to 40 species per square meter in some instances. It is also among the most critically endangered habitats in the U.S., and provides habitat for several species of environmental concern. In addition to providing valuable habitat, longleaf pine is a hardy species, resistant to both fire and pests, and typically suffers less storm damage than other species (Brockway et al. 2005, MSU 2006).

Hardwood and bottomland forests, as well as softwood pine and mixed forests would also be restored as part of the EFCRP. Species associated with pine forests, including pine warblers, and brown-headed nuthatchs, mourning dove, quail, white-tailed deer, and wild turkey would benefit from restoration of forested habitat in damaged areas (Dickson 2003).

Damaged areas of the forest will be re-established with or without EFCRP. However, the advantage of the preferred alternative over the no action alternative is that it offers control over the vegetative species that colonize damaged areas. Alternative B allows FSA to preferentially plant certain species, rather than allow the natural understory species to establish, which will allow FSA to choose species that provide high quality wildlife habitat, and are resistant to pests, disease, and fire, which would offer a long term beneficial impacts to wildlife and decrease the proliferation of invasive species.

FSA will use the Natural Resources Benefits Index (NRBI) to rank offered lands according to the relative benefits for natural resource factors. For wildlife, FSA will evaluate wildlife habitat cover benefits based on the potential value to wildlife, with longleaf pine and mixed stands of hardwood awarded the most points. The NRBI also evaluates benefits to T&E species and the potential for site preparation to control invasive species. Under the preferred alternative and with the use of the NRBI,

areas with particularly high value for wildlife habitat will be given preference, which may result in leveraged benefits for wildlife. In other words, the preferred alternative is designed specifically to target high quality wildlife habitat, which will provide greater long term highly beneficial impacts than if damaged areas were planted haphazardly or allowed to recolonize naturally (FSA 2006c).

The removal of downed and damaged trees under the preferred alternative would decrease the amount of host material available for insect and disease outbreaks, limiting the impacts of undesirable pest activity, such as SPB, and additional tree mortality in storm damaged areas. The preferred alternative also allows for the resumption of low intensity fire application, which is an essential process because it reduces fire fuels and prevents high intensity fires, recycles carbon and nutrients, controls insects and diseases, and renews successional cycles (Brown and Smith 2000). Longleaf pine, in particular, is associated with frequent surface fires, and is resistant to damage from low intensity surface fires. Fires fueled by fallen pine needles limit growth of woody shrubs and hardwood species not resistant to fire, and reinforces longleaf pine site dominance (Brockway et al. 2005).

Fish communities tend to be resilient and recover quickly following disturbance. Hurricane Katrina caused fish kills in coastal areas, including catfish and Gulf sturgeon, but are unlikely to have long term adverse effects (Adams 2005). The return of basic water quality, and combination of immigration and reproduction, is likely to return fish populations to pre-disturbance numbers.

In fact, the influx of organic material such as twigs and other woody debris following the hurricanes may have short term, moderate, beneficial effects on some fish populations by creating a nutrient pulse, which could increase stream productivity during the first year. Fallen trees may also have long term, moderate beneficial effects on fisheries by stabilizing stream channels and creating complex habitats such as pools and side channels (Adams 2005). However, if downed trees are removed from streams and rivers during EFCRP implementation, these long term benefits will not be realized. Finally, restoration of bottomland hardwood will improve water quality by filtering and flushing nutrients, processing organic wastes, and reducing sediment in waters filtering into streams and rivers (EPA 2006h). The improvement in water quality will have long term moderate to highly beneficial impacts on inland fisheries.

Implementation of CPs may have short term minor to moderate effects, with more beneficial than adverse effects. Site preparation and removal of damaged trees, particularly in CPs in which new trees are planted (i.e. CP 35A, CP 35C, CP 35E, and CP 35G), may open the canopy and understory, allowing early successional species to benefit from growth of herbaceous vegetation. Removal of downed trees may remove a significant source of nutrient cycling, as well as quality nesting, roosting, foraging, and perching habitat for a variety of wildlife, including small mammals, amphibians, reptiles, and birds, but may also remove fire fuels and habitat for harmful insects.

A small amount of wildlife mortality may occur if prescribed burns are employed during site preparation. However, southeastern forest ecology is adapted to limited surface fire, and some species may benefit from prescribed burns. Raptors, deer, and wild turkeys are attracted to recently burned habitats, harmful insects, such as the SPB, are reduced, and fire wounds on hardwoods provide potential nesting cavities. Early successional vegetation following a burn benefit birds, small mammals, wild turkeys, bobwhites, and gopher tortoises. Temporary increases in nutrients in burned habitats may increase the quality of forage (Dickson 2003).

Herbicides may be used during site preparation under the preferred alternative. Chemicals, when used in compliance with labeling instructions and BMPs, degrade quickly and do not indicate a negative impact on forest health. Target-specific application would be the preferred method to reduce the affected area. Fertilization has been shown to improve survival of pine seedlings. The use of fertilizers under the preferred alternative would improve potential survival rates of seedlings, as well as increase the biomass and nutrient content of understory vegetation. This may, in turn, temporarily increase vegetative diversity and fruit production, which would benefit wildlife species in the short term (Dickson 2003).

Overall, the preferred alternative, Alternative B, would have long term moderate to high beneficial effects on wildlife and vegetation in the EFCRP area. Alternative B would contribute to the achievement of the EFCRP objectives and would result in improved wildlife habitat quality.

4.1.2 PROTECTED SPECIES

4.1.2.1 Level of Impact

This section presents the analysis of the effects of each alternative on protected species in the project area. Impacts to protected species will have a temporal component that describes the duration of the effect. Impacts may also be beneficial or adverse, and impacts to protected species may vary in intensity. Table 4.1.4 establishes the criteria for the level of impact on the resource.

Table 4.1.4. Definition of criteria used to determine the duration of effect, type of effect, and level of effect of EFCRP alternatives on protected species.

Duration of Effect	Type of Effect	Level of Effect
Short term: Impacts to a biological resource's condition, use, or value experienced during implementation of program, generally not exceeding than 3 years.	**Beneficial:** An effect that would improve the habitats condition, use, or value compared to its current condition, use, or value for protected species.	**Minor:** A perceptible localized impact on habitat condition, use, or value that has little direct consequence for protected species.
Long term: Impacts to a biological resource's condition, use, or value experienced as result of program, generally lasting 3 or more years.	**Adverse:** An effect that would result in degradation of a biological resource's condition use, or value compared to its current condition, use, or value for protected species.	**Moderate:** A localized impact on habitat condition, use, or value that has a measurable consequence for protected species.
		High: A measurable impact on habitat condition, use, or value that is large and/or widespread and could have permanent consequences for protected species.

4.1.2.2 Alternative A – No Action

Under Alternative A, EFCRP funding will not be available for the implementation of the nine CPs, which will impact protected species. The impacts of not implementing each CP are summarized in Table 4.1.5 and described in further detail below.

Table 4.1.5. Summary of the impacts of Alternative A on affected protected species.

Affected Environment: Biological Resources	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35C & CP 35D New and Existing Bottomland Hardwood	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Upland Hardwood	CP 35I Mixed Existing
Protected Species	Short term highly adverse impacts would result from the increase in fire fuel and potential for pest and disease outbreak from downed trees. Long term highly adverse impacts on red-cockaded woodpeckers, gopher tortoises, and possibly bald eagles, would result due to the loss of longleaf pine and the potential for undesirable species to recolonize damaged areas.	Short term highly adverse impacts would result from the increase in fire fuel and potential for pest and disease outbreak from downed trees. Long term highly adverse impacts on listed freshwater mussels and the gulf sturgeon from low water quality would result from the loss of bottomland hardwoods.	Short term highly adverse impacts would result from the increase in fire fuel and potential for pest and disease outbreak from downed trees. Long term highly adverse impacts on protected species would result from the loss of habitat and the potential for undesirable species to recolonize damaged areas.		

Hurricane Katrina damaged 16 Federal wildlife refuges and destroyed habitat for at least 3 federally protected species, causing an estimated $94 million of damage to the wildlife refuges on the Gulf Coast, which remain closed. Damage to coastal dunes and beaches may cause population declines in the Alabama beach mouse and sea turtles. Hurricane Katrina destroyed at least 50 turtle nests along the Alabama coast (J. Cummins, personal communication). The damaged refuges also included areas used by migratory birds as stopping points along the Mississippi flyway (Sheikh 2005).

Downed and damaged longleaf pine in forest habitat may have resulted in the loss of nesting habitat for bald eagles and red-cockaded woodpeckers, two ESA listed species (J. Cummins, personal communication). The Noxubee National Wildlife Refuge in Mississippi, which contains habitat for the red-cockaded woodpecker, was heavily damaged (Sheikh 2005).

Taking no action would have moderate adverse impacts on protected species and habitat. In the short term, fuel levels and the threat from insects and disease would be high, which would increase the likelihood of the loss of overstory trees due to damaging, high intensity wildfires. Although longleaf pine, a species that offers habitat for red-cockaded woodpeckers and gopher tortoises, is resistant to and even dependent on periodic surface fires, a canopy fire could cause serious mortality to these valuable species (Brockway et al. 2005).

In the long term, the loss of habitat due to the hurricane or to post-hurricane fire or disease will adversely impact protected species by displacement, loss of cover and food sources until the lost habitat regenerates to pre-hurricane conditions.. Under the no action alternative, natural colonization will be

unlikely to favor quality protected species habitat such as longleaf pine or mixed hardwoods, and may favor the proliferation of invasive species or lower quality, slow growing species.

Alternative A would not contribute to the achievement any of the EFCRP objectives and would result in potentially harmful impacts on protected species and habitat.

4.1.2.3 Alternative B – Preferred Action

Alternative B will implement nine CPs with varied impacts on protected species. The impacts of each CP are summarized in Table 4.1.6 and described in further detail below.

Table 4.1.6. Summary of the impacts of Alternative B on affected protected species.

Affected Environment: Biological Resources	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35C & CP 35D New and Existing Bottomland Hardwood	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Upland Hardwood	CP 35I Mixed Existing
Protected Species	Short term minor adverse impacts to protected species and gopher tortoise burrows may result from surface disturbance during site preparation, although impacts would be reduced with CP 35B as less preparation is required. Long term highly beneficial impacts on red-cockaded woodpeckers, gopher tortoises, and possibly bald eagles, would result due to the restoration of longleaf pine, which may restore the natural fire regime and reinforce the dominance of longleaf pine.	Short term minor adverse impacts to protected species may result from surface disturbance during site preparation, although impacts would be reduced with CP 35D as less preparation is required. Long term highly beneficial impacts on listed freshwater mussels and the gulf sturgeon would result from the restoration of bottomland hardwoods due to the potential for improvements in water quality.	Short term minor adverse impacts to protected species and gopher tortoise burrows may result from surface disturbance during site preparation, although impacts would be reduced with existing CPs as less preparation is required. Long term highly beneficial impacts on protected species habitat would result from the restoration of habitat and the potential for undesirable species to recolonize damaged areas.		

Alternative B would primarily result in long term, highly beneficial impacts for some T&E and sensitive species found in the EFCRP project area. EFCRP funds would be used to restore longleaf pine, upland hardwood, bottomland hardwood, and softwood vegetation, and would remove downed trees that may be adversely affecting habitat quality for protected species. These activities would improve habitat for protected species, alleviate concerns about possible future damage from insects and disease, and decrease the probability of unacceptable losses of remaining trees from intense wildfire (USFS 2005). In addition, placing private forestland into CPs would ensure that private forestland would remain forested and protect them from development, further enhancing their value for protected species.

The hurricanes damaged longleaf pine throughout the Southeastern U.S., which represents valuable red-cockaded woodpecker habitat, and may also have reduced nests and nesting trees for bald eagles (J. Cummins, personal communication). Replanting longleaf pines would increase the occurrence of this important habitat and improve conditions for the red-cockaded woodpecker and potentially the bald eagle (USFS 2005). Long term, highly beneficial impacts for the red-cockaded woodpecker and bald eagle would result from the restoration of longleaf pine forests in damaged areas.

Gopher tortoises, a federally threatened species, occur in upland forested habitats in the EFCRP area. The restoration of upland hardwoods and pine species will have long term, highly beneficial impacts on the gopher tortoise by providing desirable habitat conditions and stability to or an increase in the integrity of gopher tortoise colonies (J. Cummins, personal communication). Planting upland hardwood species in damaged areas may improve habitat conditions for gopher tortoises, resulting in long term, highly beneficial impacts.

Gulf sturgeon mortality likely due to poor water quality and an influx of saline water was associated with Hurricane Katrina. As contaminated urban floodwaters recede and salinity return to normal, populations are expected to recover (Adams 2005). Freshwater mussels are sensitive to changes in water quality, and may benefit from improvements in water quality and declines in sedimentation. Alternative B may have long term minor to moderate beneficial impacts on gulf sturgeon and freshwater mussel populations by improving water quality by minimizing soil erosion with the restoration of damaged forests, and the restoration of native bottomland hardwood communities. Bottomland hardwood forests improve water quality by filtering nutrients, processing contaminants, and reducing sedimentation (EPA 2006h).

Short term, minor to moderate adverse effects might occur with the implementation of CPs. Gopher tortoise burrows could be crushed, and if prescribed burns are used, minor losses due to mortality may occur. However, these impacts are not likely in areas where surveys are completed and burrows are marked and avoided. Alternative B would contribute to the achievement of the EFCRP objectives and would result in long term, highly beneficial effects on protected species through improvements in habitat.

4.2 CULTURAL RESOURCES

4.2.1 ARCHAEOLOGICAL RESOURCES

4.2.1.1 Level of Impact

This section presents the analysis of the effects of each alternative on cultural resources. Effects to cultural resources will have a temporal component that describes the duration of the effect. Effects may also be beneficial or adverse, and may vary in intensity. Table 4.2.1 establishes the criteria for the level of impact on the resource.

Table 4.2.1. Criteria used to determine level of impact.

Duration of Effect	Type of Effect	Level of Effect
Short term: An effect lasting from 1 to 3 years. Usually the time it takes for CPs to become established.	**Beneficial:** An effect that would protect the condition, use, or value of cultural resources compared to its current condition, use, or value.	**Minor:** Localized effect that is not measurable and is of little consequence.
Long term: An effect lasting 3 years or longer.	**Adverse:** An effect that would result in degradation of the condition, use, or value of cultural resources compared to its current condition, use, or value.	**Moderate:** Localized impact that is measurable and of consequence.
		High: Measurable impact that is widespread and could have permanent consequences.

4.2.1.2 Alternative A – No Action

Table 4.2.2 summarizes the effects of the No Action Alternative on cultural resources.

Table 4.2.2. Effects of the No Action Alternative on cultural resources.

Affected Environment: Cultural Resources	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35C & CP 35D New and Existing Bottomland	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing
Archaeological Resources	Long term moderate adverse effects would occur, including soil erosion and soil surface exposure due to removed vegetation and natural storm events.				
Architectural Resources	Long term moderate adverse effects would occur through fallen tree damage and increased wildfire potential from fuel buildup. Wooden structures would be the most susceptible.				
Traditional Cultural Properties	Long term moderate adverse effects would occur because of lack of cleanup and restoration activities at TCPs that may be required.				

Archaeological Resources

Under the No Action Alternative, long term moderate adverse effects of the hurricanes would continue, including soil erosion from removed vegetation, natural weathering, wildfire, and soil surface exposure to additional erosional events. High-temperature wildfire, and in some cases, high-temperature prescribed burns, could damage surface or shallow archaeological sites. Artifacts made of bone; shell and other perishable organic materials may be damaged or destroyed due to fire.

Shallow archaeological sites may also be affected by fire. Studies show that the temperature of the soil below one inch from the surface is not usually raised unless extremely intense 700 degree Celsius (1292 Fahrenheit) fires are at the surface. Studies conducted in the southeastern United States showed that temperatures in the top .12 to .25 inches of the soil layer usually do not exceed 135 degrees Celsius (275 Fahrenheit). In most cases, deeper buried sites will not be affected by fire (USFS 2004).

Prehistoric pottery was made by firing clays in intense heat. If refired, some chemical and physical changes may occur, making identification difficult. Fire can also ruin the potential for acquiring dates of prehistoric pottery (USFS 2004).

Indirect effects may include erosion losses due to burned vegetation cover, or further deterioration of artifact or feature condition following damage by high temperatures. Increased ground surface visibility may facilitate illegal collecting of artifacts from surface exposures (USFS 2004).

Forestry practices, including salvage activities, would continue from other programs or typical forestry activity. These activities may have a long term moderate adverse effect on archaeological resources, because there may be no requirement to conduct resource inventory. As such, mitigative measures are rare and archaeological resources may be damaged.

Architectural Resources

Under the No Action Alternative, long term moderate adverse effects of the hurricanes would continue. These effects may include not removing fallen trees and vegetation from structures, possibly causing them to collapse; and the potential for increased wildfire from the fuel buildup on the land.

Historic wooden structure, wooden cemetery markers and wooden fence lines are susceptible to damage by fire. Ceramic and glass artifacts from historic sites may crack, craze, or melt and fuse, making identification difficult.

Traditional Cultural Properties

Under the No Action Alternative, long term moderate adverse effects of the hurricanes would continue. TCPs may have been impacted by windthrow and removal of vegetation, possibly destroying critical vegetation or structures.

4.2.1.3 Alternative B – Preferred Action

Table 4.2.3 summarizes the effects of the Preferred Alternative on cultural resources.

Table 4.2.3. Effects of the Preferred Action on cultural resources.

Affected Environment: **Cultural Resources**	**CP 35A & CP 35B New and Existing Longleaf Pine**	**CP 35C & CP 35D New and Existing Bottomland**	**CP 35E & CP 35F New and Existing Softwood**	**CP 35G & CP 35H New and Existing Hardwood**	**CP 35I Mixed Existing**
Archaeological Resources	Short term minor adverse effects may occur to unknown archaeological sites through site preparation activities, although impacts would be minimized with existing CPs as less preparation is required. Long term beneficial effects would occur with implementation because conservation plans in place would protect archaeological sites from further damage.				
Architectural Resources	Short term and long term moderate beneficial effects would occur through cleaning out fallen trees and vegetation that may be impacting architectural resources. Conservation plans would be in place for CP implementation and management. Debris removal would reduce wildfire intensity and scope.				
Traditional Cultural Properties	Short term and long term moderate beneficial effects would occur through cleanup and restoration, allowing the TCP to return to its desired status.				

Archaeological Resources

Under the Preferred Alternative, short term minor adverse effects would occur from implementation of the CPs. Due to the rich cultural and archaeological history of these States, the potential for encountering archaeological resources during implementation of EFCRP contracts is considered moderate. CPs that are ground disturbing beyond what is normally disturbed from previous forestry practices have the potential to impact known and yet unknown archaeological resources. Such practices include road construction and harvesting of salvage timber, earthmoving for site preparation and planting, installation of firebreaks and fencing, and construction of erosion control mechanisms.

Long term beneficial effects would occur from implementation of the CPs. During installation, the CPs would seek to avoid effects to archaeological resources. Appropriate archaeological review would be completed prior to implementation of an EFCRP contract. The archaeological review would at a minimum meet survey guidelines set forth by the SHPO and conducted under the supervision of state archaeologists where required. Results and recommendations from the survey should receive concurrence from the SHPO prior to project implementation.

Architectural Resources

Short and long term moderate beneficial effects would occur to architectural resources. If eligible resources are located on proposed enrollment land, removal of fallen trees and debris would help preserve structures and integrity.

Should proposed CPs include the removal or modification of historic architectural resources included in or eligible for the NRHP, consultation with the appropriate State SHPO would occur to determine how to proceed.

Traditional Cultural Properties

Short and long term moderate beneficial effects would occur for TCPs through debris removal and cleanup. TCPs would more rapidly return to return to its desired status.

