L O U I S I A N A

Statewide Forest Resource Assessment and Strategy

A Comprehensive Analysis of Forest-Related Conditions, Trends, Threats, Opportunities, and Management Strategies

July 2010

Louisiana Statewide Forest Resource Assessment and Strategy:
A comprehensive analysis of forest-related conditions, trends, threats, opportunities, and management strategies.

July 2010

Produced by
Louisiana Office of Forestry, LDAF
5825 Florida Blvd, Suite 1068
Baton Rouge, Louisiana
(225) 925-4500

Acknowledgements:
This document was produced with contributions from many program leaders of the Louisiana Office of Forestry. Gus Rowland and Epney Brasher compiled and edited the document. The Concise History of Louisiana Forestry, the Condition and Trends, the Executive Summary, the section on Storms, the GIS Section Report, the Summary of Office of Forestry Re-districting, and The Louisiana Process: Coordination and Incorporation of Materials from other Agencies sections were written by Gus Rowland. The Summary of Goals, Objectives, Strategies, and Resources Needed was written by Gus Rowland and Epney Brasher. Bret Lane and Don Smith assisted in writing the wildfire section. Carlton Cobb assisted in writing the Forest Health section focused on insects and disease. Mike Thomas contributed in writing the Hardwood Regeneration portion of the assessment. Michael Countess, of the Southern Group of State Foresters, provided significant assistance in organizing the assessment and contributed in writing the Renewable Energy, Climate Adaptation & Climate Offsets section and the Management Environment section. Jeremy Coffey contributed in writing the Aviation Branch Report. Gus Rowland conducted all GIS analyses and mapping, except where noted our otherwise attributed. The Assessment Survey questions were developed by Epney Brasher, Don Smith, Mike Thomas, and Malhon Doucet. The cover was developed by Gus Rowland of the Louisiana Office of Forestry. Cover photos: Indian Creek Reservoir and University Lake cypress by Gus Rowland; Hoy Road fire by Charlie Greer.

Abbreviations Used:
AON Assessment of Need
BCLR Bald Cypress Leafroller
CCC Civilian Conservation Corps
CRP Conservation Reserve Program
CWPP Community Wildfire Protection Plan
DASM Digital Aerial Sketchmapper
EAB Emerald Ash Borer
EPA Environmental Protection Agency
FEPP Federal Excess Property Program
FHP Forest Health Protection
FHTET Forest Health Technology Enterprise Team
FIA Forest Inventory and Analysis
FLEP Forest Land Enhancement Program
FLP Forest Legacy Program
FPP Forest Productivity Program
FOA Fire Occurrence Area
FR Fusiform Rust
FTC Forest Tent Caterpillar
GIS Geographic Information Systems
LDAF Louisiana Department of Agriculture and Forestry
LDWF Louisiana Department of Wildlife and Fisheries
LFA Louisiana Forestry Association
LFC Louisiana Forestry Commission
LGS Louisiana Geological Survey
LOSCO Louisiana Oil Spill Coordinator's Office
LSU Louisiana State University
MAV Mississippi Alluvial Valley
NLCD National Land Cover Database
NRCS Natural Resource Conservation Service
NWI National Wetlands Inventory
OOF Office of Forestry (Louisiana Office of Forestry)
SEBSRP Southeast Biomass State and Regional Partnership
SPB Southern Pine Beetle
SOD Sudden Oak Death
SSEB Southern States Energy Board
STATSGO State Geographic Dataset
SWRA Southern Wildfire Risk Assessment
U.S. United States (of America)
USDA United States Department of Agriculture
USGS United States Geological Survey
USFS United States Forest Service
VFA Volunteer Fire Assistance
WAP Wildlife Action Plan
WUI Wildland Urban Interface (and Intermix)

Table of Contents

Table of Contents continued:

Appendix

Glossary

Acre - An area of land measuring 43,560 square feet. An acre can be measured as 1 chain × 10 chains (1 chain = 66 feet)
Best management practices (BMPs) - techniques and methods used to prevent sedimented runoff, especially in agricultural and forested areas.
Biodiversity - biological diversity in an environment as indicated by numbers of different species of plants and animals.
Carbon sequestration – methods and techniques used to store carbon dioxide within and environment or ecosystem
Clear-cutting - the process of removing all trees in a stand
Crown - the head of foliage of a tree or shrub
Ecosystem - the complex of a community of organisms and its environment functioning as an ecological unit
Environment - the complex of physical, chemical, and biotic factors (as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival
Erosion - to wear away by the action of water, wind, or glacial ice
Exotic – introduced from another country **:** not native to the place where found
Forest - a dense growth of trees and underbrush covering a large tract
Forest diversity - the presence of multiple types of trees and biota within a forest
Fragmentation - to break up or apart into fragments or smaller parts
Hardwoods - the wood of an angiospermous tree as distinguished from that of a coniferous tree
Invasive species – a non-native species found within an environment which may have a detrimental impact
Log - a usually bulky piece or length of a cut or fallen tree; *especially* **:** a length of a tree trunk ready for sawing and typically 8ft in length.
Native species - A species that is a part of the original biota or wildlife in a designated place
Parcelization - a process by which larger tracts of land are divided into smaller tracts between additional landowners
Prescribed fire - the treatment of a defined tract of land with a predetermined extent of fire to encourage positive growth characteristics in some types of commercial trees and further reduce the impact of competitive biota in the understory
Regeneration - a renewal of trees in a tract following harvest or absence.
Runoff - the portion of precipitation on land that ultimately reaches streams often with dissolved or suspended material.
Sedimentation - the action or process of forming or depositing material that settles out from water, wind, or glaciers
Sustainable forest management – the active management of forest resources meant to promote diversity, productivity, and stewardship of the forest within the equilibrium of a changing rural environment over time
Thinning - the process of removing a portion of trees to improve the growth of the remaining trees in a tract; typically performed in commercial timber tracts
Timber stand - an assemblage of trees
Watershed - a region or area bounded peripherally by a divide and draining ultimately to a particular watercourse or body of water
Wetland - land or areas (as marshes or swamps) that are covered often intermittently with shallow water or have soil saturated with moisture
Wildland - land that is uncultivated or unfit for cultivation
Wildfires - a sweeping and destructive conflagration especially in a wilderness or a rural area

List of Figures

List of Maps

maps continued:

Executive Summary

The state of Louisiana is blessed with abundant natural resources. Commerce stemming from the State's timber assets is second only to State's petroleum and natural gas industry and provides thousands of jobs within the state's top renewable industry. Abundant water, a sub-tropical climate, and high-quality soils form the foundation of the state's ability to generate both excellent pine and hardwood stands. Over the past three-quarters of a century, it has been the Office of Forestry which has led the way in providing landowner assistance and protection to these assets. But in recent years, as relentless national and statewide financial despair have diffused to every facet of the economy, the ability of the Office of Forestry to continue to provide the same consistently high level of service to the public has become threatened. It is within this recent and pervasive atmosphere of fiscal uncertainty that the Office provides a premiere assessment of our issues, challenges, capacity, and natural richness. As a State, Louisiana is proud, as a people, we are energetic, in our work ethic, we are tireless, and in our devotion to a way of life, we are unyielding, determined.

This document, the first of what may become a perennial re-assessment of the conditions and goals for forestry in Louisiana, has been put in motion in response to innovations in the U.S. Farm Bill focused on dispersing what limited funds are available to the states and forestry initiatives most in need or demonstrating the greatest potential. In accordance with this mandate and in opportune harmony with what has been and will continue to be three of the underlying duties of the Office of Forestry, this document will incorporate three national priorities, as designated by the Farm Bill. Those being:

- Conserving working forest landscapes
- Protecting forests from threats
- Enhancing public benefits from trees and forests

In this document and in the process by which we assess our past, present, and future, specific priorities and strategies for success, some shared by our neighboring states and others unique to Louisiana , will be expressed. Our assessment will attempt to designate our State's regions that demonstrate the greatest concern or opportunity and portray how the Office has analyzed the threats at hand and allocated our resources to best serve the citizens and landowners of Louisiana. Through this process, our Office will aim

to depict our history, how we've grown through the decades, and the fresh, yet traditional approaches we are utilizing to confront the demands on our Office, our state, and our forest-related industries into the future.

An account of these primary issues is to follow:

Issue 1: **Wildfire & Protection**

Wildfire is a prevalent risk to Louisiana's forests. This section will discuss the history of wildfire protection by the Office of Forestry, how the office of has evolved to confront the risks for battling wildfire, and what regions of the state annually display the highest risk of fire.

Issue 2: **Longleaf Regeneration**

With a conducive climate and suitable soils, longleaf pine, native to Louisiana, is making a comeback in some parts of the state. This section will discuss longleaf pine, the challenges in promoting this pine variety, and where and why longleaf develops best.