Because the areas of potential effect of EFCRP actions are not yet defined, no Native American sacred sites or traditional cultural properties are identified. Once these areas are defined, consultation with Native American groups that have traditional ties to the lands may be needed to determine whether such properties exist on affected lands.

4.3 WATER RESOURCES

4.3.1 SURFACE WATER

4.3.1.1 Level of Impact

This section presents the analysis of the effects of each alternative on surface water resources. Impacts to surface water will have a temporal component that describes the duration of the effect. Impacts may also be beneficial or adverse, and may vary in intensity. Table 4.3.1 establishes the criteria for the level of impact on the resource.

Table 4.3.1. Criteria used to determine level of impact.

Duration of Effect	Type of Effect	Level of Effect
Short term: An effect lasting from 1 to 3 years. Usually the time it takes for CPs to become established.	**Beneficial:** An effect that would improve the condition, use, or value of surface water compared to its current condition, use, or value.	**Minor:** Localized effect that is not measurable and is of little consequence.
Long term: An effect lasting 3 years or longer.	**Adverse:** An effect that would result in degradation of the condition use, or value of surface water compared to its current condition, use, or value.	**Moderate:** Localized impact that is measurable and of consequence.
		High: Measurable impact that is widespread and could have permanent consequences.

4.3.1.2 Alternative A – No Action

Under Alternative A, EFCRP funding will not be available for the implementation of the nine CPs, which will impact surface water. The impacts of not implementing each CP are summarized in Table 4.3.2 and described in further detail below.

Table 4.3.2. Summary of the impacts of Alternative A on surface water resources.

Affected Environment: Surface Water Resources	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing	CP 35C & CP 35D New and Existing Bottomland
Short Term	Minor to moderate adverse effect— Without these CPs revegetation of disturbed soil would not occur across the EFCRP area. Runoff from areas containing sediment will impact surface water quality of nearby streams and rivers. Downed timber clogging waterways could result in diverting streamflow, scouring streambanks and destabilizing channels.				
Long Term	Minor to moderate adverse effect— Sediments delivered to streams would continue to be redistributed throughout the channel, affecting channel shape and size and aquatic habitat. Invasive species may invade disturbed areas, these species typically do stabilize soil as effectively as native vegetation or trees and sediment would continue to be delivered from these areas.				Minor to moderate adverse effect— Revegetation of wetlands would not occur and filtration of pollutants of sediment from surface runoff that is provided by healthy wetlands would be reduced, adversely impacting water quality of nearby waterbodies.

The quality of water draining from forested watersheds in the South is typically the highest in the country. For this reason, the effects of forestry activities on water quality have been widely studied. Pollution impacts on water quality from forestry activities are generally local in nature, short-lived, less frequent, and less extensive in nature than impacts related to either agricultural or urban activities (USFS 2006).

Without adequate controls, however, forestry operations do have the potential to significantly affect high-quality water sources and critical fisheries habitat. Silvicultural operations that can cause nonpoint-source pollution include road and skid trail construction, tree cutting and removal, site preparation and stand regeneration treatments, herbicide application, fertilizer application, and prescribed burning. The major types of potential pollutants produced by these sources include sediment, logging equipment fluids, nutrients from harvested areas and applied fertilizers, forestry pesticides, and increased water temperature or thermal pollution (USFS 2006).

The majority of impacts to surface water quality from the 2005 hurricane season have not been assessed. Those areas that have been assessed are urban areas and reported impacts are related to urban and industrial pollution sources. EFCRP

Forestry pollution from a skid trail. Courtesy of MDEQ.

will have little or no impact on these issues and they are not analyzed further in this PEA.

Under Alternative A, moderate adverse effects may occur to water quality. Water quality would continue to be impacted by existing sources of impairment. Any improvements to water quality and surface water resources would be dependent on existing State and Federal programs.

Under the No Action Alternative, reforestation efforts may not occur at the same level of EFCRP implementation. Throughout the EFCRP area, impacts from loss of vegetation and downed timber may result in increased soil erosion and sedimentation of surface water. In addition, silviculture practices may be accelerated over normal activity levels and will occur on more acres throughout the region because of the need to reforest affected areas. This may result in increased impacts to water quality from forestry practices. Implementation of BMPs can be costly and the lack of funds to install BMPs may result in additional water quality impacts. Additional impacts would result in areas that are not reforested and ongoing erosion from these areas could further adversely impact water quality. As discussed in section 3.3.1, waterbodies in many of the EFCRP States are already impacted by sedimentation issues, and any additional impacts would further degrade these resources.

Implementation of Alternative A would not result in any of the objectives of EFCRP.

4.3.1.3 Alternative B – Preferred Action

Alternative B will implement nine CPs with varied impacts on surface water. The impacts of each CP are summarized in Table 4.3.3 and described in further detail below.

Table 4.3.3. Summary of the impacts of Alternative B on surface water resources.

Affected Environment: Surface Water Resources	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing	CP 35C & CP 35D New and Existing Bottomland
Short Term	Minor to moderate adverse effect— Site preparation, including seedbed preparation and removal of downed trees, would result in surface disturbing activities which may temporarily alter surface hydrology and increase sedimentation of nearby waterbodies. These impacts would be minimized with existing CPs as less site preparation in required.				
Long Term	Minor beneficial effect— Tree plantings once established would slow runoff by increasing soil infiltration resulting in decreased soil erosion, which in turn would decrease sediment loads in surface water. Reforestation would also increase nutrient uptake, decreasing nutrients in surface water.				Minor to moderate beneficial effect— Establishment of bottomland timber would filter surface runoff draining upland improving water quality of adjacent streams and rivers. This CP would also decrease flood flows and stabilize streambanks, reducing channel erosion and maintaining and improving aquatic habitat.

Implementation of Alternative B would provide long term, moderate to high beneficial effects to water quality. Each CP will be designed to protect surface water resources by including specific direction such

as mitigation and management practices that comply with individual State water quality, forestry and conservation guidelines and regulations. The respective State and Federal guidelines and regulations will ensure that impacts to surface water resources will be addressed in each CP implemented under the EFCRP. Effects of each CP are summarized in Table 4.3.1.2.

Reforestation and tree plantings will result in long term moderate to high beneficial effects on surface water. Reforestation and tree plantings reduce soil erosion and sediments in surface runoff which, in turn, will reduce sediment input into local streams and rivers and improve downstream water quality. Trees and vegetation planted under each CP will intercept surface runoff and increase infiltration, slowing the flow of water which reduces soil erosion and volume of runoff. Reducing surface runoff volume and soil erosion decreases the amount of sediment carried to nearby waterbodies such as streams, rivers, and lakes, improving and maintaining water quality and aquatic habitat. In addition, trees will increase uptake of nutrients in the watershed, reducing the amount of nutrients in surface runoff, and improving water quality.

Implementation of EFCRP will result in water quality improvements in watersheds that have been identified by each State as priority watersheds. One of the main goals of the EFCRP is to reduce the amount of sediment, nutrients, and pollutants entering waterways, and NRBI criteria will evaluate the potential impacts that a contract will have on surface water quality. This criteria is based on location within a priority watershed, amount of sediment that would be delivered to surface water, human population impacts, and proximity to the waterbody. Preference will be given to contracts that will result in the greatest improvement to water quality and to CPs that will restore wetlands and riparian areas, both of which improve water quality by filtering sediment from surface runoff. This preference will result in greater improvements to water quality, more than if reforestation were to occur without EFCRP.

Short term adverse effects may occur during implementation of the CPs. Site preparation activities would include surface disturbing activities, which could increase soil erosion, resulting in sedimentation of nearby waterbodies. Sediment impacts as a result of CP implementation are dependent on the amount of erosion produced by land disturbing activities, intensity and duration of storm events occurring during the activities, proximity of the activities to a stream course, and the amount of sediment actually moving into the stream channels and remaining stored.

Mitigation measures and the use of BMPs are required and would mitigate any adverse effects of implementing CPs. Mitigation measures and BMPs will be in place within a site preparation plan that would be developed for each contract. These mitigation measures would be designed to meet State water quality goals by reducing erosion and providing interception and filtration of runoff that would limit delivery of sediment to nearby waterbodies.

Implementation of Alternative B would result in the attainment of EFCRP objectives.

4.3.2 GROUNDWATER

4.3.2.1 Level of Impact

This section presents the analysis of the effects of each alternative on groundwater in the project area. Impacts to groundwater will have a temporal component that describes the duration of the effect. Impacts may also be beneficial or adverse, and impacts to groundwater may vary in intensity. Table 4.3.4 establishes the criteria for the level of impact on the resource.

Table 4.3.4: Description of impacts for groundwater resources.

Duration of Impact	Type of Impact	Level of Impact
Short term: An impact that would result in the change of groundwater	**Beneficial:** An impact that would improve groundwater conditions,	**Minor:** A measurable or perceptible, minor, localized change of

conditions, uses, or value lasting one to three years.	uses, or value compared to its current condition, use, or value.	groundwater conditions, uses, or value that is of little consequence.
Long term: An impact that would result in the change of groundwater conditions, uses, or value lasting more than three years, and probably much longer.	**Adverse:** An impact that would result in degradation of groundwater conditions, uses, or value compared to its current condition, use, or value.	**Moderate:** A localized change of groundwater conditions, uses, or value that is measurable and of consequence.
		High: A measurable change of groundwater conditions, uses, or value that is large and/or widespread and could have permanent consequences.

4.3.2.2 Alternative A – No Action

Under Alternative A, EFCRP funding will not be available for the implementation of the nine CPs, which will impact wetlands resources. The impacts of not implementing each CP are summarized in Table 4.3.5 and described in further detail below.

Table 4.3.5. Summary of the impacts of Alternative A on groundwater.

Affected Environment: Groundwater Resources	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35C & CP 35D New and Existing Bottomland	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing
Short Term	Minor adverse effect— Shallow aquifers would be impacted by short term effects to surface water quality. Without CPs to filter pollutants and sediments from surface water quality, contaminated surface water may be recharging shallow aquifers.				
Long Term	Minor adverse effect— Impacts to surface water quality that would occur without these CPs would result in polluted water recharging groundwater resource and a long term decline in groundwater quality.				

Alternative A would not contribute to the achievement of any of the EFCRP objectives and would result in long term, adverse impacts. Under the No Action Alternative, EFCRP funds would not be available for CPs that will have long, term beneficial impacts on groundwater recharge zones.

Debris, household chemicals, refrigerants, motor oil, pesticides, microbiological contamination resulting from damaged waste water treatment facilities, fuel spills and leaks, fire and explosion hazards, airborne contaminants, and building materials are among the diverse pollutants which the hurricanes have caused to end up in surface waters which recharge groundwater aquifers. It is not likely that these impacts have affected the deeper, confined aquifers, but may have affected the shallow aquifers.

Additionally, the severity of the storms may have resulted in drastic changes to the coastal geomorphology, which directly affects the subsurface hydrogeologic environment. The most important direct physical effects of a hurricane near the coast are coastal erosion, shoreline inundation owing to higher than normal tide levels plus increased temporary surge levels during storms, and saltwater intrusion primarily into estuaries and groundwater aquifers.

The absence of forests and vegetation cover in aquifer recharge zones may have resulted in increased, localized soil erosion. Localized soil erosion allows pollutants to enter the surface waters. Consequently, when polluted surface water recharges aquifers, groundwater quality declines.

4.3.2.3 Alternative B – Preferred Action

Alternative B will implement nine CPs with varied impacts on groundwater resources. The impacts of each CP are summarized in Table 4.3.6 and described in further detail below.

Table 4.3.6. Summary of the impacts of Alternative B on groundwater resources.

Affected Environment: Groundwater Resources	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35C & CP 35D New and Existing Bottomland	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing
Short Term	No effect to moderate adverse impact- Site preparation and maintenance could require earth-moving or surface disturbing activities, downfall burning, and downfall removal. These activities have the potential to mobilize potentially contaminated sediments into surface waters that recharge sole source aquifers. These impacts would be minimized with existing CPs as less site preparation in required. Until desired plants are established, herbicide and pesticide may be used to promote plant establishment. These activities have the potential to add herbicides and pesticides to surface water that recharges sole source aquifers.				
Long Term	No impact to moderate beneficial impact- Tree plantings and encouragement of under-story growth will reduce soil erosion from wind or water by increasing soil infiltration, resulting in long term beneficial effects to sole source aquifers.				

Implementation of Alternative B would result in long term beneficial impacts to groundwater. EFCRP funds would be used to restore forested aquifer recharge areas and remove downed trees and clean up debris which may be adversely affecting stream and river channel surface waters. This would reduce the amount of sediment and potential contaminants in surface water that recharges aquifers. In addition, placing private forestland into CPs would ensure that recharge areas would remain forested and protect them from development, further enhancing their inherent value.

In order to be enrolled in the EFCRP, FSA will rank EFCRP offers according to the NRBI. Water quality improvement is one of the NRBI factors that will be used to assess the natural resources benefits for the land offered. The goal is to reduce the amount of sediment, nutrients, and pollutants that will enter surface waters. This will aid in ensuring clean surface water recharge to aquifers within the EFCRP area (FSA 2006c).

Activities associated with the implementation of CPs could potentially result in short term, minor, adverse impacts on groundwater quality. A conservation plan for each CP would be prepared and BMPs will be used to mitigate any adverse impacts of implementing specific CPs. These impacts are expected to only last until the CP is permanently established, and are considered short term, minor, adverse impacts compared to the overall long term, beneficial impacts of the CPs.

4.3.3 SOLE SOURCE AQUIFERS

4.3.3.1 Level of Impact

This section presents the analysis of the effects of each alternative on sole source aquifers in the project area. Impacts to sole source aquifers will have a temporal component that describes the duration of the effect. Impacts may also be beneficial or adverse, and impacts to sole source aquifers may vary in intensity. Table 4.3.7 establishes the criteria for the level of impact on the resource.

Table 4.3.7: Description of impacts for sole source aquifers.

Duration of Impact	Type of Impact	Level of Impact

Short term: An impact that would result in the change of sole source aquifer conditions, uses, or value lasting one to three years.	**Beneficial:** An impact that would improve sole source aquifer conditions, uses, or value compared to its current condition, use, or value.	**Minor:** A measurable or perceptible, minor, localized change of sole source aquifer conditions, uses, or value that is of little consequence.
Long term: An impact that would result in the change of sole source aquifer conditions, uses, or value lasting more than three years, and probably much longer.	**Adverse:** An impact that would result in degradation of sole source aquifer conditions, uses, or value compared to its current condition, use, or value.	**Moderate:** A localized change of sole source aquifer conditions, uses, or value that is measurable and of consequence.
		High: A measurable change of sole source aquifer conditions, uses, or value that is large and/or widespread and could have permanent consequences.

4.3.3.2 Alternative A – No Action

Under Alternative A, EFCRP funding will not be available for the implementation of the nine CPs, which will impact socioeconomic resources. The impacts of not implementing each CP are summarized in Table 4.3.8 and described in further detail below.

Table 4.3.8. Summary of the impacts of Alternative A on sole source aquifers.

Affected Environment: Sole Source Aquifers	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35C & CP 35D New and Existing Bottomland	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing
Short Term	Minor adverse effect— Shallow aquifers would be impacted by short term effects to surface water quality. Without CPs to filter pollutants and sediments from surface water quality, contaminated surface water may be recharging shallow aquifers.				
Long Term	Minor adverse effect— Impacts to surface water quality that would occur without these CPs would result in polluted water recharging groundwater resource and a long term decline in groundwater quality.				

Alternative A would not contribute to the achievement of any of the EFCRP objectives and would result in long term, adverse impacts. Under the No Action Alternative, EFCRP funds would not be available for CPs that will have long term, beneficial impacts on sole source aquifer recharge zones.

Debris, household chemicals, refrigerants, motor oil, pesticides, microbiological contamination resulting from damaged waste water treatment facilities, fuel spills and leaks, fire and explosion hazards, airborne contaminants, and building materials are among the diverse pollutants which the hurricanes have caused to end up in surface waters which recharge sole source aquifers. It is not likely that these impacts have affected the deeper, confined aquifers, but may have affected the shallow aquifers.

The absence of forests and plant cover in aquifer recharge zones will result in increased localized soil erosion. Localized soil erosion allows pollutants to enter the surface waters. Consequently, when polluted surface water recharges aquifers, groundwater quality declines.

4.3.3.3 Alternative B – Preferred Action

Alternative B will implement nine CPs with varied impacts on Sole Source Aquifers. The impacts of each CP are summarized in Table 4.3.9 and described in further detail below.

Table 4.3.9. Summary of the impacts of Alternative B on Sole Source Aquifers.

Affected Environment: Sole Source Aquifers	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35C & CP 35D New and Existing Bottomland	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing
Short Term	No effect to moderate adverse impact- Site preparation and maintenance could require earth-moving or surface disturbing activities, downfall burning, and downfall removal. These activities have the potential to mobilize potentially contaminated sediments into surface waters that recharge sole source aquifers. These impacts would be minimized with existing CPs as less site preparation in required. Until desired plants are established, herbicide and pesticide may be used to promote plant establishment. These activities have the potential to add herbicides and pesticides to surface water that recharges sole source aquifers.				
Long Term	No impact to moderate beneficial impact- Tree plantings and encouragement of under-story growth will reduce soil erosion from wind or water by increasing soil infiltration, resulting in long term beneficial effects to sole source aquifers.				

Implementation of Alternative B would result in long term beneficial impacts to sole source aquifers. EFCRP funds would be used to restore forested aquifer recharge areas, remove downed trees, and clean up debris which may be adversely affecting stream and river channel surface waters. This would reduce the amount of sediment and potential contaminants in surface water that recharges sole source aquifers. In addition, placing private forestland into CPs would ensure that recharge areas would remain forested and protect them from development, further enhancing their value.

In order to be enrolled in the EFCRP, FSA will rank EFCRP offers according to the NRBI. Water quality improvement is one of the NRBI factors that will be used to assess the natural resources benefits for the land offered. The goal is to reduce the amount of sediment, nutrients, and pollutants that will enter surface waters. This will aid in ensuring clean surface water recharge to sole source aquifers within the EFCRP area (FSA 2006c).

Activities associated with the implementation of CPs could potentially result in short-term, adverse impacts to groundwater quality within sole source aquifers. A conservation plan for each CP would be prepared and BMPs will be used to mitigate any adverse impacts of implementing specific CPs. These impacts are expected to only last until the CP is permanently established, and are considered short term, minor, adverse impacts compared to the overall long term, beneficial impacts of the CPs.

4.3.4 COASTAL ZONES

4.3.4.1 Level of Impact

This section presents the analysis of the effects of each alternative on coastal resources in the project area. Impacts to coastal resources will have a temporal component that describes the duration of the effect. Impacts may also be beneficial or adverse, and impacts to protected coastal resources may vary in intensity. Table 4.3.10 establishes the criteria for the level of impact on the resource.

Table 4..3.10. Definition of criteria used to determine the duration of effect, type of effect, and level of effect of EFCRP alternatives on coastal resources.

Duration of Effect	Type of Effect	Level of Effect
Short term: Impacts to a coastal resource's condition, use, or value experienced during implementation of program, generally not exceeding than 3 years.	**Beneficial:** An effect that would improve the condition, use, or value of a coastal resource compared to its current condition, use, or value.	**Minor:** A perceptible localized impact on coastal condition, use, or value that has little direct consequence for coastal resources.
Long term: Impacts to a coastal resource's condition, use, or value experienced as result of program, generally lasting 3 or more years.	**Adverse:** An effect that would result in degradation of a coastal resource's condition use, or value compared to its current condition, use, or value.	**Moderate:** A localized impact on coastal condition, use, or value that has a measurable consequence for coastal resources.
		High: A measurable impact on coastal condition, use, or value that is large and/or widespread and could have permanent consequences for coastal resources.

4.3.4.2 Alternative A – No Action

Under Alternative A, EFCRP funding will not be available for the implementation of the nine CPs, which will impact coastal resources. The impacts of not implementing each CP are summarized in Table 4.3.11 and described in further detail below.

Table 4.3.11. Summary of the impacts of Alternative A on coastal resources.

Affected Environment: Coastal Resources	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing	CP 35C & CP 35D New and Existing Bottomland
Short Term	Moderate adverse impacts- Lack of stabilizing vegetation along waterways supplying coastal areas may impair water quality by increasing sedimentation in runoff.				
Long Term	Minor to moderate beneficial impacts- Natural colonization of damaged areas may slow runoff by increasing soil infiltration resulting in improvements to water quality in coastal zones.				Moderate adverse impacts- Invasive or low quality species may colonize damaged areas and reduce capability of system to filter nutrients and process contaminants as effectively as bottomland hardwoods.

Hurricanes bring strong winds, tornadoes, storm surges, and rain, which can cause considerable damage to coastal resources such as shallow-shelf estuarine waters, oyster reefs, submerged aquatic vegetation beds, and wetlands. Hurricane season in 2005 brought particularly intense hurricanes to the Gulf and Atlantic coasts.

Storm surge and strong winds associated with hurricanes can alter land masses, such as barrier islands, and destroy aquatic vegetation (Figure 4.3-1). Sediment deposition following Hurricane Katrina altered wetlands, beaches, and coastal barrier islands. Additionally, significant loss of seagrass beds on barrier islands was reported, which in turn, can cause declines in aquatic life dependent on seagrass beds for foraging, spawning, and nursery habitat. Finally, hurricanes can cause declines in fish populations due to changes in dissolved oxygen and salinity (Sheikh 2005).

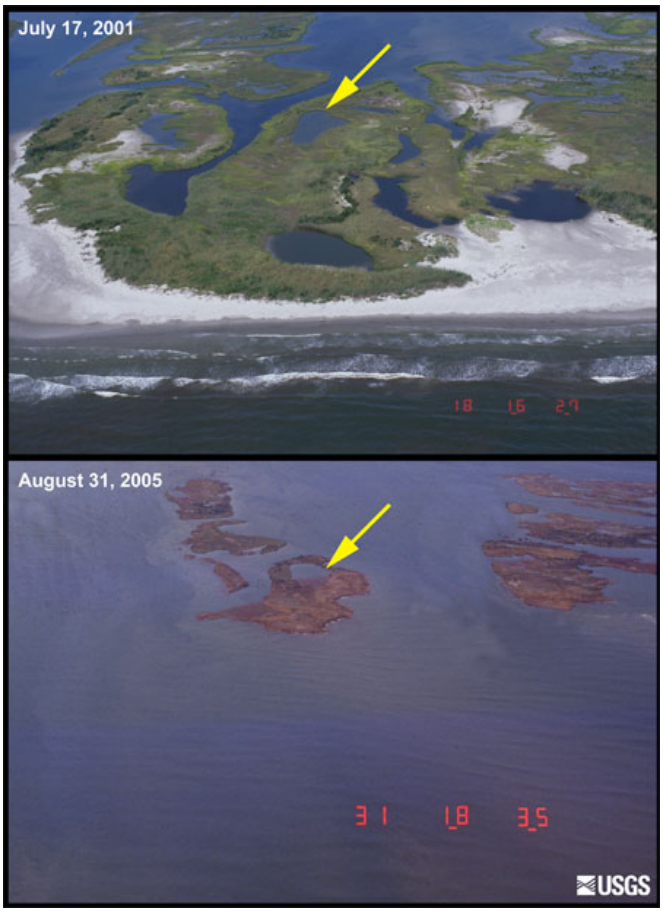


Figure 4.3-1. Storm surge and erosion dramatically altered the composition of the Chandeleur Islands following Hurricane Katrina. Photo courtesy of USGS.

Under the No Action Alternative, EFCRP funds would not be available for longleaf, upland hardwood, bottomland hardwood, and softwood restoration CPs that may have beneficial effects on coastal conditions, especially the quality of freshwater input. Without the bottomland hardwood plantings that would occur through EFCRP, soil may erode and increase sedimentation input to coastal areas, which may cause declines in water quality.

The Gulf Coast water quality is rated fair to poor, and experiences low water clarity. A hypoxic, or oxygen depleted zone, extends from the Louisiana shelf and is one of the largest hypoxic zones in the world. Also, nearly 17 percent of estuaries have degraded benthic resources associated with poor water quality or sediment (EPA 2005). Under Alternative A, bottomland hardwood forests damaged during the hurricane will not be restored and water quality may continue to decline, which may adversely impact coastal fisheries. Alternative A will have long term, moderately adverse impacts on coastal resources due to the loss of coastal bottomland hardwood vegetation.

4.3.4.3 Alternative B – Preferred Action

Alternative B will implement nine CPs with varied impacts on coastal resources. The impacts of each CP are summarized in Table 4.3.12 and described in further detail below.

Table 4.3.12. Summary of the impacts of Alternative B on coastal resources.

Affected Environment: Coastal Resources	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing	CP 35C & CP 35D New and Existing Bottomland
Short Term	Minor adverse effect- Site preparation, including seedbed preparation and removal of downed trees, may temporarily increase sedimentation in freshwater input to coastal zones. These impacts would be minimized with existing CPs as less site preparation in required.				
Long Term	Minor to moderate beneficial impacts- Restoration of forested vegetation may slow runoff by increasing soil infiltration resulting in improvements to water quality in coastal zones.				Moderate beneficial impacts-Restoration of bottomland hardwoods may improve water quality along rivers, streams, and coastal wetlands. Bottomland hardwoods filter nutrients and organic contaminants and provide wildlife habitat for wetlands species.

Alternative B will have long term, moderately beneficial impacts on coastal resources. Under CP35B, bottomland hardwood forests such as cypress and oak would be replanted. EFCRP funds would be used to restore bottomland hardwood forests, which would help control erosion and provide wildlife habitat. Bottomland hardwoods along rivers and streams and in coastal wetlands would improve the quality of water by filtering and flushing nutrients, processing organic wastes, and reducing sediment before it reaches open water (EPA 2006h). The improvements in water quality associated with bottomland hardwood restoration would provide long term moderate beneficial impacts on nursery habitat in bays, marshes, and estuaries, which may have beneficial impacts on coastal fisheries. In addition, placing private forestland into CPs would protect them from development, further enhancing their value and reducing the negative impacts of urban development on coastal systems.

Short term, minor adverse effects might occur with the implementation of CPs that would require earth-moving or surface disturbing activities. Removal of downed wood, prescribed burns, and surface disturbance may indirectly impact coastal resources by increasing sedimentation input into estuaries and wetlands.

Alternative B would provide long term, moderately beneficial impacts to coastal resources, primarily through the implementation of CP 35B and CP 35C, and would contribute to achieving EFCRP objectives.

4.3.5 WETLANDS

4.3.5.1 Level of Impact

This section presents the analysis of the effects of each alternative on wetlands. Impacts to wetlands will have a temporal component that describes the duration of the effect. Impacts may also be beneficial or adverse, and may vary in intensity. Table 4.3.13 establishes the criteria for the level of impact on the resource.

Table 4.3.13. Criteria used to determine level of impact.

Duration of Effect	Type of Effect	Level of Effect
Short term: An effect lasting from 1 to 3 years. Usually the time it takes for CPs to become established.	**Beneficial:** An effect that would improve the condition, use, or value of wetlands compared to their current condition, use, or value.	**Minor:** Localized effect that is not measurable and is of little consequence.
Long term: An effect lasting from 3 years through the EFCRP contract period of 10 years.	**Adverse:** An effect that would result in degradation of the condition use, or value of wetlands compared to their current condition, use, or value.	**Moderate:** Localized impact that is measurable and of consequence.
		High: Measurable impact that is widespread and could have permanent consequences.

4.3.5.2 Alternative A – No Action

Under Alternative A, EFCRP funding will not be available for the implementation of the nine CPs, which will impact socioeconomic resources. The impacts of not implementing each CP are summarized in Table 4.3.14 and described in further detail below.

Table 4.3.14. Summary of the impacts of Alternative A on wetlands.

Affected Environment: Wetlands	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35E & CP 35F New and Existing Softwood	CP 35I Mixed Existing	CP 35G & CP 35H New and Existing Hardwood	CP 35C & CP 35D New and Existing Bottomland
Short Term	Minor adverse effect— Disturbed areas will deliver sediments to wetlands decreasing their filtering capabilities.				
Long Term	Minor to moderate adverse effect— Without the planting of pine species, the acidic nature of bog soils would change over the long term, affecting the unique plant and animal communities that have adapted to the more acidic soils.			No effect: Since this CP would be implemented in uplands they would have no effect on wetlands.	Minor to moderate adverse effect— Without EFCRP, bottomland hardwood forests, an important wetland in the Southeast, would not be restored on a number of acres throughout the EFCRP area. The long

			term protection and enhancement of these wetlands that would occur under EFCRP would not occur and the ongoing loss of these wetlands would continue.

Wetlands at the margins of lakes, rivers, bays, and the ocean protect shorelines and stream banks against erosion. Wetland plants hold the soil in place with their roots, absorb the energy of waves, and break up the flow of stream or river currents. Wetlands also provide protection against hurricanes by creating friction, reducing high winds, and absorbing storm surges. It has been estimated that every 2.7 miles of wetlands absorbs one foot of storm surge. Various research has shown that each mile of wetland and barrier island that stands between a hurricane and inland Louisiana before landfall causes proportional dampening of both wind speed (storm intensity) and storm surge. Wind reduction of up to 25 percent has been observed from recent hurricanes and tropical storms because of remaining wetland protection. Steady losses of coastal wetlands results in increased severity of hurricane impacts (EPA 2006c, LSU 2006, and LaCoast 2006a).

Hurricanes Katrina and Rita transformed some 100 square miles of marsh to open water in southeastern Louisiana, according to preliminary estimates by the USGS. Although this early analysis of wetlands does not take into account some marsh recovery, indications are that much of the loss may be permanent. Some of the new areas of open water will likely become new lakes. Follow-up imagery and aerial photography will be used to determine if some of the submerged marshes reemerge over time (USGS 2006e). Figure 4.3-2 is a before and after photo from Hurricane Rita and is an example of vegetation loss.

Figure 4.3-2. Holly Beach, Louisiana. Before and after photos of Hurricane Rita. The lower photograph shows loss of vegetation and land from storm surges. Also, in the lower photograph, note the sand deposit emerging from the flood waters in a mid-island location half way between the arrows. Source: USGS 2006f.

In addition to actual loss of wetlands, hurricanes impact wetlands in other ways. Saltwater storm surges from the hurricanes affect interior marshes far inland, uprooting and destroying inland wetland vegetation, and the high salinity in the days and weeks following the storms lead to further declines in wetland vegetation (SRDU 2006). Loss of vegetation in wetland greatly reduces their functions and increases their vulnerability to other human or natural impacts.

The No Action Alternative would result in minor adverse effects to wetlands. Under Alternative A, current trends in wetland loss would be expected to continue at present rates throughout all the impacted States. Ongoing State and Federal programs would continue to strive to protect and restore wetlands, including those impacted by the hurricane 2005 season. Wetlands would continue to be protected under EO 11990, the CWA, and the Food Security Act. However, the benefits of CP 35B, bottomland hardwood restoration would not occur under the No Action Alternative. Without CP 35B to assist landowners and land managers, efforts to restore and protect bottomland hardwood forests and associated wetlands would move forward under existing program directions but will not have the funds or support needed to affect an area as large as the EFCRP area. In addition, placing acres of private land into CP 35B would protect bottomland hardwood forests from conversion to softwood forests or to other land uses such as agriculture and urban development.

Adverse impacts to bogs throughout the EFCRP area, may also occur under Alternative A. Soils in bogs are characteristically acidic which results in unique plant and animal communities. Throughout the Southeast loblolly pine, longleaf pine, and slash pine that border bogs are responsible for the acidic nature of bog soils and loss of these tree species could result in a changes to soil acidity and change the unique nature of the plant and animal communities within Southeastern bogs.

4.3.5.3 Alternative B – Preferred Action

Alternative B will implement nine CPs with varied impacts on wetlands resources. The impacts of each CP are summarized in Table 4.3.15 and described in further detail below.

Table 4.3.15. Summary of the impacts of Alternative B on wetlands.

Affected Environment: Wetlands	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35E & CP 35F New and Existing Softwood	CP 35I Mixed Existing	CP 35G & CP 35H New and Existing Hardwood	CP 35C & CP 35D New and Existing Bottomland
Short Term	Minor adverse effect— Site preparation, including seedbed preparation and removal of downed trees, may result in surface disturbing activities temporarily disturbing surface hydrology, increasing erosion, and result in sediments being deposited in wetlands, reducing wetland functions. These impacts would be minimized with existing CPs as less site preparation in required.				
Long Term	Minor beneficial effect— Longleaf pine reforestation and planting of other pine species will help maintain acidic soils in bogs throughout the EFCRP area.			No effect to minor beneficial effect— Tree plantings will slow runoff by increasing soil infiltration resulting in reduced surface runoff, decreased erosion, and reducing sedimentation of wetlands. Water quality from reforested areas would be of good quality, enhancing nearby wetland values and functions.	Minor to moderate beneficial effect— This CP will result in restoration and protection of wetlands throughout the EFCRP area. Lost or damaged vegetation would be restored to impacted wetlands increasing their ability to filter surface runoff.

The Preferred Alternative would result in long term minor to moderate beneficial effects to wetlands. Under this alternative, bottomland hardwood plantings would occur and would help to maintain and restore the wetland functions and values of this important wetland type. Pine species that are responsible for the acidic nature of soils found in Southeastern bogs would be planted, helping to maintain the unique characteristics of bogs throughout the EFCRP area.

Site preparation of each of the CPs may result in short term minor adverse effects to wetlands. Site preparation activities might require earth moving activities and soil disturbance, which may disrupt the hydrology of wetlands and may have the potential to introduce sediments into nearby wetlands, decreasing their functions. These effects would only be of short duration; only lasting until CPs are established. Impacts from site preparation are minor compared to the long term benefits of the

protection and restoration of bottomland hardwoods. . In addition, BMPs would be implemented that would mitigate any adverse effects of site preparation.

4.3.6 FLOODPLAINS

4.3.6.1 Level of Impact

This section presents the analysis of the effects of each alternative on floodplains. Impacts to floodplains will have a temporal component that describes the duration of the effect. Impacts may also be beneficial or adverse, and may vary in intensity. Table 4.3.16 establishes the criteria for the level of impact on the resource.

Table 4.3.16. Criteria used to determine level of impact.

Duration of Effect	Type of Effect	Level of Effect
Short term: An effect lasting from 1 to 3 years. Usually the time it takes for CPs to become established.	**Beneficial:** An effect that would improve the condition, use, or value of floodplains compared to their current condition, use, or value.	**Minor:** Localized effect that is not measurable and is of little consequence.
Long term: An effect lasting from 3 years through the EFCRP contract period of 10 years.	**Adverse:** An effect that would result in degradation of the condition use, or value of floodplains compared to their current condition, use, or value.	**Moderate:** Localized impact that is measurable and of consequence.
		High: Measurable impact that is widespread and could have permanent consequences.

4.3.6.2 Alternative A – No Action

Under Alternative A, EFCRP funding will not be available for the implementation of the nine CPs, which will impact socioeconomic resources. The impacts of not implementing each CP are summarized in Table 4.3.17 and described in further detail below.

Table 4.3.17. Summary of the impacts of Alternative A on floodplains.

Affected Environment: Floodplains	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing	CP 35C & CP 35D New and Existing Bottomland
Short Term	Minor adverse effect: Reduced vegetative cover in upland forests would result in decreased infiltration of surface runoff, increasing the volume of flood flows delivered to streams and rivers. Increased flood volumes could result in scouring in floodplains and decreased floodplain functions.				Minor adverse effect—Loss of vegetation in floodplains reduces infiltration of flood flows and decreases flood storage capacity. Flood flow velocities and volume would increase increasing damages to natural resources and structures from flood events.
Long Term	No effect— These CPs would not be located in floodplains and would have no long term effects.				Minor adverse effect—Without this CP reestablishment of bottomland hardwoods would occur at a much slower rate or not at all. Without these species floodplain functions would be diminished and flood velocities would increase, resulting in erosion in floodplains and stream channels and increased flood damage to downstream structures.

Floodplains function to store floodwater and slow flood flows, which decreases flood damage. Impacts to floodplains such as construction and loss of vegetation can reduce a floodplain's flood storage capacity and ability to slow flood velocities, resulting in increased soil erosion, degradation of stream channels, and damage to buildings and structures. Trees, shrubs, and other vegetation play an integral role in floodplain function by increasing infiltration of flood waters into soil and slowing flood velocities.

Bottomland hardwood forests were severely impacted by the 2005 hurricane season. This forest type is located in riparian areas and floodplains throughout EFCRP States and is important in maintaining floodplain functions throughout the Southeast. Loss of these forests prior to the 2005 hurricane season has lead to a dramatic reduction in floodplain functions along the Mississippi River. Where bottomland hardwood forests in the Mississippi River floodplains once stored at least 60 days of floodwater, they now store only 12 days (EPA 2006).

Under the No Action Alternative, long term minor adverse effect would occur. EFCRP funds would not be available for CPs that would beneficially affect the ability of floodplains to store floodwaters. Without the bottomland hardwood plantings that would occur through EFCRP, floodplain conditions

will recover at a much slower rate, if at all; the lack of floodplain function could cause a change or loss of vegetation including riparian vegetation, trees, and wetlands. These conditions may lead to a further decrease in floodplain functions such as loss of flood storage capacity and ability of the floodplain to slow flood velocities and flows. With the loss of these functions, soil erosion will increase and stream channels and water quality will be degraded because of increased sediment. Downed trees in stream and river channels may also alter the hydrology of floodplains and may result in increased localized erosion. Without the guidance of the EFCRP, some construction may occur that would alter floodplain flowage, capacity, or other functions.

Alternative A would not contribute to the achievement any of the EFCRP objectives and would result in little change to floodplains.

4.3.6.3 Alternative B – Preferred Action

Alternative B will implement nine CPs with varied impacts on floodplains. The impacts of each CP are summarized in Table 4.3.18 and described in further detail below.

Table 4.3.18. Summary of the impacts of Alternative B on floodplains.

Affected Environment: Floodplains	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35C & CP 35D New and Existing Bottomland	CP 35E & CP 35F New and Existing Softwood	CP 35I Mixed Existing	CP 35G & CP 35H New and Existing Hardwood
Short Term	No effect to minor adverse effect- Site preparation, including seedbed preparation and removal of downed trees, may result in surface disturbing activities and temporarily alter floodplain hydrology. These impacts would be minimized with existing CPs as less site preparation in required. No structures or earthmoving activities are authorized for these CPs.				No effect- This practice would not be implemented in floodplains and would have little to no effect on floodplain hydrology or functions.
Long Term	No effect to minor beneficial effect- Tree plantings may slow runoff by increasing soil infiltration resulting in long term benefits to floodplains. No structures or earthmoving activities authorized for this CP.				

Under Alternative B, minor improvements in floodplain functions and stream profiles would occur. EFCRP funds would be used to restore forested floodplains and remove downed trees that may be adversely affecting stream and river channel morphology. These activities would increase floodwater storage capacity, slow flood flow velocities, and result in overall improvement in floodplain functions. In addition, placing private forestland into CPs would ensure that floodplains would remain forested and protect them from development, which would further enhance their value.