Issue 3: **Cogongrass**

A vigorous invasive, cogongrass has aggressively begun to overrun the South. This section will discuss the vectors that have promoted its spread, the threats that it presents, and the steps that Louisiana Forestry is taking to discourage its march across the state.

Issue 4: **Urban Sprawl and WUI (Wildland Urban Interface)**

The population of Louisiana has been in flux through recent years. Following four major hurricanes in the last five years, the exodus and return of the state's population has led to increased movement out of urban areas into the rural frontier. Without question, the portion of the state most impacted lies north, across Lake Pontchartrain, from New Orleans. This section will discuss this impact and show the regions of the state that are being impacted by interface and intermix.

Issue 5: **Insects, Disease, and Forest Health**

Blessed with an ecosystem that is productive in forestry, the same elements in Louisiana promote threats to the forests. This section will discuss insects and disease that have historically plagued forest health and the steps to which the Office of Forestry has gone to detect and prevent these risks.

Issue 6: **Cypress-Tupelo Management**

The long-term and productive management of cypress and tupelo stands by landowners in south Louisiana has been a contentious issue in recent years. While it is consistently the mission of the Office of Forestry to support the independent landowner in keeping forested lands productive and healthy, there has been a growing movement among private interests to prevent landowners from harvesting timber. This section will discuss this issue, outline the areas of the state involved, and present the positions of those for and opposed to traditional silviculture in theses bottomland hardwood areas.

Issue 7: **Gulf Storms and Climate**

Positioned in the center of the Gulf of Mexico, Louisiana has suffered some of the most devastating storms in US history. This section will discuss the aftermath of these storms, including the devastation caused by hurricanes such as Katrina, Rita, Ike, and Gustav, in recent years on Louisiana's forests and the value of the trees left standing.

Issue 8: **Hardwood Regeneration**

The regeneration of hardwood stands, especially in areas of the state that lend themselves to other forms of agriculture, has been an ongoing effort for the Office of Forestry. This section will discuss where the efforts are taking place and what steps are being incorporated to promote this effort.

Concise History of Louisiana Forestry

The development of forestry in Louisiana has ebbed and flowed like the state's many rivers and bayous from humble beginnings, the first mill opening in 1716, to a major, renewable industry- second only to mineral and petroleum exploration in Louisiana. Initially, the timber assets of Louisiana were far to remote for significant harvest. It wasn't until rail lines began to cut across the state in the late nineteenth century that major industry grew and mills began to pop up in the landscape. The practice of forestry itself did not follow the early harvesting of timber. Until the 1800s, Louisiana held millions of acres of untouched longleaf, shortleaf, and bottomland hardwood, rivaled only by west coast potential in its breadth and prospect. The richness of timber led to a "cut out and get out" approach that eventually saw much of the early, assessable longleaf stands quickly depleted (3,5) . Yet as the United States began to develop a renewable approach to the timber industry, characterized by the beginnings of forestry programs at Yale and Biltmore, Louisiana quickly followed by establishing early laws to help safeguard the

(2)

Figure 1: Henry Hardtner (right), Father of Southern Forestry

industry from arson and promote education and regeneration of the harvested timber. In fact, in 1904, a year before the US Forest Service was formed, Louisiana had already begun to focus on protecting and

promoting this new, and lucrative state industry by passing Act 113, which established the Department of Forestry, to be charged with the "preservation of the forests ...suppression and prevention of forest fire... reforesting of denuded forest land...for the proper instruction relative to forestry... [and] to provide penalties for the violation of this act and for other purposes." (7). By 1914, an industry that had barely existed two decades before had become the leading lumber producer in the country (8).

In 1917, the first Louisiana State Forester, R.D. Forbes, was named. That same year, students from his alma mater, Yale School of Forestry, began to travel to Louisiana for a three month stint of field training in Urania. Urania was the home Henry Hardtner, the Father of Southern Forestry. Hardtner, who would become the head of the Conservation Commission of Natural Resources and a successful Louisiana state legislator, had recognized early the benefits of reforestation and proactive forest management techniques (3,1,5). Hardtner's endeavors were among the first to utilize reforestation and sustained-yield measurement and would form an enduring educational experience and relationship with the Forest Service and the Yale School of Forestry (6).