Minor adverse effects might occur with the implementation of CPs that would require earth-moving or surface disturbing activities. These activities could potentially alter floodplain flow, capacity, or other functions. Appropriate FSA oversight would minimize adverse effects and minimize indirect effects to areas outside the 100-year floodplain.

In accordance with EO 11988, the CPs implemented under EFCRP would not be considered unwise actions or uses. There are no other practicable alternatives to locating the CPs within floodplains and all practical measures will be taken by FSA to minimize harm to the floodplains. Based on these factors, FSA will not complete public notice for each EFCRP contract that includes CPs within floodplains unless the CPs affect a floodway or are located in a coastal high hazard area.

The direct impacts of all CPs would be generally beneficial, and would contribute to achieving EFCRP objectives.

4.4 SOIL RESOURCES

4.4.1.1 Level of Impact

This section presents the analysis of the effects of each alternative on soil resources in the project area. Impacts to soil resources will have a temporal component that describes the duration of the effect. Impacts may also be beneficial or adverse, and impacts to soil resources may vary in intensity. Table 4.4.1 establishes the criteria for the level of impact on the resource.

Table 4.4.1: Description of impacts for soil resources.

Duration of Impact	Type of Impact	Level of Impact
Short term: An impact that would result in the change of soil conditions, uses, or value lasting one to three years.	**Beneficial:** An impact that would improve soil conditions, uses, or value compared to its current condition, use, or value.	**Minor:** A measurable or perceptible, minor, localized change of soil conditions, uses, or value that is of little consequence.
Long term: An impact that would result in the change of soil conditions, uses, or value lasting more than three years, and probably much longer.	**Adverse:** An impact that would result in degradation of soil conditions, uses, or value compared to its current condition, use, or value.	**Moderate:** A localized change of soil conditions, uses, or value that is measurable and of consequence.
		High: A measurable change of soil conditions, uses, or value that is large and/or widespread and could have permanent consequences.

4.4.1.2 Alternative A – No Action

Under Alternative A, EFCRP funding will not be available for the implementation of the nine CPs, which will impact soil resources. The impacts of not implementing each CP are summarized in Table 4.4.2 and described in further detail below.

Table 4.4.2. Summary of the impacts of Alternative A on soil resources.

Affected Environment: Soil Resources	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing	CP 35C & CP 35D New and Existing Bottomland
Short Term	Localized areas would be subject to wind and water erosion of topsoils. Unprotected slopes could erode, form gullies or experience land slippage due to water saturation of soils. Organic content and soil productivity could be temporarily reduced due to leaching and soil moisture stresses. Newly deposited or exposed soils caused by hurricanes may be subject to high erosion rates until natural vegetation can become established and stabilize these surfaces				
Long Term	Soil moisture stress, reduced organic content and reduced productivity could delay establishment of mature forest successional species. Disturbed soil areas may be colonized by undesirable invasive species that could inhibit or delay a return to former forest conditions. Erosion and gullying of slopes may preclude a return to former forest conditions, and become an active source of sediments polluting local streams. Increased surface flows may cause localized				Recruitment of hardwood trees may be delayed due to instability of disturbed areas, continued disturbance from minor events and persistence of early successional growth stages on unstable soils. Increased surface flows into

	streambank erosion and initiate streamcourse migration.	bottomlands may cause localized streambank erosion and increased stream sedimentation. Destabilized streambanks may initiate streamcourse migration through bottomlands.

Implementation of Alternative A would result in long term, adverse impacts on soil resources. EFCRP funds would not be available for CPs that may have beneficial effects on soils, and the soil resource concerns listed in Section 3.4 would continue to occur.

The effects of the hurricanes on soil resources and belowground processes may be substantial. The erosion and deposition of sediment during hurricanes may directly alter chemical and physical characteristics soils, which will in turn affect health and productivity of surviving forests, as well as reestablishment of forests in areas of high mortality. The rapid stabilization of this eroded and newly deposited sediment is also important to prevent future erosion, remobilization, and damage to adjacent, sensitive areas such as coastal environments (USGS 2002).

In addition to erosion, deposition, and soil structure effects, the hurricanes have introduced toxic chemicals into the soil. The toxic chemicals originate from a variety of sources, which include but are not limited to: household chemicals, petroleum products, pesticides, herbicides, damaged waste water treatment facilities, airborne contaminants, debris, and building materials.

The hurricanes which visited the Southeast in 2005 toppled trees throughout an extensive area and created open gaps in the canopy of forests. This has created a situation which has the potential for high intensity wildfire. High intensity wildfires not only destroy vegetation, but can detrimentally burn soils. Detrimentally burning soils reduces soil productivity by volatilizing nitrogen, causing a breakdown of the soil's surface structure, severely reducing soil microorganism populations and their effectiveness, and increasing run-off and on-site surface-sheet and rill erosion due to reduction of vegetation and formation of water-repellent layers.

Increased water flows in areas of downed trees and open gaps in the canopy of forests are due in part to frequent rainfall as well as reduced transpiration. This can produce flooding and decrease streambank stability, which results in soil erosion downstream. This is important in areas such as the Southeast, where intense thunderstorms can create considerable overland flow if infiltration capacity is reduced.

4.4.1.3 Alternative B – Preferred Action

Alternative B will implement nine CPs with varied impacts on soil resources. The impacts of each CP are summarized in Table 4.4.3 and described in further detail below.

Table 4.4.3. Summary of the impacts of Alternative B on floodplains.

Affected Environment: Soil Resources	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing	CP 35C & CP 35D New and Existing Bottomland
Short Term	Site preparation and maintenance could require earth-moving or surface disturbing activities, downfall burning, and downfall removal. These activities may temporarily expose soils to increased erosion. These impacts would be minimized with existing CPs as less site preparation in required. Localized areas not treated would be subject to wind and water erosion of topsoils. The extent of unprotected slopes subject to water impacts would be reduced. Organic content and soil productivity would be maintained in treated areas. Treatment of newly deposited or exposed soils caused by hurricanes would reduce erosion of				

	these newly exposed or deposited soils.	
Long Term	Tree plantings and vegetation restoration would reduce the potential for high intensity wildfires, reduce the occurrence of localized soil erosion and surface runoff, maintain soil productivity and organic content, resulting in long term beneficial impacts to soil resources.	Tree plantings and vegetation restoration would return these important habitats to productive levels for wildlife and preclude invasive species becoming established. The potential for erosion from secondary effects would be reduced.

Implementation of Alternative B would result in long term beneficial impacts to soil resources. EFCRP funds would be used to restore forested areas, remove downed trees, and clean up debris which may be adversely affecting soil resources. The establishment of trees and other vegetation would reduce the potential for high intensity wildfires, reduce the occurrence of soil erosion and surface runoff, and address several soil resource concerns listed in Section 3.4. In addition, placing private forestland into CPs would ensure that soil resources would remain forested and protect them from development, further enhancing their value.

In order to be enrolled in the EFCRP, FSA will rank EFCRP offers according to the NRBI. Soil erosion prevention is one of the NRBI factors that will be used to assess the natural resources benefits for the land offered. This will aid in ensuring the long-term productivity of the most erodible soils within the EFCRP area (FSA 2006c).

Activities associated with the implementation of CPs could potentially result in short term, minor, adverse impacts to soil resources. A conservation plan for each CP would be prepared and BMPs will be used to mitigate any adverse impacts of implementing specific CPs. These impacts are expected to only last until the CP is permanently established, and are considered short term, minor, adverse impacts compared to the overall long term, beneficial impacts of the CPs.

4.5 AIR QUALITY

4.5.1.1 Level of Impact

This section presents the analysis of the effects of each alternative on air quality. Impacts to air quality will have a temporal component that describes the duration of the effect. Impacts may also be beneficial or adverse, and may vary in intensity. Table 4.5.1 establishes the criteria for the level of impact on the resource.

Table 4.5.1. Criteria used to determine level of impact.

Duration of Effect	Type of Effect	Level of Effect
Short term: An effect lasting from 1 to 3 years, usually the time it takes for CPs to become established.	**Beneficial:** An effect that would improve air quality compared to current conditions.	**Minor:** Localized effect that is not measurable and is of little consequence.
Long term: An effect lasting 3 years or longer.	**Adverse:** An effect that would result in degradation of air quality compared to current conditions.	**Moderate:** Localized impact that is measurable and of consequence.

		High: Measurable impact that is widespread and could have permanent consequences.

4.5.1.2 Alternative A – No Action

With massive amounts of downed trees and other woody debris, USFS is expecting that the areas impacted by the 2005 hurricane season will experience a high risk of wildfire. They estimate there is up to three times the normal manageable amount of fuel on national forest lands where there is intensive fuels reduction program, and even higher amounts on some lands where fuel reduction treatment has not been as rigorously applied. Greater fuel loading will increase the intensity of a wildfire, causing it to burn hotter and making it more difficult to control. There is also increased potential for wildfire along the wildland urban interface where the burning of large debris piles could result in escaped fires (Bosworth 2005).

Characterization of the true extent of effects of prescribed and wildland fires on ambient air quality is incomplete due to the deficiency of air quality monitoring sites in rural areas. Also, particulate standards are based on 24-hour and annual averages, whereas smoke plumes may significantly degrade air quality in a community for just a few hours before moving or dispersing. These short-term, acute impacts likely cause discomfort at the least, and possibly even affect health, but may not result in a violation of the NAAQS (Sandberg et al. 2002).

Carbon sequestration is also greatly affected by hurricanes, and hurricanes are a significant factor in reducing short term carbon storage in the U.S. It has been estimated that a single storm can convert approximately 10 percent of the annual U.S. carbon sequestration to downed and dead biomass, and as the biomass decomposes carbon is slowly released into the atmosphere. Timber salvage can reduce the amount of carbon lost to decomposition and conversion of salvaged timber to wood products such as furniture and building materials results in continued carbon storage. Increased risk of wildfires also results in lost carbon storage as increased emissions of CO_2 from fires further decreases the amount of carbon stored in forests. Hurricanes also decrease carbon storage when they destroy trees and other vegetation in forests. Since carbon is stored in vegetation, these losses diminishes the carbon storage capacity of forests (McNulty 2002).

Alternative A may result in minor to moderate adverse effects to air quality. Without the removal of downed trees, fuel levels would remain high increasing the likelihood of wildland fires. Wildland fires would most likely have a greater impact on air quality than prescribed burns, since these fires would potentially burn hotter and for longer duration, and release more particulates and carbon into the air. Indirectly, it may have an effect on the ability to implement other forestry practices such as prescribed burning, since prescribed burning in areas with large amounts of downed timber may be restricted due to risks associated with escaped fires. Not allowing prescribed burning would result in additional storage of fuel loads, increasing the risk of fires over the long term. In addition, the tree plantings and timber salvage that would occur under EFCRP would help increase carbon storage. Without EFCRP funding these activities may occur at a lesser extent throughout EFCRP area, decreasing carbon sequestration and releasing more carbon into the atmosphere.

Alternative A would not contribute to the achievement any of the EFCRP objectives.

4.5.1.3 Alternative B – Preferred Action

Under the preferred alternative, minor adverse effects may occur to air quality. Air quality could be temporarily reduced in the immediate vicinity of heavy equipment on dirt roads. During dry weather conditions, these activities would further reduce air quality by increasing dust. Impacts from traffic of

heavy vehicles would be short term, lasting only during site preparation and timber salvage activities (1-3 months).

Prescribed burning for site preparation would result in additional impacts to air quality. However, since most prescribed burning would occur in rural areas, it is not expected that air quality standards would be violated. In addition, as presented in the mitigation measures listed in Chapter 6.0, applicable State regulations for prescribed burning would be followed to minimize any adverse effects to air quality. However, through prescribed burning fuel loads would be reduced, decreasing the potential for wildland fires, which have a greater impact on air quality and release more particulates into the air. PM found in the smoke would further degrade the already impacted air quality in Jefferson County, Alabama, which is a nonattainment area for PM.

Minor beneficial effects to air quality would result from implementation of Alternative B. Under EFCRP, timber salvage would reduce fuel loads, reducing the potential for potential for smoke from wildland fires to impact local air quality. Timber salvage also decreases the amount of carbon lost to the atmosphere through decomposition of downed and dead biomass, resulting in long term benefits to air quality. Increasing live biomass through tree plantings would also increase carbon storage throughout the EFCRP area, reducing the amount of greenhouse gases in the atmosphere and improving air quality.

Alternative B would contribute to achieving EFCRP objectives.

4.6 RECREATION

4.6.1 Level of Impact

This section presents the analysis of the effects of each alternative on recreation in the project area. Impacts to recreation will have a temporal component that describes the duration of the effect. Impacts may also be beneficial or adverse, and impacts to recreation may vary in intensity. Table 4.6-1 establishes the criteria for the level of impact on the resource.

Table 4.6-1. Definitions of the duration, type, and level of effect on recreation activities.

<table>
<tr><th>Duration of Effect</th><th>Type of Effect</th><th>Level of Effect</th></tr>
<tr><td rowspan="2">Short term: The time between the project's instigation through complete installation, a period of 1 to 3 years.</td><td rowspan="2">Beneficial: An effect that would improve the resource's condition, use, or value compared to its current condition, use, or value.</td><td>Minor: A measurable or perceptible, minor, localized change in the recreation or the recreation industry. The change is a value is of little consequence.</td></tr>
<tr><td rowspan="2">Moderate: A localized change in recreation or the recreation industry. This change would be measurable and of consequence, and would likely be observed by affected individuals.</td></tr>
<tr><td rowspan="2">Long term: The time after installation of CPs is complete and extending throughout the life of the project (10 years) and beyond.</td><td rowspan="2">Adverse: An effect that would result in degradation of a resource's condition use, or value compared to its current condition, use, or value.</td></tr>
<tr><td>High: A measurable change in recreation or the recreation industry. This change would be large and/or widespread and could have permanent consequences.</td></tr>
</table>

4.6.1.1 Alternative A – No Action

Under Alternative A, EFCRP funding will not be available for the implementation of the nine CPs, which will impact recreation. The impacts of not implementing each CP are summarized in Table 4.6.2 and described in further detail below.

Table 4.6.2. Summary of the impacts of Alternative A on recreation.

Affected Environment: Recreation	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35C & CP 35D New and Existing Bottomland	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing
Forest-based Recreation	Short term minor effect because most forest-based recreation occurs on public land, not on private land. Most of the area's recreation participants would not be affected if no CPs were installed. NIPF landowners and their invited guests may have limited access to traditional recreation areas. Long term minor adverse effect because without CP implementation, land that could have been reclaimed and replanted would be left to regenerate more slowly on its own.				
Fishing and Wildlife-Related Recreation	Short term minor adverse or no effect—Hurricane-damaged NIPF land used for fishing, hunting, and wildlife-watching activities would be less desirable because of decreased wildlife populations and limited access to sites. Long term minor adverse effect—Land that could have been reclaimed and replanted would be left to regenerate on its own. This regeneration would occur at a slower rate than if CPs were implemented. Invasive species and pests may establish in unreclaimed land and may decrease the overall beneficial habitat for fish and wildlife.				
Recreation Economy	Short term minor or no short term effects to the regional recreation economy. Recreation visitors who would spend money in the region would likely choose to visit the area because of the widespread damage. Long term minor adverse effects– Without forest reestablishment, outdoor recreation may not increase to pre-hurricane levels, adversely affecting income to outfitters and other recreation-based businesses. Limited access to sites may also discourage visiting recreation participants. Scenic views from public recreation sites to NIPF land may be slow recover, also discouraging visitors who spend money and time in recreation counties.				

The widespread destruction of forest land in the South has drastically reduced the amount of land available for outdoor recreation. Many roads and trails that traditionally provide access to some traditional recreation areas have been destroyed or are blocked by downed trees and/or other debris. People who traveled into the forests of the Southern U.S. primarily for aesthetics will find a severely altered environment. Short term (and potentially long term) minor to moderate adverse affects on recreation may occur because of the limited or possibly blocked access to certain recreation sites throughout the project area. Access to recreation trails and streams would be more difficult because of the fallen timber.

Short term (and potentially long term) minor to moderate adverse affects on recreation may occur because of the limited or possibly blocked access to certain recreation sites throughout the project area. Access to recreation trails and streams would be more difficult because of the fallen timber.

Participants of hunting, fishing, and wildlife-related activities have also been moderately affected by the initial loss of fish and wildlife. In addition, fish and wildlife populations have been affected in the short and long term because of habitat and corridor destruction or alteration. In addition, damaged trees are

inherently unstable; another storm may cause more windthrow that would be dangerous to recreation participants and NIPF landowners.

As recreational activities on forest lands have been reduced or eliminated in some areas of the EFCRP, recreational counties and businesses that rely on recreational participants have also experienced short term (and possibly long term) minor to moderate adverse impacts. Because of the importance of recreation and tourism to the region's economy, considerable income provided by tourism, recreation, hunting, fishing, wildlife watching, and other businesses would experience short term adverse minor to moderate impacts.

Under the No Action Alternative, recreation and tourism would continue at the current trend, as modified by the hurricanes. Financial compensation for installing selected CPs would not be available to private landowners and little or no land would be restored and replanted.

Alternative A would not contribute to the achievement any of the objectives listed in Section 1.3 and may negatively impact recreational opportunities within the project area and the recreational business sector.

4.6.1.2 Alternative B – Preferred Action

Alternative B will implement nine CPs with varied impacts on recreation. The impacts of each CP are summarized in Table 4.6.3 and described in further detail below.

Table 4.6.3. Summary of the impacts of Alternative B on recreation.

Affected Environment: Recreation	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35C & CP 35D New and Existing Bottomland	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing
Forest-based Recreation	Short term minor adverse effects. Land clearing may improve access to recreational sites. However, most recreation in Southern forests occurs on public land. Unsightly construction activities from CP implementation may result in an unpleasant recreation environment. Long term minor beneficial effect. Land that is clear of downed trees and planted in one of the CPs would be aesthetically pleasing, improving the experience of recreation participants on private land and adjacent public land.				
Fishing and Wildlife-Related Recreation	Short term minor beneficial effect. NIPF land used as habitat by fish and wildlife species would begin to recover more quickly with habitat established through the CPs. All CPs would improve water quality for inland fisheries. Fishing, hunting, and wildlife-watching opportunities would improve. Long term beneficial effects would occur as trees planted for CPs mature and provide more mature habitat for fish and wildlife species.				
Recreation Economy	Short term minor effects to the regional recreation economy resulting from the installation of the CPs that may compromise outdoor experiences on adjacent land. Long term minor beneficial effects after CPs are established. Restoration of local fishing, hunting, and outdoor recreation sites would provide more opportunities and potentially bring more income to outfitters and other recreation-based businesses.				

The implementation of the Preferred Alternative would have beneficial long term impacts on recreation and their attendant species of fish and wildlife, including game species of birds, fish and mammals. Installation of the proposed CPs would increase habitat for game bird and mammal species. Increased wildlife populations, especially game animals, could enhance the economic value of forest and adjacent lands for hunting, wildlife watching, and other outdoor recreational activities.

Minor to moderate long term beneficial effects would result from the removal of the downed timber, improving access to recreation areas and streams, reducing the severity of forest fires or prescribed burns, reducing additional blowdown from future storms, and providing a safer forest with fewer pests. The CPs would increase the desirability of land and surface waters to be used for hiking, boating, or camping by improving aesthetics and reducing human health factors as the level of pollutants decrease.

In addition, surface water adjacent to enrolled lands would benefit from increased water quality, thus improving the opportunities for wildlife viewing. However, any expected returns would not be realized until several years after implementation of the proposed EFCRP because of the time required for development of vegetation and travel corridors. An increase in water quality would allow for the replenishment of game fish species, possibly increasing the popularity and yields of sport fishing.