It was also during this burgeoning period for forestry that Louisiana's Alexander State Forest was initially purchased and expanded. Beginning in 1923 with the initial purchase of 2,068 acres near Woodworth, south of Alexandria, the Alexander State Forest would eventually expand to over 8,000 acres across the next fifteen year. Management of the state forest has always been a source of pride for the Office of Forestry, evidenced by the great deal of early work directed by the Office and performed by the Civilian Conservation Corps throughout the 1930s. In fact, ground breaking use of aerial surveys to facilitate forest management, as documented by State Forester N.D. Canterbury in 1929, continues to be practices through the use of GIS technology for the current supervision of the forest's resources (3).

Through the next several decades, Louisiana developed its own forestry programs and curriculum, first with the Louisiana State University School of Forestry- founded in 1926, and later a second forestry school at Louisiana Tech opened in 1946 (4). These schools educated a local crop of foresters who would begin to steward forestry through the twentieth century. Yet as the current of forestry knowledge and practice would develop, the course of the state's official forestry office would meander through a succession of agencies before finally being paired with agriculture.

Figure 2: R. D. Forbes, Louisiana's First State Forester

Initially a part of the Department of Natural Resources' Department of Conservation, along with Wildlife and Fisheries and Minerals, the Louisiana Forestry Commission was legislatively separated in 1944 in a move that would provide buffer from state politics and place a board of public and private timber interests at the helm of Forestry's future. The Louisiana Forestry Commission would foster the growth of forestry over the next four decades, providing for improvements in forest protection and wildfire detection, improved management techniques, nursery expansions, and continued wildfire and forest education (3,5). In the mid-1980s, in a move that would bring considerable resources to the joint department, the Louisiana Forestry Commission saw the independent authority of forestry legislatively merge with the Louisiana Department of Agriculture. The newly formed Louisiana Department of Agriculture and Forestry, headed by a publically elected Commissioner, would begin to share duties in the structuring of forestry's future.

To the present, the Louisiana Office of Forestry has weathered political and financial torrents, but remains progressive in its attempts to provide the best resources available in its continuing mission to protect the people of Louisiana from wildfire and to provide the best programs and services available to the landowner and private citizen. Annually, the Office oversees millions of dollars of cost-share funding that provides

critical assets to the landowner. Programs such as FPP (Forest Productivity Program), FLEP (Forest Land Enhancement Program), and CRP (Conservation Reserve Program), as well as non-cost programs such as the Forest Stewardship Program, provide a significant impact in the sustainability of Louisiana's forests and forest related industries. Further, the Office has promoted specialization in law enforcement, aerial wildfire detection, and GIS/computer aided techniques, to support and improve the core principles of forestry that have been a part of Louisiana's tradition from its very beginnings.

Figure 3:

Louisiana State Foresters	Term
R. D. Forbes	1918-1921
V. H. Sonderegger	1921-1925
W. R. Hine	1925-1929
N. D. Canterbury	1929
V. H. Sonderegger	1929-1940
M. E. Brashears	1940-1942
Massey H. Anderson	1942-1947
James E. Mixon	1947-1976
Donald L. McFatter	1976-1984
Michael P. Mety	1984-1987
Carlton S. Hurst	1988
Paul D. Frey	1989-2008
Wade Dubea	2008-Present

References and Citations:

1 Barnett, James. 2007. *Henry Hardtner, 'Father of Southern Forestry' led movement for reforestation.* http://www.thepineywoods.com/HardtnerJun07.htm

2 Barnett, James. 2008. *Carl A. Schenck and the Biltmore Forestry School, Asheville, NC.* http://www.thepineywoods.com/CSchenckAp08.htm

3 Burns, Anna C. 1968. A History of the Louisiana Forestry Commission. Natchitoches, Louisiana: Northwestern State College.

4 Burns, Paul. 2008. *Chronicle of LSU School of Renewable Natural Resources 1911-2008.* http://www.rnr.lsu.edu/Alumni/rnrchronical.htm

5 Kerr, Ed. 1958. History of Forestry in Louisiana. Baton Rouge, Louisiana: Louisiana Forestry Commission.

6 NC State Echo Project. 2005. *History of Forestry.* http://www.lib.ncsu.edu/specialcollections/forestry/background.html