Once the initial harvesting is complete, the water quality would slowly but steadily improve. Long term beneficial impacts would result from the land clean up and tree planting. As plants and trees mature, they would create a visually pleasing place to recreate and provide habitat for wildlife species.

As downed timber is harvested and new trees are planted, an increase of sediment in waterbodies may occur. Short term minor to moderate adverse impact to recreational activities may occur during the installation of the proposed CPs, especially during initial reclamation efforts. Unsightly construction activities may result in an unpleasant recreation environment. Earth-moving and tree removing efforts may temporarily increase sediments in receiving waterbodies and displace game species, but long term benefits would accrue with the installation of the CPs.

Site specific environmental reviews would be completed for each EFCRP contract and would tier to this PEA. Indicators used for assessing the effects of the recreation alternatives should include an analysis of the number of impaired stream miles or acres enrolled, and the CPs impact on connectivity of trails as well as the number of users.

4.7 SOCIOECONOMICS

4.7.1 Level of Impact

This section presents the analysis of the effects of each alternative on State and regional socioeconomics in the project area. Impacts to socioeconomics will have a temporal component that describes the duration of the effect. Impacts may also be beneficial or adverse, and impacts to socioeconomics may vary in intensity. Table 4.7-1 establishes the criteria for the level of impact on the resource.

Table 4.7.1. Definitions of the duration, type, and level of effect on socioeconomics.

<table>
<tr><th>Duration of Effect</th><th>Type of Effect</th><th>Level of Effect</th></tr>
<tr><td rowspan="2">Short term: The time between the project's instigation through complete installation, a period of 1 to 3 years.</td><td rowspan="2">Beneficial: An effect that would improve the resource's condition, use, or value compared to its current condition, use, or value.</td><td>Minor: A measurable or perceptible, minor, localized change in the timber industry and/or regional or State economy. The change is a value is of little consequence.</td></tr>
<tr><td rowspan="2">Moderate: A localized change in the timber industry and/or regional or State economy. The value of the change is measurable and of consequence.</td></tr>
<tr><td rowspan="2">Long term: The time after installation of CPs is complete and extending throughout the life of the project (10 years) and beyond.</td><td rowspan="2">Adverse: An effect that would result in degradation of a resource's condition use, or value compared to its current condition, use, or value.</td></tr>
<tr><td>High: A measurable change in the timber industry and/or regional or State economy. The value of this change is large and/or widespread and could have permanent economic consequences.</td></tr>
</table>

This Section begins with a general discussion of the 2005 hurricane season impacts on timber inventories and a summary of timber price dynamics following large natural disasters. It then addresses specific damage to States severely impacted by the 2005 hurricane season and the short and long term economic impacts to the region. Finally, the EFCRP alternatives will be compared.

4.7.1.1 2005 Hurricane Season

The damage to the forest resources in the southern U.S. from 2005 Hurricane season was considerable (see Figure 4.7-1). Early estimates from forest inventories indicate potential timber losses from Hurricane Katrina amount to roughly 4.2 billion cubic feet of timber (15-19 billion board feet) spread over five million acres of light to heavily damaged forest land in Mississippi, Alabama, and Louisiana. Nearly 60 percent of the damage occurred to softwoods— predominantly pines—with the remainder of the damage occurring to hardwoods. According to the USDA Forest Service, down and damaged wood is sufficient to produce 800,000 single family homes and 25 million tons of paper and paperboard (USFS 2005b).

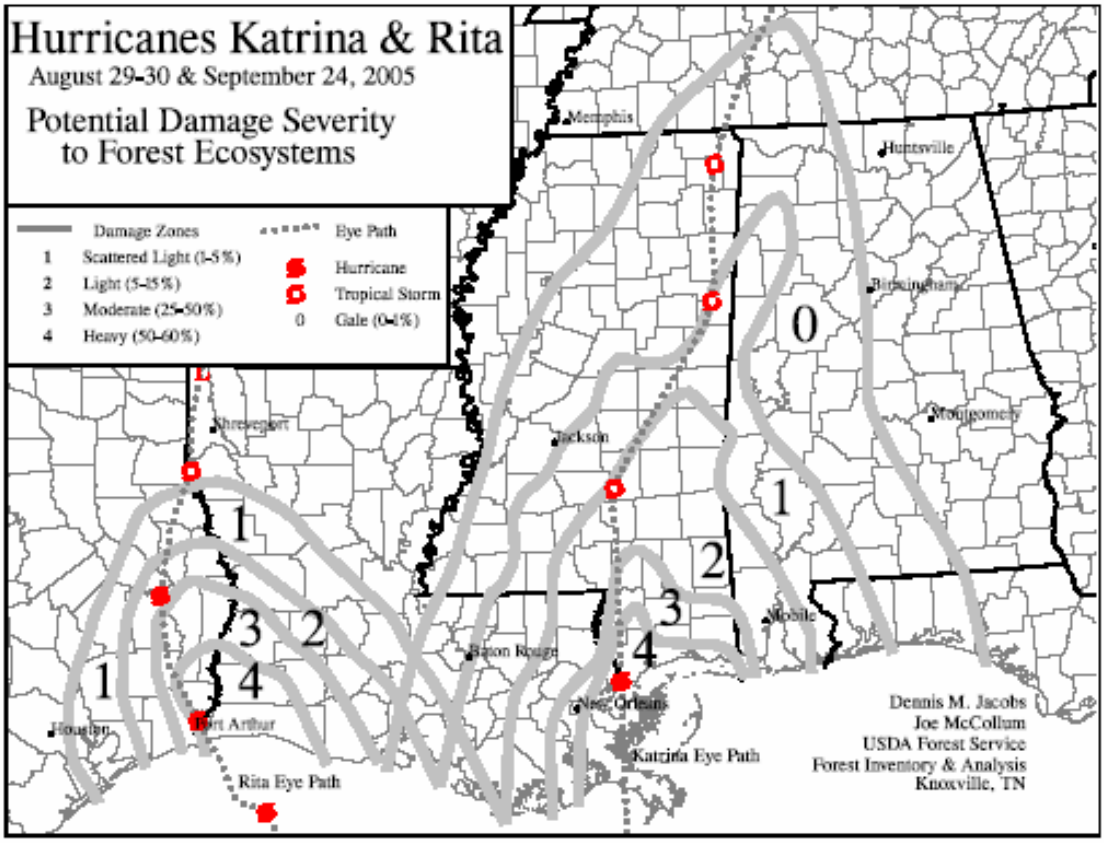


Figure 4.7-1. Potential damage severity of Hurricanes Katrina and Rita.

Source: UDSA FIA 2005

4.7.1.2 Timber Price Dynamics

Natural catastrophes are regular features of timber production in the U.S., especially from hurricanes, fires, and insect and disease outbreaks. Although these large-scale forest-based catastrophes are true "shocks" to timber markets, the economic ramifications are somewhat predictable based on past events.

Damaged timber stocks have vanishingly small opportunity costs and the liquidation of damaged stocks can create a supply pulse, driving short term prices down. However, because trees take a long time to

grow, large reductions in timber stocks can lead to a price increase resulting from increasing scarcity and enhancement in value of remaining stocks (Prestemon and Holmes 2000). Experts predict that in the months and years after a catastrophic disturbance, total supply initially increases, then decreases below pre-storm levels (inventory effect), and finally recover to the initial equilibrium over many years as inventory grows back (Prestemon and Holmes 2004).

Prestemon and Holmes (2004) have used the timber market after Hurricane Hugo to develop a model of timber market dynamics following natural disasters. Although destruction of Hurricane Hugo was not as widespread, its effects on forests in the South are similar and can be used to predict the long term effects of the hurricanes in 2005.

In 1989, Hurricane Hugo affected two-thirds of the timberland area within a 23-county area of South Carolina. In the damage zone, 21 percent of the softwood inventory was killed, and a volume equivalent to about 37 percent of that 21 percent of killed softwood inventory was salvaged over the next nine months. Ninety-three percent of the salvaged timber came from private lands (Prestemon and Holmes 2004).

Timber prices in the affected region dropped immediately following the hurricane and then recovered within a few years. Standing inventory was severely reduced in the zone, forcing prices upward in a classic response of the timber market to abundant supplies. Sawmills and other solidwood product producers were closed in the months and years following the storm because of the increased scarcity of sawmill quality timber (Prestemon and Holmes 2004).

In the pulp and paper sector, no such shift was evident. In fact, the pulp and paper sector might have even expanded in the hurricane's aftermath. This increase likely occurred because of industry response to the greater availability of low quality sawtimber-sized material in the damage region and/or in anticipation of a pulse of pulpwood-sized material following the storm as vigorously growing younger stands grew as a result of Hugo's natural thinning and landowners' tree-planting after the storm (Prestemon and Holmes 2004).

The economic shock from the overabundance of timber after Hurricane Hugo lasted 18 to 30 months. However, because the Katrina/Rita area has warmer winters, more downed timber may be lost because of rot, insect, and/or stain damage more quickly, shortening this short term economic impact. Area mills may be able to salvage and store timber (Hyberg 2006). However, after a certain period of time, stored timber will likely succumb to rot, stain and/or damage.

4.7.1.3 Short Term Impacts

The initial effects of the timber damage and subsequent salvage attempt have not yet been quantified. However, the timber price decreases immediately after the hurricanes have seemed to meet the expectations of Prestemon and Holmes (2004). Texas A&M University has reported that stumpage prices have dropped substantially in the affected counties after the storm (TFS 2005a). There are several factors affecting the timber prices and related local economies in the South, including:

- The abundance of timber has put pressure on the timber market and reduced short term timber prices as landowners attempt to salvage their crop;
- Reduced grade quality for storm-damaged timber, but salvage of higher-value timber in depressed price market;
- Logging costs for salvage operations are inherently higher due to added difficulty when harvesting in damaged stands;
- Loggers and foresters were more difficult to find when demand for logging increased dramatically all at once. The immediate needs of small salvage jobs, in particular, were difficult to meet because of the shortage of logging crews. Several southern university

extension agencies have created websites and hotlines providing information about available foresters logging companies;

- Persistent fuel and energy prices increases resulting from the disruption of production and distribution in the oil industry; and
- Prior to the hurricane, existing inventories at area mills were already high in preparation for the winter wet season (FDF 2006a, Guidry 2005, TFS 2005a, MSU 2006b, TFS 2006a, TFS 2005c).

To address this short term spike in supply, landowners have been advised to retain downed timber through the salvage period to benefit from the increased return as the supply of quality-sized timber decreases (Daniels 2005). However, holding storm damaged timber may decrease the value of the product because of damage from rot, stain, and insects.

Other short term effects of the hurricane damaged forests include the production and sale of seedlings and the labor that will likely be necessary for reforestation efforts. Landowners purchase seedlings for reforestation from one of several forest industry nurseries. In addition, some State forestry agencies also have nurseries, including Texas, Louisiana, and Mississippi. These suppliers will see an increased demand for seedlings as previously forested acreage is cleared and prepared for planting (Vanderveer 2006, MFC 2006a, LDF 2006).

This increase will result in moderate to high beneficial impacts to the forest nursery market. In Texas, Louisiana, and Arkansas, demand for seedlings has been low in the recent past and the forest nursery market has been somewhat depressed. The increase in seedling demand will likely be easily met by local nurseries. It is expected that nurseries are anticipating a spike in demand for the next couple of years and are preparing accordingly (Vanderveer 2006).

In addition, most tree planting in the region is done by hand-planting crews supervised by contractors. Consequently, there will likely be an increased need for labor (Vanderveer 2006). Labor needs that cannot be met through local sources would likely be filled by bringing in forest workers from surrounding areas.

This increase could lead to a combination of several possible outcomes, including:

- Increased employment by established crews,
- Additional crews or companies formed to meet demand,
- Increased cost to landowners as contracting crews raise their prices in response to increasing demand, and/or
- Increased wages to tree-planting employees and contractors.

However, many companies work on a regional basis and use migrant laborers, so real economic benefits to the State or region may be smaller than expected (Dunn 2006).

4.7.1.4 Long term Impacts

Long term impacts to the forest industry will likely follow a similar trend as occurred after Hurricane Hugo in 1989. After the initial income from timber salvage efforts, owners of severely damaged stands will not receive an income from timber until replanted trees grow to marketable size. Contrarily, owners with little or no damage and owners who are able to retain downed timber through the salvage period will experience an increase in return as the supply of quality-sized timber decreases (Daniels 2005).

With the drastic reduction in sawmill quality timber, regional sawmills and other solidwood product producers will likely find it difficult to remain profitable, potentially closing. Pulp and paper production facilities may experience smaller negative, or maybe slightly positive, impacts because of the abundance

of low quality sawtimber-sized material in the damage region and the increase in pulpwood-sized material produced from initial replanting efforts. The USFS has developed a map of primary processing mills overlaid by Hurricane Katrina's damage zones (see Figure 4.7-3). Depending on the type of wood the mill processes, these, and other, mills may experience moderate to high impacts as a result of the forestry damage.

Many wood processing facilities are located outside the Gulf Coast area where the majority of the timber is grown and most of the hurricane damage was sustained. For example:

- The primary industry in Northern Mississippi is wood furniture manufacturing, an industry that requires good-quality, large-sized timber (Munn and Tilley 2005).
- Most of the secondary forest product manufacturing facilities in Texas are located outside of East Texas. For example, in 1999, over 70 percent of State's total output for secondary solid wood products industry and over 88 percent of the secondary paper and paperboard products industry occurred outside of the timber-producing counties of East Texas (Xu 2002).
- Secondary timber-processing facilities are found throughout the State of Florida, although the vast majority of timber is harvested in northern Florida. In southern Florida's Dade County, the direct and indirect jobs attributable to the timber-based economy far exceeded the statewide county average (Carter and Jokela 2002).

In addition to 16,000 forest industry businesses (sawmills, pulp mills, forestry consulting firms, etc.) and over 770,000 jobs directly related to forestry in the South, there are many more individuals and businesses that rely on the forest industry. Forestry-related services such as equipment suppliers also depend on a thriving forest industry and non forestry-related businesses in the area rely on the purchasing power of forest industry employees and their families. The payroll from the forest industry into the Southern economy has multiplier effects that doubles or triples its impact and creates more than 1.2 million jobs (Abt et al. 2002, SRDC 1999). The forest industry, and State, regional, national, and international economies will experience long term adverse impacts as a result of the timber damage in the South. Recovery will be slow as the new resource grow and mature to a marketable stage. The EFCRP will facilitate replanting and regrowth of damaged trees through out the impacted area.

4.7.1.5 State Damage Assessments

This section assesses damage to forests in Mississippi, Louisiana, Alabama, and Texas. Forest damage assessments for North Carolina and Florida were not available.

Alabama

Alabama sustained damage from Hurricane Katrina, although not as severely as Mississippi or Louisiana. The Forestry Inventory Analysis (FIA) unit of the USFS has compared data from historic FIA surveys with Katrina's storm track data and FIA models based on historic hurricane damage to estimate the extent and amount of damage (shown in Table 4.7.2).

Table 4.7.2. Alabama potential down timber from Hurricane Katrina.

Damage Level	Total Timberland (acres)	Damaged Timberland Area (acres)	Percent of Timberland Damaged
Moderate (2 Counties)	1,194,349	86,487	7
Light (8 Counties)	4,086,139	472,914	12
Total	**5,280,488**	**559,401**	**11**

Source: USFS (2005b).

Mississippi

Mississippi sustained considerable damage from Hurricane Katrina. Nearly 90 percent of all forests damaged by Hurricane Katrina were within 60 miles of the coast, predominantly in Mississippi (MFC 2005). The FIA unit of the USFS has compared data from historic FIA surveys with Katrina's storm track data and FIA models based on historic hurricane damage to estimate the extent and amount of damage (shown in Table 4.7.3).

Table 4.7.3. Mississippi potential down timber from Hurricane Katrina.

Damage Level	Total Timberland (acres)	Damaged Timberland Area (acres)	Percent of Timberland Damaged
Severe (8 Counties)	2,200,500	1,973,502	90
Moderate (13 Counties)	3,908,700	1,191,871	30
Light (11 Counties)	2,949,400	206,677	7
Total	**9,058,600**	**3,372,050**	**37**

Source: USFS (2005b).

According to the Mississippi Forestry Commission, Hurricane Katrina caused significant damage to 1.3 million acres of forestland in the State. One-third of Mississippi's timber damaged by this hurricane was concentrated in eight counties of southern Mississippi, with the greatest damage occurred from the coastal counties northward to Laurel, Mississippi, in Jones County. Heavy damage to pine forests occurred in Hancock, Harrison, and Pearl River Counties (Hurricane Katrina New Orleans 2005, USFS 2005b). Table 4.7.4 details the damage to forest acreage and the estimated dollar amount of the timber damage in nine severely impacted counties.

Table 4.7.4. Hurricane Katrina damage assessment for severely damaged Mississippi counties.

County	Total Timber Damage (in dollars)	Forest Acres	
		Percent Damaged	Total Acres
Forrest	69,925,867	30	63,615
Greene	79,226,209	20	68,169
Hancock	120,665,915	60	105,010
Harrison	150,530,342	60	124,975
Jackson	159,022,429	50	137,499
Lamar	69,135,313	42	89,140
Pearl River	149,044,239	42	141,984
Perry	109,259,666	30	97,739
Stone	96,060,914	45	92,686

Source: MFC (2005).

An estimated 14.6 million cords of paperwood and 3.2 billion board feet of sawtimber were destroyed. The estimated economic impact of this loss was $1.3 billion (Hurricane Katrina New Orleans 2005).

Louisiana

The State of Louisiana was affected by Hurricanes Katrina and Rita. The preliminary estimates of cumulative economic impact to Louisiana's timber industry as a result of reduced revenue and increased costs are $610.8 million from Hurricane Katrina and $225.9 million from Hurricane Rita (Guidry 2005).

The FIA unit of the USFS has compared data from historic FIA surveys with Katrina's storm track data and FIA models based on historic hurricane damage to estimate the extent and amount of damage. These results are in Table 4.7.5.

Table 4.7.5. Louisiana potential down timber from Hurricane Katrina.

Damage Level	Total Timberland (acres)	Damaged Timberland Area (acres)	Percent of Timberland Damaged
Severe (1 Parish)	21,400	21,400	100
Moderate (6 Parishes)	1,155,353	938,863	81
Light (8 Parishes)	1,255,065	135,705	11
Total	**2,431,818**	**1,095,968**	**45**

Source: USFS (2005b).

Hurricane Rita affected an estimated 636,787 acres of forest land in Louisiana. Of this total, 180,329 acres were damaged, meaning "imminent mortality" of the trees and "salvage is required," and 456,458 acres were affected, meaning lands have sustained some damage and future growth has been impacted (TFS 2005).

Texas

Hurricane Rita made landfall in East Texas and Louisiana, damaging 771,000 acres of timber in Southeast Texas. The worst affected timber-producing counties include Orange, Hardin, Jasper, and Newton. As much as 6 percent (worth $833 million) of the total timber growing stock in East Texas sustained light to heavy damage (see Figure 4.7-2) (TFS 2005a). The Texas Forest Service categorized the forest land changed as damaged or affected. Damaged areas are in "imminent mortality" and "salvage is required." Affected lands have sustained some damage and future growth has been impacted. Initial estimates of the acreage of timber damaged or affected in Texas are approximately 870,000 acres. Estimates of forest damage by county are listed in Table 4.7.6 (TFS 2005).

An estimated 533 million cubic feet of timber was damaged in Texas which could have been used to make various forest products worth $3.7 billion. Based on historical average economic activities supported by the harvested timber volumes in East Texas, it is estimated that this amount of timber could have supported $13.2 billion of economic activity in East Texas. These indirect economic activities include upstream and downstream industries of the forest product industry and the service sectors that support the timber-based communities (see Figure 4.7-3) (TFS 2005b).

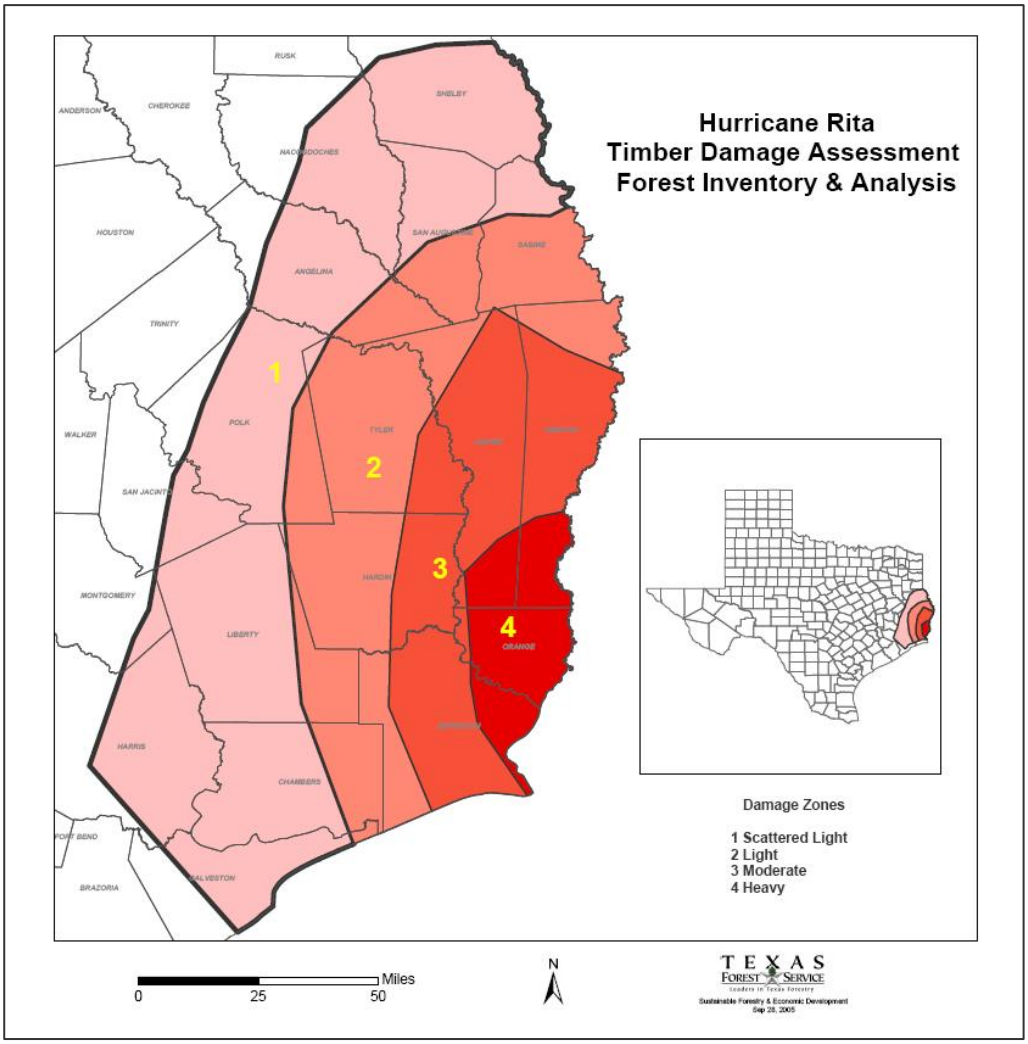


Figure 4.7.2. Damage zones from Hurricane Rita for Texas forests.

Source: TFS (2005).

Table 4.7.6. Hurricane Rita timber damaged and affected counties in East Texas.

County	Damaged				Affected			
	Volume (1,000 cubic feet)[1]	Value ($1,000)	Area (Acre)	Volume Percent[2]	Volume (1,000 cubic feet)[1]	Value ($1,000)	Area (Acre)	Volume Percent[2]
Angelina	9,624	10,250	4,832	2.1	10,437	11,213	5,216	2.3
Chambers	353	306	448	1.5	462	421	557	1.9
Hardin	75,678	60,145	57,990	14.5	62,501	48,742	47,865	12.0
Harris	2,420	2,269	1,739	1.9	3,116	3,066	2,217	2.4
Jasper	148,457	137,906	102,773	24.2	113,596	99,756	74,724	18.5
Jefferson	15,400	11,950	16,780	29.0	14,691	11,370	13,817	27.7
Liberty	8,595	7,125	9,108	2.8	10,353	9,066	10,800	3.4
Montgomery	370	306	643	1.7	616	605	911	2.9
Nacogdoohes	7,596	6,514	4,936	1.9	8,577	7,452	5,649	2.1
Newton	98,148	78,528	103,317	22.0	72,535	57,628	71,354	16.2
Orange	35,018	30,920	43,833	42.7	13,953	10,901	17,427	17.0
Polk	15,599	14,313	10,342	3.6	14,954	14,159	9,795	3.4
Sabine	25,939	26,148	12,673	5.2	25,151	25,181	12,783	5.0
San Augustine	13,515	12,797	9,098	2.8	14,396	13,663	9,061	3.0
San Jacinto	2,103	1,801	496	3.1	2,699	2,436	594	4.0
Shelby	7,077	6,184	5,898	1.5	7,515	6,510	6,812	1.6
Tyler	66,744	54,581	50,226	11.6	59,007	48,559	45,859	10.2
Total	**532,636**	**462,043**	**435,132**	**9.5**	**434,559**	**370,728**	**335,441**	**7.8**

[1]Refers to growing stock volume.
[2]Applies to area as well, except for timberland where there are no growing stock trees.
Source: TFS (2005).

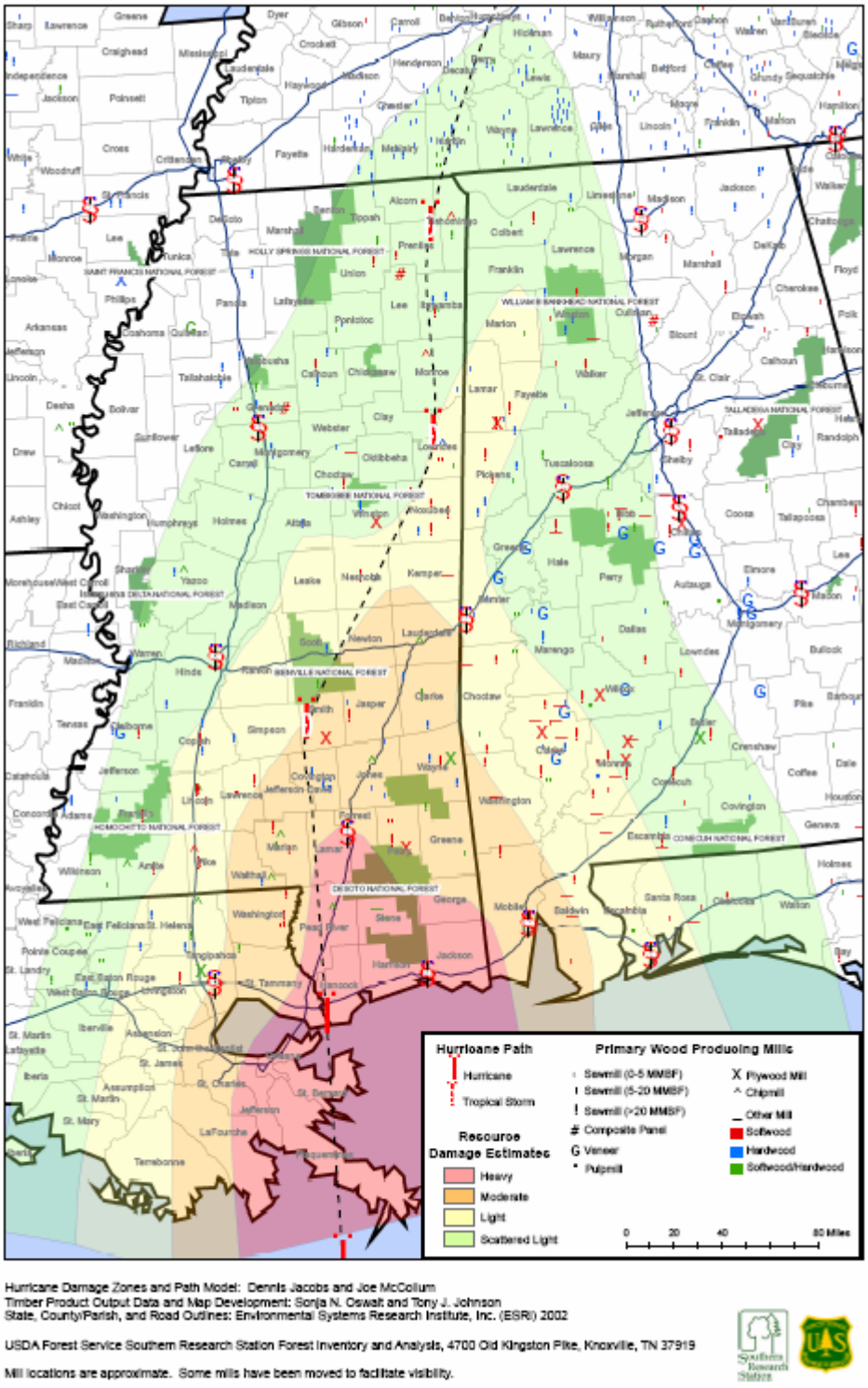


Figure 4.7.3. Primary wood processing mills in relation to Hurricane Katrina's path inland.

Source: USFS (2005c).

4.7.1.6 Alternative A – No Action

Under Alternative A, EFCRP funding will not be available for the implementation of the nine CPs, which will impact socioeconomic resources. The impacts of not implementing each CP are summarized in Table 4.7.7 and described in further detail below.

Table 4.7.7. Summary of the impacts of Alternative A on socioeconomics.

Affected Environment Socioeconomic	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35C & CP 35D New and Existing Bottomland	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing
Regional Timber Economy	Funds authorized to replace or harvest longleaf pine forests would not be released. Up to 14 percent of the 15-19 billion board feet of timber on five million acres of light to heavily damaged forest land in Mississippi, Alabama and Louisiana would not be recovered or replaced. **Short Term Effects:** Timber prices decrease. Harvest costs are higher. Sale of seedlings increase. Increase in planting workforce. **Long Term Effects:** Severely damaged stands will not have income until replanted trees grow to marketable size. Stands with little or no damage will have an increase in income as the supply of quality-sized timber decreases.				
State Timber Economy	Approximately one-third of the total counties in the 6-State area have been labeled as having sustained moderate to heavy hurricane damage would not receive Federal funding to replace or harvest longleaf pine forests. Direct and indirect impacts from payments or rental rates in high poverty areas would not take place. **Short Term Effects:** Timber prices decrease. Harvest costs are higher. Sale of seedlings increase. Increase in planting workforce. **Long Term Effects:** Severely damaged stands will not have income until replanted trees grow to marketable size. Stands with little or no damage will have an increase in income as the supply of quality-sized timber decreases. Actions by private land owners and companies will be slower and may cause greater impacts to the environment.				
Regional Poverty	Many landowners in economically depressed areas may not be able to salvage and replant longleaf pine forests on their land without the financial assistance from this program. **Short Term Effects:** Timber prices decrease. Harvest costs are higher. Sale of seedlings increase. Increase in costs to hire planting workforce. Work will be of limited duration in economically depressed areas. **Long Term Effects:** Severely damaged stands will not have income until replanted trees grow to marketable size. Stands with little or no damage will have an increase in income as the supply of quality-sized timber decreases.				

Under Alternative A, the No Action Alternative, the $404.1 million authorized under the 2006 Act would not be provided to landowners of damaged NIPFs and State school trust lands. The short and long term economic impacts to timber markets, landowners, forest nurseries, and wood-processing facilities described above in Sections 4.7.1.3 and 4, would likely occur. Implementation of the No Action alternative does not mean there will not be any income to NIPFs and State school trust funds; actions by private individuals and companies will take place; however, their actions will be slower and will likely cause greater damage to the habitat than if plans, funds and guidelines for harvest and restoration are implemented as in the Preferred Alternative.

If the No Action Alternative is implemented, revenue normally provided to public schools from school trust lands damaged in the hurricanes, would likely decrease substantially once initial timber salvage efforts have occurred.

In addition, direct and indirect economic benefits derived from the payments and/or rental rates in counties with high poverty rates would not be realized. Without financial assistance, landowners in these areas may not be able to salvage and/or replant their land, thereby exacerbating the area's financial problems. Losses of valuable timber resources will directly impact the producers and indirectly the economic well being of the surrounding communities and businesses from loss of local income and spending capacity of the population dependant on the timber industry.

4.7.1.7 Alternative B – Preferred Action

Alternative B will implement nine CPs with varied impacts on socioeconomic resources. The impacts of each CP are summarized in Table 4.7.8 and described in further detail below.

Table 4.7.8. Summary of the impacts of Alternative B on socioeconomics.

Affected Environment Socioeconomic	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35C & CP 35D New and Existing Bottomland	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing
Regional Timber Economy	Funds authorized to replace or harvest longleaf pine forests would be available. Up to 14 percent of the 15-19 billion board feet of timber on five million acres of light to heavily damaged forest land in Mississippi, Alabama and Louisiana could be recovered or replaced. **Short Term Effects:** Timber prices decrease. Harvest costs are higher. Sale of seedlings increase. Increase in planting workforce. Increase in stable workforce. **Long Term Effects:** Severely damaged stands will not have income until replanted trees grow to marketable size. Stands with little or no damage will have an increase in income as the supply of quality-sized timber decreases. Private landowners and companies will have more guidance and oversight to ensure harvest and planting methods are used that do not adversely impact the environment.				
State Timber Economy	Approximately one-third of the total counties in the 6-State area have been labeled as having sustained moderate to heavy hurricane damage would be eligible to receive Federal funding to replace or harvest longleaf pine forests. Direct and indirect impacts from payments or rental rates in high poverty areas would occur since they are the areas that would be the areas of emphasis in sign up notifications. **Short Term Effects:** Timber prices decrease. Harvest costs are higher. Sale of seedlings increase. Increase in planting workforce. **Long Term Effects:** Severely damaged stands will not have income until replanted trees grow to marketable size. Stands with little or no damage will have an increase in income as the supply of quality-sized timber decreases.				
Regional Poverty	Many landowners in economically depressed areas would have access to funds that would help them implement projects to salvage and replant longleaf pine forests on their land. **Short Term Effects:** Timber prices decrease. Harvest costs are higher. Sale of seedlings increase. Increase in costs to hire planting workforce would be alleviated by assistance from the program. Many of the laborers in the workforce live in economically depressed areas and would benefit from the increased funding. **Long Term Effects:** Severely damaged stands will not have income until replanted trees grow to marketable size. Stands with little or no damage will have an increase in income as the supply of quality-sized timber decreases. Workforce stability would occur and an influx to the local and regional area would assist the forest related and dependant economy.				

The Alternative B, the Preferred Action, would provide rental rates and cost-share assistance to owners or operators of NIPF (including school trust lands) who experienced a loss of 35 percent or more of merchantable timber directly related to hurricanes Katrina, Ophelia, Rita, Dennis, and Wilma during the 2005 calendar year. Conservation plans would be written for each site and financial assistance would be provided for 50 percent of the cleanup and replanting activities per this plan. Activities could include:

- Salvage harvesting and transportation,
- Debris removal,
- Site preparation,
- Tree seedling purchase,
- Seedling planting,
- Groundcover/understory planting,
- Vegetation maintenance until plants/trees are well established, including herbicides, and
- Other erosion control measures.

Alternative B would implement EFCRP and provide 10-year financial assistance contracts. Participants will have the choice of receiving one discounted, lump-sum payment or annual rental payments throughout the duration of the contract. These payments would provide direct and indirect economic benefits to residents of counties with high poverty rates and assist stimulating the economy of the entire region.

Revenue provided to public schools from school trust lands would likely decrease substantially once initial timber salvage efforts have occurred, but enrolled trust lands would still provide income to the schools through rental rates over the 10-year contract.

EFCRP rental payments per acre will be the average of all CRP rental rates throughout each county. In the States of Alabama, Louisiana, and Mississippi, the CRP rental rate ranges from $66 an acre in Geneva County, Alabama to $21 per acre in Stone County, Mississippi. In Southern Mississippi, where much of the forestry damage occurred, the average CRP rental rates for counties are between $21 and $29 per acre and are among the lowest rates in the region (FSA 2006b). Even though landowners in these counties will receive more weight in the eligibility scoring process because the area sustained the most damage, the low rental rates in these same counties would mean more out-of-pocket expenses for the landowners in these areas than for landowners in areas with higher CRP rates. However, in the absence of other programs, the funds provided by EFCRP would provide assistance to the areas hardest hit by hurricane damage.

Total funding for EFCRP is $404.1 million, which will remain available until expended. The $404.1 million appropriated will provide sufficient funding to reforest between 650,000 and 802,000 acres of the 5.6 million acres affected throughout the six States, or approximately 11.6 to 14.3 percent of the total acres of severely damaged timber. Costs per acre include technical assistance costs, NRCS costs, cost share, lump-sum payments, and annual payments (FSA 2006).

Because of this limited funding, the statue requires eligibility requirements to be met. Potentially enrolled land will be evaluated and ranked balancing the offers' contribution to soil erosion prevention, water quality improvement, wildlife habitat restoration, and mitigation of economic loss (as rated on the NRBI) (FSA 2006, FSA 2006c). Initial scoping for this project has revealed that landowners are dissatisfied with two economic aspects of the EFCRP. Landowners have indicated that the 50 percent of the cost share element required by the program would be difficult to meet, given the wide-spread destruction of homes, forestland, and regional infrastructure. Another concern surrounds the higher eligibility rating for acres planted with wildlife-friendly habitat such as longleaf pine. Landowners would prefer to plant faster-growing softwoods to more rapidly produce economically viable crops (see Appendix C, Scoping letters).

However, as EFCRP is a conservation and assistance program (not a replacement program) and may be combined with other financial assistance programs, the NRBI will allow for assistance money to be provided where it will provide more environmental benefits. In addition, the statue requires that conservation measures be implemented along with economic benefits for the landowners (FSA 2006c).

As stated above, because of limited funds, approximately 11.6 to 14.3 percent of the total severely damaged timber acreage will be affected by EFCRP. However, EFCRP may result in less severe impacts in some areas and/or for some individuals. As the forests harvested and replanted with EFCRP assistance mature, long term beneficial impacts would be realized by landowners, school trust land managers, the wood products industry and the population dependant on the timber industry through increasing revenues and stability of resources for timber, water, recreation and wildlife.

4.8 ENVIRONMENTAL JUSTICE

4.8.1.1 Level of Impact

This section presents the analysis of the effects of each alternative on environmental justice issues in the project area. Environmental justice issues will have a temporal component that describes the duration of the effect. Impacts may also be beneficial or adverse, and impacts to environmental justice may vary in intensity. Table 4.8.1 establishes the criteria for the level of impact on environmental justice.

Table 4.8.1. Definitions of the duration, type, and level of effect on environmental justice.

Duration of Effect	Type of Effect	Level of Effect
Short term: The time between the project's instigation through complete installation, a period of 1 to 3 years.	**Beneficial:** An effect that would improve the resource's condition, use, or value compared to its current condition, use, or value.	**Minor:** A measurable or perceptible, minor, localized change in environmental justice issues. These changes may not be easily observed.
		Moderate: A localized change in environmental justice issues. This change would be measurable and of consequence, and would likely be observed by affected individuals.
Long term: The time after installation of CPs is complete and extending throughout the life of the project (10 years) and beyond.	**Adverse:** An effect that would result in degradation of a resource's condition use, or value compared to its current condition, use, or value.	**High:** A measurable change environmental justice issues. This change would be large and/or widespread and could have permanent environmental justice consequences.

Site specific environmental reviews would be completed for each EFCRP contact and would tier to this PEA. Specific indicators used to measure the effects of alternatives on environmental justice would include the number of displaced minority or disadvantaged landowners and/or forest industry employees and number of affected minority producers.

Primary environmental justice issues for the EFCRP are related to economics. There is extensive timber damage in the South and, regardless of which alternative is implemented, landowner out-of-pocket expenses will be substantial (see Section 4.7, Socioeconomics). Because of the cost-share and relatively small rental rate amounts, low-income or other limited resource NIPF landowners may not have the funds available to restore and replant their land.

Another environmental justice concern may include health and safety issues arising because much of the low-income and minority population lives in areas that sustained catastrophic hurricane damage (see Section 3.8.1 for more information about poverty in the EFCRP project area).

4.8.1.2 Alternative A – No Action

Under Alternative A, EFCRP funding will not be available for the implementation of the nine CPs, which will impact environmental justice. The impacts of not implementing each CP are summarized in Table 4.8.2 and described in further detail below.

Table 4.8.2. Summary of the impacts of Alternative A on environmental justice.

Affected Environment Environmental Justice	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35C & CP 35D New and Existing Bottomland	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing
Minority Populations	Projects to replace or harvest longleaf pine forests would not take place; contractors would not hire local people; no H2-B guest workers would be employed; school trust lands would not be restored and funds for area schools, including those with minority students would decrease. **Short Term Effects:** The forestry workforce would be reduced as contractors lay off workers. **Long Term Effects:** Jobs in the forest would be slow in returning and the workforce would leave the area or move into other occupations.				
Minority Forest Landowners	NIPF landowners, including minority landowners would not have assistance to hire workers to replace or harvest longleaf pine forests; they would take longer to replace damaged resources; their income would be reduced. **Short Term Effects:** The landowner would loose the opportunity to reestablish income producing resources and would take longer to reestablish trees on the land. **Long Term Effects:** The landowner would not recover from the hurricane damage as quickly and could loose the land if other methods are not provided for restoration projects.				
Migrant Farm Labor	No reforestation projects would take place in longleaf pine forests. Contractors may have to reduce their workforce leaving many migrant forestry workers without stable employment. **Short Term Effects:** Migrant workers would be forced to find immediate employment in other areas of the county. **Long Term Effects:** The lack of work in the area would add to the decline of area economies and some producers may have to sell their land because of lack of workers.				
Health and Safety	Damaged trees would not be removed except for public safety along roads and trails. Hazardous fuel loading would increase; insect populations would increase and could spread to healthy trees. Wildfire severity would increase and suppression would become more hazardous. **Short Term Effects:** Timber resources would be wasted, there would be an increase in travel and fire hazards in areas with downed timber. **Long Term Effects:** Conditions would only worsen as the timber decays and fuel loading increases. The potential for catastrophic wildfires endangering people and property will increase.				

Under the No Action Alternative any environmental justice currently occurring would continue. No FSA actions would be required or necessary under the No Action Alternative to address existing or ongoing issues with environmental justice.

Under this alternative, there would be no EFCRP funds available for any NIPF landowners (including minorities) or school trust lands for harvest and restoration actions. The school trust lands would provide less money to the school system because much of the income would have to be used to restore the land for future production. The end result would be less funding for area schools which likely have minority students. In addition, some landowners may not have the funds to hire tree-planting and other services from contractors who employ workers from the H2-B guest worker program. These contractors may reduce their workforce or shut down their business, leaving many migrant workers without stable employment.

No removal of damaged trees would be implemented except for those needed to protect public safety along roads and trails or those actions covered under other decisions or other Federal and State programs. Hazardous fuel loadings would remain and increase, insect damage would increase and likely spread to surrounding healthy trees. Hazardous conditions would persist and worsen for workers engaged in wildfire suppression, prescribed burning, and salvage work. Due to heavy fuel loads, some areas would not be safe for wildfire suppression or prescribed burning. Lengthening the return interval for prescribed fire will allow accumulations of fuel, on top of the additions from storm damage, and increase the severity of wildfires.

4.8.1.3 Alternative B – Preferred Action

Alternative B will implement nine CPs with varied impacts on environmental justice. The impacts of each CP are summarized in Table 4.8.3 and described in further detail below.

Table 4.8.3. Summary of the impacts of Alternative B on environmental justice.

Affected Environment Environmental Justice	CP 35A & CP 35B New and Existing Longleaf Pine	CP 35C & CP 35D New and Existing Bottomland	CP 35E & CP 35F New and Existing Softwood	CP 35G & CP 35H New and Existing Hardwood	CP 35I Mixed Existing
Minority Populations	Projects to replace or harvest longleaf pine forests would take place; contractors would hire local people; H2-B guest workers would be employed; school trust lands would be restored and funds for area schools, including those with minority students would increase. **Short Term Effects:** The forestry workforce would provide employment on a steady basis. **Long Term Effects:** Jobs in the forest would continue as the cleanup and management activities continue; the workforce would remain stable.				
Minority Forest Landowners	NIPF landowners, including minority landowners would be able to apply for assistance to hire workers to replace or harvest longleaf pine forests; they would be able to replace damaged resources quicker with expert guidance from qualified foresters. **Short Term Effects:** The landowner would be able to reestablish income producing resources and the time needed to restore the forest would be much shorter. **Long Term Effects:** The landowner would recover from the hurricane damage more quickly; could continue to hire locally and contribute to rebuilding the hurricane damaged economy of the area.				
Migrant Farm Labor	Reforestation projects would take place in longleaf pine forests. Contractors would have the resources and work for their workforce and could provide stable employment for many migrant forestry workers. **Short Term Effects:** Migrant workers would have immediate employment in areas and not have to move out of the county. **Long Term Effects:** The stability of work in the area would add to the economic recovery of the areas damaged by the hurricanes.				

Health and Safety	Damaged trees would be removed for public safety along roads and trails as well as in areas not generally accessed by the public. Hazardous fuel loading would decrease; there would be short term increase in insect populations but they would be controlled as healthy trees grow and mature in storm damaged areas. Wildfire severity would decrease and fire suppression would not be as hazardous. **Short Term Effects:** Timber resources would be recovered, there would be a decrease in downed timber that could affect travel and fire hazards. **Long Term Effects:** Conditions would continue to improve as timber is removed and cleaned up; fuel loading decreases; and the potential for catastrophic wildfires endangering people and property decreases.

The Preferred Alternative would allow for the reforestation of many destroyed private forest acres in the six EFCRP project area States. All landowners, including minority landowners, eligible for EFCRP funds would be considered for enrollment. Landowners would likely hire forest management contractors for initial seedling planting and subsequent thinning, etc. Because these contractors employ H-2B guest workers, minority individuals in this program would benefit from EFCRP. Through the EFCRP program, school trust land managers may have the necessary funds to clean up and replant lands that provide revenue to the area public schools.

The economic issues that may have environmental justice implications include:

- EFCRP funds are designed to provide landowners with half of the eligible cost of establishing a permanent cover. Low-income or other limited resource NIPF landowners may not be able to provide the necessary funds to replant, even with EFCRP assistance.
- Landowners would receive annual rental payments on the land that is enrolled under EFCRP. These rental rates vary widely between EFCRP counties, from $22 an acre in southern Mississippi to $66 in southern Alabama. These differences would affect the amount of money provided to different landowners.

During initial enrollment, FSA will make extra outreach efforts to ensure low income and minority landowners are aware of the program.

Short and long term minor to moderate beneficial impacts on the health and safety of forest workers, landowners, and the area's population are expected because the Preferred Action would reduce fuel loadings from the existing level to a more easily managed level.

The Preferred Action would also provide landowners of between 650,000 and 802,000 acres with money to hire workers for salvage timber operations, soil preparation, and planting of new trees.

In addition, because the EFCRP cost-share money would be available from 12 months up to 36 months, participants may be able to wait out the initial rush of post-hurricane evaluation and reclamation. This delay may allow for more qualified specialists to support the removal and soil preparation required for the program.

Site specific environmental reviews would be completed for each EFCRP contact and would tier to this PEA. Specific indicators used to measure the effects of alternatives on environmental justice would include the number of displaced minority or disadvantaged landowners and/or forest industry employees and number of affected minority producers.

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5.0 CUMULATIVE EFFECTS

5.1 Introduction

CEQ stipulates that the cumulative impacts analysis within an EA should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present and reasonably foreseeable actions regardless of what agency or person undertakes such other actions" (CEQ, 2006). CEQ guidance in *Considering Cumulative Effects* affirms this requirement, stating that the first steps in assessing cumulative effects involve defining the scope of the other actions and their interrelationship with the proposed action (CEQ, 2006). The scope must consider geographic and temporal overlaps among the proposed action and other actions. It must also evaluate the nature of interactions among these actions.

Cumulative impacts most likely arise when a relationship exists between a proposed action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in proximity to the proposed action would be expected to have more potential for a relationship than those more geographically separated. Similarly, actions that coincide, even partially, in time tend to have potential for cumulative effects.

For this PEA, the geographic boundary for cumulative impacts analysis is the ecoregions overlaying the counties designated as qualifying for the EFCRP program. For the purposes of this analysis, the goals and plans of Federal programs designed to mitigate the risks of hurricane loss on private, non-industrial forests are the primary sources of information used in identifying past, present, and reasonably foreseeable actions.

5.2 Past, Present, and Reasonably Foreseeable Actions

In addition to the EFCRP, there are other Federal and State programs designed to assist forestry programs and recovery activities in the hurricane States.

USDA has made available more than $4.5 billion to hurricane victims since Sept. 2005. Assistance has included $22 million in Emergency Watershed Protection funds; $31 million in Emergency Conservation Program funds; $152 million in Emergency Loan funding; $239 million in Rural Development funding; and $1.3 billion in Food and Nutrition assistance.

USDA also made the following programs available to farmers and ranchers adversely affected by the 2005 hurricanes: the Emergency Conservation Program, Emergency Loan Program, Federal Crop Insurance and the Noninsured Crop Disaster Assistance Program.

On January 26, 2006, the USDA announced $2.8 billion in aid to assist victims of the 2005 hurricane season. USDA is providing $1.2 billion in aid to agricultural producers; primarily in Alabama, Florida, Louisiana, Mississippi, North Carolina, and Texas. USDA will provide disaster payments to farmers, ranchers and others through eight separate programs. Funding is provided through (1) Section 32 of the Act of August 24, 1935 and (2) The Department of Defense, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico, and Pandemic Influenza Act, 2006.

USDA is providing $250 million for crop disaster, livestock, tree, and aquaculture assistance from Section 32 funds in the following new programs; however, none of these funds are to be used for recovery of forestry lands:

- **Hurricane Indemnity Program (HIP):** HIP will provide payments to farmers who received crop insurance or Noninsured Crop Disaster Assistance Program (NAP) payments as a result of the hurricanes.

- **Tree Indemnity Program (TIP):** TIP will provide flat payments per acre for the re-planting and rehabilitation (such as pruning or staking) of perennial orchards, vines, and bushes that produce an annual crop, damaged as a result of the hurricanes. Timber losses are not included in this program.
- **Feed Indemnity Program (FIP):** FIP will provide payments to eligible owners and cash lessees of certain types of forage based livestock for feed losses.
- **Livestock Indemnity Program (LIP):** LIP will provide payments to producers whose livestock died as a direct result of the hurricanes.
- **Aquaculture Grants:** USDA will provide block grants to States adversely affected by the hurricanes in 2005 for aquaculture losses.

In addition to the Section 32 funds, USDA is providing $903.9 million to agricultural producers adversely affected by hurricanes in 2005. Of that total, $404.1 million is for the Emergency Forestry CRP. Producers will also receive assistance through the following programs:

- **Emergency Conservation Program (ECP):** Through ECP, as administered by FSA, $199.8 million is available in emergency funding and technical assistance for farmers and ranchers to rehabilitate farmland damaged by natural disasters and for carrying out emergency water conservation measures in periods of severe drought. The bill increased ECP cost-share assistance from 75 percent to 90 percent. On private nonindustrial forest, landowners must have suffered a loss of at least 35 percent of the forest acres on commercial forest land. Payments to private nonindustrial forest landowners are limited to 75 percent of the cost of reforestation, rehabilitation, and related measures, not to exceed $150 per acre.
- **Emergency Watershed Program (EWP):** Through this program administered by USDA's Natural Resources Conservation Service (NRCS), the 2006 Defense Appropriations Act provides supplemental funding of $300 million to repair damages resulting from hurricanes that occurred during calendar year 2005. Under this program, private non-industrial forest landowners can receive cost share for cleaning up structures on private land and reimbursement for costs associated with downed timber removal at a rate not to exceed $150 per acre. They can also receive financial and technical assistance to remove and dispose of debris and animal carcasses that could adversely affect health and safety on non-Federal land in a hurricane-affected county. There is also emergency funding and technical assistance available to respond to emergencies created by natural disasters, including clearing debris from clogged waterways, restoring vegetation, stabilizing river banks, repairing levees and structures; reseeding damaged areas; and purchasing floodplain easements. NRCS provides up to 75 percent of the funds needed to restore the natural function of a watershed and up to 90 percent in limited resource areas. The community or local sponsor of the work pays the remaining cost-share, which can be provided by cash or in-kind services.

5.3 Cumulative Effects Matrix

Table 5.1. Cumulative effects of NRCS and other conservation programs with EFCRP CPs.

Resource Issues	State and Federal Forestry Management Programs	Ongoing Forestry Practices	EFCRP Alternative A: No Action	EFCRP Alternative B: Preferred
Biological Resources	Existing State and Federal forestry programs protect and enhance natural habitats that are important for protected species and other wildlife. The USFS directs the Forest Stewardship program managed independently by each State for NIPF owners. The program guards against soil erosion, protects water quality, improves wildlife habitat, and ensures sustainable timber supply. Forest Health Protection is USFS program providing technical assistance to prevent and manage forest pest insect and disease outbreaks in southern forests.	Ongoing forestry practices have the potential to detrimentally affect biological resources if State and Federal forestry practices are not followed. These practices include the use of best management practices as well as proper seed bed preparation, timber salvage, and prescribed burning.	Under the No Action alternative, EFCRP funds would not be available to NIPF owners, although some funds may be provided through ECP and EWP. The No Action alternative would not benefit existing forestry management programs such as the Forest Health Protection Program, on forestland damaged during the hurricanes, although existing programs would continue to protect wildlife habitat and T&E species, and prevent exotic species invasions and pest outbreaks.	EFCRP, combined with other Federal and State forestry programs, would cumulatively have a greater impact on biological resources. These programs could complement each other and potentially improve the effectiveness of each program.
Cultural Resources (archaeological, architectural, and TCPs)	Programs receiving Federal funds need to comply with section 106 of the NHPA. Compliance with NHPA protects cultural resources located on private land that participates in these programs, protecting cultural resources that might not otherwise be protected.	Earth moving activities associated with forestry activities has the potential to disturb historic and prehistoric cultural properties. Discovery and/or disturbance of cultural resources may go unreported by private landowners.	Existing NHPA regulations would continue to protect known cultural resources on private lands, although new surveys would not necessarily be conducted.	Under EFCRP, private land enrolled in contracts would be surveyed for cultural properties and in turn protected or preserved on private land.

Resource Issues	State and Federal Forestry Management Programs	Ongoing Forestry Practices	EFCRP Alternative A: No Action	EFCRP Alternative B: Preferred
Surface Water Resources	Many existing forestry programs are designed to improve water quality and activities occurring under these programs will benefit water quality by reducing soil erosion and decreasing sediments in surface water. Current BMPs developed and implemented in each State will continue to protect water quality throughout the EFCRP area. Clean up activities will help remove debris that could be a source of impairment on water quality, such as cars leaking oil, gas, and other pollutants. These activities will result in long term improvements to water quality.	Surface water quality leaving forested lands is generally of high quality. Ongoing forestry practices that could adversely impact surface water quality include skid trail construction, chemical applications, and prescribed burning. These ongoing activities would continue to impact water quality of local waterbodies.	Under the No Action Alternative, existing State and Federal programs will be relied upon to protect and improve surface water resources and water quality. The benefits that would be provided under EFCRP would not be realized, which could have a detrimental effect on water quality, especially those already impacted by siltation.	EFCRP, in combination with existing Federal and State forestry programs, would result in cumulative benefits to surface water resources. EFCRP, combined with other Federal and State conservation programs, would cumulatively have a greater impact on water quality. These programs would complement each other and potentially improve the effectiveness of each program.
Groundwater Resources including Sole Source Aquifers	The preservation of natural habitats through various coastal and freshwater protection programs have positive impacts on water quality, including reducing soil erosion and decreasing sediments in surface water. The USFS directs the Forest Stewardship program managed independently by each State for NIPF owners. The program guards against soil erosion and protects water quality, which improves the quality of water recharging aquifers and reduces groundwater contamination.	Ongoing forestry practices have the potential to detrimentally affect surface water that recharges aquifers, if State silvicultural BMPs are not followed.	Under the No Action Alternative, existing State and Federal programs will be relied upon to protect and improve groundwater quality. The benefits that would be provided under EFCRP would not be realized, which could have a detrimental effect on the quality of water that recharges aquifers.	EFCRP, in combination with existing Federal and State forestry programs, would result to cumulative benefits to groundwater resources. EFCRP, combined with other Federal and State conservation programs, would cumulatively have a greater impact on the quality of water recharging SSAs and other groundwater resources. These programs could complement each other and potentially improve the effectiveness of each program.

Resource Issues	State and Federal Forestry Management Programs	Ongoing Forestry Practices	EFCRP Alternative A: No Action	EFCRP Alternative B: Preferred
Coastal Resources	Forestry programs designed to improve water quality, particularly the Forest Stewardship program, may impact coastal zones.	Ongoing forestry practice indirectly affects coastal resources. Forestry practices can introduce sediments and other pollutants into nearby stream and rivers. These pollutants are carried to downstream coastal zones, adversely impacting coastal resources.	Under the No Action Alternative restoration of bottomland hardwood and upland vegetation would be dependent upon alternative State and Federal programs such as ECP and ECW. Improvements to surface water quality, which may benefit coastal resources, would also rely on alternative programs.	EFCRP would restore bottomland hardwoods, which would improve water quality and benefit coastal resources. EFCRP, combined with other existing State and Federal programs would have a cumulatively greater benefit for coastal resources.
Wetlands Resources	The preservation of natural habitats through various coastal and freshwater protection programs, especially the NRCS WRP, will have positive impacts on wetlands. Through WRP and other conservation programs, wetlands will be maintained and preserved to reduce impacts that occur from degradation of natural resources and land conversion.	Ongoing forestry practices have the potential to impact wetlands. Forestry practices can introduce sediment into surface runoff and although an important wetland function is the filtration of sediment from runoff, an overburden of sediment can diminish wetland's ability to filter sediment and other pollutants.	Current BMPs in each State are designed to protect water quality and other water resources, including wetlands. Wetlands would continue to receive benefits from BMPs and would continue to be protected by State and Federal regulations.	EFCRP, in combination with existing Federal and State forestry programs, would result cumulative benefits to water resources. EFCRP, combined with other Federal and State conservation programs, would cumulatively have a greater impact on forested wetlands,. Installation of CPs, especially CP35B, would restore forested wetlands and/or improve the quality of water in wetlands. EFCRP would complement existing programs and potentially improve the effectiveness of each program.

Resource Issues	State and Federal Forestry Management Programs	Ongoing Forestry Practices	EFCRP Alternative A: No Action	EFCRP Alternative B: Preferred
Floodplains Resources	These programs strive to preserve native vegetation, install riparian buffers, and protect natural habitats, all of which serve to maintain or enhance floodplain functions and reduce impacts to floodplains that occur from degradation of natural resources and land conversion.	Ongoing forestry practices, especially those that occur in floodplains have the potential to adversely effect floodplain functions and values. Skid trail and temporary road construction associated with timber harvest activities can alter floodplain hydrology and capacity.	Current silvicultural BMPs in each State are designed to protect floodplains. Floodplains would continue to receive benefits from BMPs. Floodplains would also continue to be protected by local, State, and Federal regulations.	EFCRP, in combination with existing Federal and State forestry programs, would result in cumulative benefits to floodplains. EFCRP, combined with other Federal and State conservation programs, would cumulatively have a greater impact on water quality, bottomland hardwood forests, and floodplains. Installation of CPs would improve the capacity of floodplains to store excess water. EFCRP and the other conservation programs would complement each other and potentially improve the effectiveness of each program.
Soil Resources	These programs encourage native and other desirable vegetation cover. Vegetation cover directly benefits soil resources through reduced erosion and encouragement of soil development.	Ongoing forestry practices have the potential to adversely affect soil resources if State and Federal forestry practices are not followed.	State and Federal forestry programs would continue to provide beneficial impacts to soil resources through reduced erosion and encouragement of soil development. Existing soil resource concerns would continue.	EFCRP would complement ongoing soil conservation efforts. Additional acres would be reforested, increasing all programs' overall effectiveness.

Resource Issues	State and Federal Forestry Management Programs	Ongoing Forestry Practices	EFCRP Alternative A: No Action	EFCRP Alternative B: Preferred
Air Quality	While these programs are not specifically designed to improve air quality, these programs will benefit air quality. Vegetation and reforestation activities will increase the amount of live biomass, increasing the amount of CO_2 that is removed from the atmosphere resulting in overall improvements to air quality.	Ongoing Forestry practices such as prescribed burning can increase the amount of particulates in the air, adversely affecting air quality. Timber harvest activities may also increase the amount of dust and vehicle emissions in local airsheds. These impacts are generally local in nature and are short term.	Under the No Action Alternative, existing State and Federal programs will continue to improve air quality through the restoration and protection of native vegetative communities. Prescribed burning would continue to be regulated by each State, reducing the adverse impacts of this practice.	EFCRP would complement ongoing conservation programs' restoration of native vegetative communities and enhance the overall benefits to air quality. Under the Action Alternative, additional acres would be reforested resulting in increased carbon storage capacity, reducing the overall impacts to air quality in local airsheds from greenhouse gases.
Recreation	Existing State and Federal programs, such as the Economic Action Program, managed by the USFS, provide technical and financial assistance to private landowners to expand or develop markets for forestry products, to respond to environmental or social changes in forest management, and promote forest resource sustainability. Increased recreational use of land enrolled in or near forest stewardship programs may benefit the local economy directly and/or in indirect sales.	The USDA Cooperative Forestry Program applies sound sustainable and economic principles to the management of forestry resources. Local economies are also stimulated by recreational visitors and use.	Incremental benefits that would accrue to State recreational opportunities with implementation of EFCRP CPs would not occur; however, restoration efforts would continue under other conservation programs.	EFCRP would provide funding to landowners and State trust lands to clean up and restore forests. This restoration will improve the aesthetics of the region and provide habitat for wildlife. Hunting, fishing, and wildlife watching opportunities would be improved. In addition, access to recreational areas may be improved as a result of the clean-up efforts.

Resource Issues	State and Federal Forestry Management Programs	Ongoing Forestry Practices	EFCRP Alternative A: No Action	EFCRP Alternative B: Preferred
Socioeconomic Resources	Existing State and Federal programs, such as the Economic Action Program, managed by the USFS, provide technical and financial assistance to private landowners to expand or develop markets for forestry products, to respond to environmental or social changes in forest management, and promote forest resource sustainability.	The USDA Cooperative Forestry Program applies sound sustainable and economic principles to the management of forestry resources. Local economies are also stimulated by recreational visitors and use.	State and Federal forestry programs would continue to provide economic benefits to private landowners through programs directing forest management.	Through EFCRP, additional funds would be available to landowners to implement CPs. Rental rates would be available to producers for forestland that qualifies for assistance as determined by percent loss and the value of the land under the environmental index. Restoration of damaged forests may enhance recreational value of the land and could increase local income derived from recreation use.
Environmental Justice	No cumulative impacts have been identified.	No cumulative impacts have been identified.	No cumulative impacts have been identified.	No cumulative impacts have been identified.

6.0 MITIGATION MEASURES

6.1 Introduction

Avoiding or minimizing the possible impacts to natural resources stemming from the implementation of EFCRP CPs is a key component to the success of EFCRP.

Before EFCRP is implemented, a site specific environmental review must be conducted on all lands as a condition of contract approval. As a part of the site specific environmental review process, coordination of specific actions and consultation with the appropriate agencies would be conducted to reduce or eliminate the incidence or risk to the specific resources identified in the environmental review.

6.2 Roles and Responsibilities

FSA, USDA – FSA would oversee proper implementation of EFCRP and coordination with land owners to minimize impacts on natural resources stemming from the implementation of CPs on a site specific basis. FSA would also conduct consultation for ESA, cultural resources, and wetlands, as needed.

Natural Resources Conservation Service, USDA –NRCS would assist landowners and provide technical information in the implementation of CPs. Works onsite to provide FSA with technical assistance which includes assistance in completing the site specific environmental reviews.

U.S. Fish and Wildlife Service, DOI – The FWS is responsible for the administration of the Endangered Species Act and ensuring that Federal actions do not jeopardize or destroy threatened or endangered species.

State Historic Preservation Offices (SHPO) – The SHPOs would consult and review actions potentially affecting impacting historic properties in each State.

Tribal Historic Preservation Offices (THPO) – For Tribes that have been approved to assume national program responsibilities on tribal lands, pursuant to Section 101(d) of the National Historic Preservation Act, THPOs would review Federal agency undertakings that may impact or be on Tribal land, pursuant to Section 106 of the NHPA.

6.3 Mitigation Matrix

Each conservation plan may include requirements for CP implementation that would restrict activities in time, space, or type. Table 6-1 shows some of the potential mitigation that may be required as part of the conservation plans for CP implementation.

Table 6.1. Summary of potential mitigation requirements for conservation plans.

Resource	Potential Mitigation Requirement
Protected Species	Minimize ground disturbing activities and debris removal; plant specific tree species or plant ground cover in between trees that maximize wildlife habitat. A site specific consultation with the FWS prior to CP implementation will minimize the negative impacts of any potentially ground disturbing activities.
Cultural Resources	Consultation with SHPO or THPO, if applicable, to evaluate potential to impact cultural resources. Some locations may have limited activity.

Resource	Potential Mitigation Requirement
Water Resources including, Surface Water, Groundwater, and Sole Source Aquifers	BMPs will be used to mitigate any adverse impacts of implementing specific CPs. Each EFCRP State has developed guidelines regarding BMP implementation related to silviculture. Many States also regulate and monitor the use of BMPs.
Wetlands	Any activities in wetland must be in compliance with section 404 of the CWA, EO 11990, and Food Security Act. Prior to any disturbance in wetlands the appropriate permits will be obtained.
Floodplains	In accordance with EO 11988, the CPs implemented under EFCRP would not be considered unwise actions or uses. There are no other practicable alternatives to locating the CPs within floodplains and all practical measures will be taken by FSA to minimize harm to the floodplains. Based on these factors, FSA will not complete public notice for each EFCRP contract that includes CPs within floodplains unless the CPs affect a floodway or are located in a coastal high hazard area.
Air Quality	Activities will be conducted in accordance with each State's SIP and with appropriate ordinances and regulations related to prescribed burning. Each of the EFCRP States allow private landowners to use prescribed burning as a forestry management option. Each State has specific ordinances that regulate prescribed burning on private forestland.

7.0 LIST OF PREPARERS

Table 7.1. Individuals who prepared this PEA, with their area of expertise, education, and experience.

Name	Area of Expertise	Education	Experience
Kelson Forsgren The Shipley Group	Project Manager; Public Involvement	M.S., Technical Communication	12 years
Danielle Healey The Shipley Group	Technical Writer; Wildlife, Vegetation, T&E	M.S. Ecology; B.A. Biology	2 years
Suzy Hill The Shipley Group	Technical Writer; Surface Water, Air Quality	M.A. Science Education; B.S. Watershed Science	3 years
Kim Richardson Barker The Shipley Group	Technical Writer; Socioeconomics, Recreation	M.S. Range Science; B.S. Environmental Studies	3 years
Barry Myers The Shipley Group	Technical Writer; Soils, Groundwater, Sole Source Aquifers	M.S. Hydrogeology; B.S. Hydrogeology	3 years
Mike Donahoo The Shipley Group	Technical Reviewer	B.S. Biology	30 years
Paul Rusanowski The Shipley Group	Technical Reviewer	Ph.D. Plant Science; M.S. Botany; B.S. Biology	30 years
Joseph Schomaker Schomaker Natural Resources Consulting	Cultural Resources; Tribal Relations; Traditional Cultural Properties	Certified archaeologist	25 years

Table 7.2. Individuals who reviewed this PEA for Farm Service Agency, with their area of expertise, education, and experience.

Name	Area of Expertise	Education	Experience
James Fortner	Environmental Compliance Manager	B.S., Agriculture and Extension Education	21 years
Kathleen Schamel	Federal Preservation Officer	B.A.; M.A., Anthropology	22 years
Matthew Ponish	Agricultural Program Technology Specialist	B.S. Wildlife/Fisheries Biology & Management	7 Years
Skip Hyberg	Cost Benefit Analysis		
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8.0 PERSONS AND AGENCIES CONTACTED

Table 8.1. Persons and Agencies Contacted.

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Florida Chapter		222 S. Westmonte Drive Suite 300 Altamonte Springs, FL 32714
Alabama Chapter		2100 1st Avenue North, Suite 500 Birmingham, AL 35203 Phone:
North Carolina	Doug MacKinnon	4705 University Drive, Suite 290 Durham, NC 27707
Texas Chapter	Lynn Mc Bride	P. O. Box 1440 711 Navarro San Antonio, TX 78295-1440
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	J. Voelker (govt. affairs)	1301 Pennsylvania Avenue, NW, Suite 402 Washington, D.C. 20004-1763
Southern Environmental Law Center	NC: Lark Hayes	200 West Franklin St., Suite 330 Chapel Hill, NC 27516-2559
	AL	The Candler Building 127 Peachtree St., Suite 605 Atlanta, GA 30303-1840

Agency	Name	Address
Sustainable Agriculture Coalition	Pam Browning, Policy Coordinator	110 Maryland Ave, NE, Suite 306 Washington, DC 20002
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Wildlife Management Institute	Len H. Carpenter (TX)	4015 Cheney Drive Fort Collins, Colorado 80526
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Farm Bureau	Steve Pringle	Texas
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Agency	Name	Address
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9.0 GLOSSARY

Aquifer: A geologic formation that is water bearing. A geological formation or structure that stores and/or transmits water, such as to wells and springs. Use of the term is usually restricted to those waterbearing formations capable of yielding water in sufficient quantity to constitute a usable supply for people's uses.

Best Management Practices: Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from non-point sources (EPA 2006f).

Biological Assessment: An analysis conducted for major Federal construction projects requiring an environmental impact statement, in accordance with legal requirements under section 7 of the Endangered Species Act. 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 (FSM 2670.5.2).

Broadcast burning: A type of prescribed burning where contiguous blocks are burned at the same time. The goal is to have fire burn across most or all of the surface within the block

Canopy: The more or less continuous cover of branches and foliage formed collectively by the crown of adjacent trees and other woody growth.

Categorical Exclusions: An agency-defined category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by the agency pursuant to NEPA. Projects qualifying for a "categorical exclusion" are not required to undergo additional NEPA analysis or documentation.

Channel morphology: The physical configuration of a stream channel: width, depth, shape, etc.

Conservation Practices: A series of NRCS approved agricultural practices and management techniques designed to control nonpoint pollution.

Council on Environmental Quality: An advisory council to the President established by the National Environmental Policy Act of 1969. It reviews Federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters.

Critical habitat: Under the Endangered Species Act: (1) The specific areas within the geographic area occupied by a federally listed species on which physical and biological features are found that are essential to the conservation of the species and that may require special management or protection; and (2) The specific areas outside the geographic area occupied by a listed species that are determined to be essential for the conservation of the species.

Cumulative Effect: The incremental environmental impact or effect of the proposed action, together with impacts of past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time (USFWS 2006).

Direct effects: Effects that are caused by an action and occur at the same place and time.

Ecosystem: A complete, interacting system of organisms considered together with their environment (for example; a marsh, a watershed, or a lake).

Endemic: Naturally occurring in a particular location.

Environmental Assessment: A concise public document, prepared in compliance with NEPA, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient

evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact (FONSI).

Environmental Impact Statement: A detailed written statement required by section 102(2)(C) of NEPA, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short term uses of the environment versus the maintenance and enhancement of long term productivity, and any irreversible and irretrievable commitment of resources. A programmatic EIS or EA: covers general matters in broader terms and analyzes conceptual or planning alternatives. In such cases, at least one more level of site-specific NEPA analysis is necessary before implementation can proceed.

Erosion: A geomorphic process that describes the wearing away of the land surface by wind, water, ice or other geologic agents. Erosion occurs naturally from weather or runoff but is often intensified by human land use practices.

Exotic species: A species occurring in an area outside of its historically known natural range as a result of intentional or accidental dispersal by human activities. Also known as an introduced species.

Fire risk: The probability of an ignition occurring as determined from historical fire record data.

Fire suppression: All work and activities connected with fire-extinguishing operations, beginning with discovery and continuing until the fire is completely extinguished.

Firebreak: A natural or constructed barrier to stop or check fires that may occur, or to provide a control line from which to work.

Floodplain: The land bordering a stream, built up of sediments from overflow of the stream and subject to inundation when the stream is at flood stage.

Geographic Information System: A type of computer program used to store and analyze geographic data.

Groundwater: The supply of fresh water found beneath the Earth's surface, usually in aquifers, which supply wells and springs. Because ground water is a major source of drinking water, there is growing concern over contamination from leaching agricultural or industrial pollutants or leaking underground storage tanks.

Hardwoods: Broadleaf trees or shrubs.

Herbicide: A chemical compounds used to kill undesirable vegetation.

Hydric soils: Soil that, in its undrained state, is flooded long enough during a growing season to develop anaerobic (lacking air – saturated) conditions that support the growth and regeneration of hydrophytic vegetation.

Hydrophytic vegetation: Plants specialized to grow in water or in soil too waterlogged for most plants to survive.

Indirect effects: Secondary effects which occur in locations other than the initial action or significantly later in time.

Infiltration: The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Intermediate: Trees that form an intermediate layer beneath the dominant tree canopy but above the understory.

Landing: Any place where round timber is assembled for further transport.

Late succession: Ecosystems distinguished by old trees and related structural features.

Listed species: Under the Endangered Species Act, or similar State statute, those species officially designated as threatened or endangered through all or a significant portion of their range. See also: Threatened and endangered species.

Management area: An area for which a single set of management prescriptions is developed and applied.

Mitigation: Avoiding or minimizing impacts by limiting the degree or magnitude of the action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact by preservation and maintenance operations during the life of the action.

Monitoring: The periodic evaluation on a sample basis of management practices to determine how well objectives have been met and how closely management standards have been applied.

National Natural Landmarks: Outstanding examples of the Nation's natural history representing both public and private ownership.

Nesting habitat: Habitats used by wildlife (birds) for nesting.

Non-Industrial Private Forestland: Land with existing tree cover, or which is suitable for growing trees, that is owned by an individual, group, association, corporation, Indian Tribe, other legal private entity, or person who receives concurrence from the landowner for practice implementation and who holds a lease on the land for a minimum of 10 years or State school trust means, as determined by the Deputy Administrator.

Nonpoint source (pollution): Cause of water pollution that is not associated with point (fixed) sources. Nonpoint sources include runoff from agricultural, urban, construction, and mining sites, as well as septic systems and landfills.

Noxious weeds: A plant specified by law as being especially undesirable, troublesome, and/or difficult to control.

Nutrients: Chemical compounds in a usable form and have nutritive value for plants and/or animals.

Prescribed fire: Any fire ignited by management actions to meet specific objectives. An approved written prescribed fire plan must exist and NEPA requirements must be met before ignition. This term replaces management ignited prescribed fire.

Programmatic Environmental Assessment: An Environmental Statement involving a broad Federal action. Examples include 1) actions occurring in the same general geographical location; and 2) actions which have relevant similarities, such as common timing, impacts, alternatives, methods of implementation, media, or subject matter.

Recharging groundwater: Refers to water entering and replenishing an underground aquifer through faults, fractures, or direct absorption.

Riparian area: A transition between the aquatic ecosystem and the adjacent upland terrestrial ecosystem. It is identified by soil characteristics and by distinctive vegetative communities that require free or unbounded water.

Riparian: Refers to a stream and all the vegetation on its banks.

Rural: The Rural class setting is characterized by moderate to high levels of use on developed sites, roads, trails, and water surfaces. Contact with other users is lower away from these areas. Controls such as signs and barriers exist but to a lesser degree than in the urban setting and they tend to be in harmony with the man-made environment. (Examples of the Urban and Rural settings include cities, villages, farms, ranches, parks, and campgrounds near heavily populated areas).

Sawtimber: Trees suitable in size and quality for producing logs that can be processed into lumber; generally those with a diameter of 8 inches or greater.

Scoping: An early and open process designed to identify the environmental issues and significant factors to be addressed in the analysis process.

Sensitive species: Those species identified by the Regional Forester for which population viability is a concern as evidenced by significant current or predicted downward trends in (a) population numbers or density, or (b) habitat capability that would reduce a species' existing distribution.

Siltation: The deposition of finely divided soil and rock particles upon the bottom of stream and river beds and reservoirs.

Silviculture: A scientific discipline devoted to management of forest resources.

Slash: The residue left on the ground after felling and other silvicultural operations and/or accumulating there as a result of storm, fire, girdling, or poisoning trees.

Snag: A standing dead tree usually greater than five feet in height and six inches in diameter at breast height.

Temporary roads: Those roads needed only for the purchaser or permittee's use. The Forest Service and the purchaser or permittee must agree to the location and clearing widths. Temporary roads are used for a single, short-term use, e.g., to haul timber from landings to Forest Development Roads, access to build water developments, etc. Temporary roads must be obliterated as part of a timber sale contract.

Threatened and endangered species: Under the Endangered Species Act, those species officially designated by the National Marine Fisheries Service or U.S. Fish and Wildlife Service as being in danger of extinction (i.e., endangered) or likely to become endangered (i.e., threatened) within the foreseeable future through all or a significant portion of their range. Threatened and endangered species are protected by law. See also: Listed species.

Traditional Cultural Properties: Places that are eligible for inclusion in the National Register of Historic Places because of their "association with cultural practices or beliefs of a living community that are rooted in that community's history and are important in maintaining the continuing cultural identity of the community."

Watershed: 1.) Describes a cohesive, hydrologically-linked landscape that is drained by a waterway leading to a lake or reservoir. 2.) A geographic area delineated by its peaks and ridgelines, which divide surface water flow into two or more directions.

Wetland: 1. A transitional area between aquatic and terrestrial ecosystems that is inundated or saturated for periods long enough to produce hydric soils and support hydrophytic vegetation. 2. A seasonally flooded basin or flat.

Wilderness: An area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions.

Windthrow: Trees uprooted by wind, or the phenomenon that causes such uprooting to occur.

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