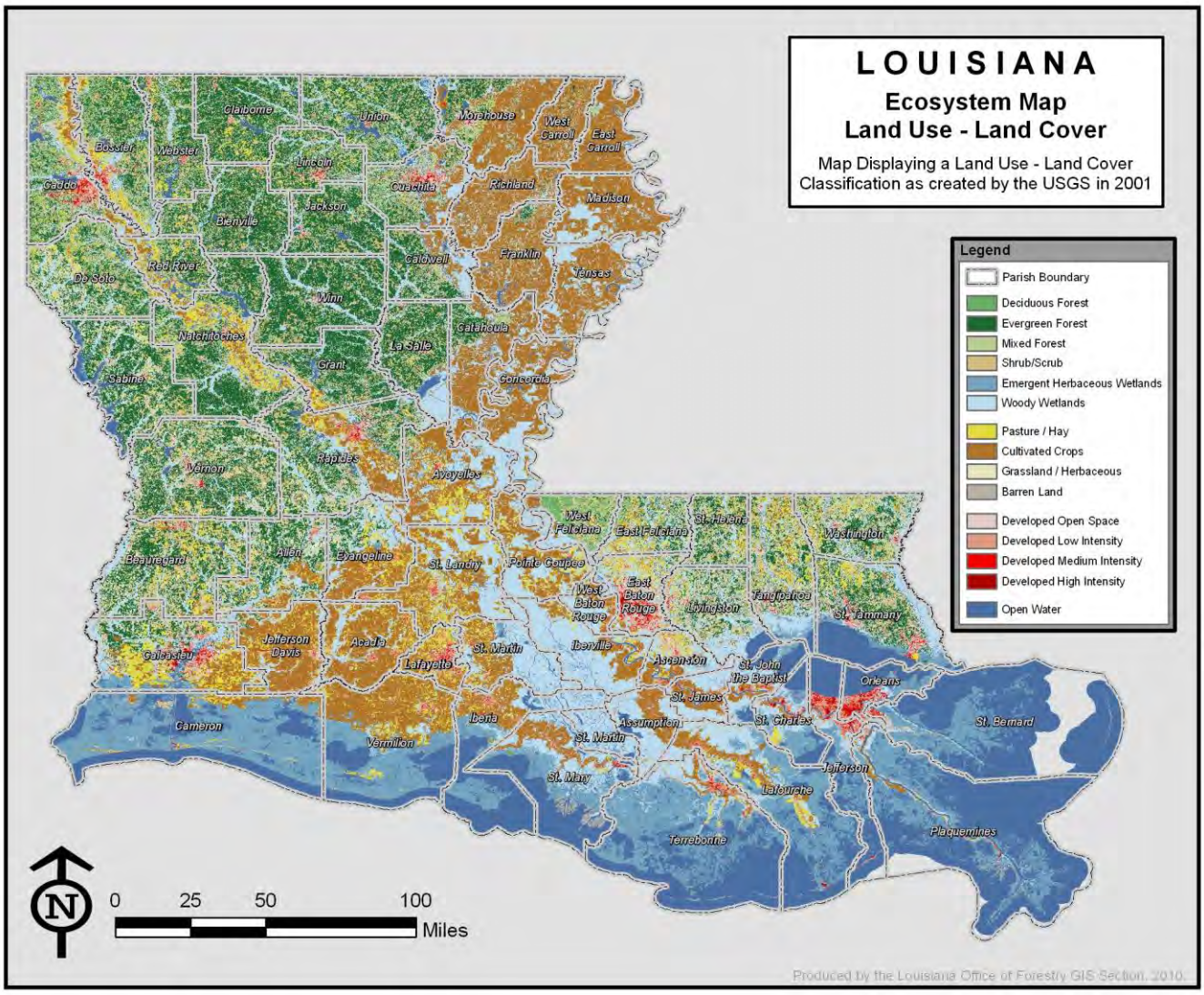
7 State of Louisiana. 1904. *Acts of the General Assembly*. Act 113.

8 Steer, Henry B. 1948. Lumber Production in the United States, 1799-1946. Washington, D.C.: US Government Printing Office. As cited in Burn, 1968: pg.7.

Office of Forestry Patch from the LDNR era.

Conditions and Trends

Louisiana Land Cover Classifications **Map 1**



(7)

Recent land use classifications of Louisiana bear out that the state is essentially rural and predominately composed of agricultural and forested lands, although water, be it off shore or inland, is abundant. This leads to an observable competition between crops and timber, especially in Louisiana's alluvial plane region along the Mississippi River.

The state has also begun to observe a significant urban-to-rural movement of its population, especially in the Florida Parishes north of New Orleans- even without a spike in population. This phenomenon can be

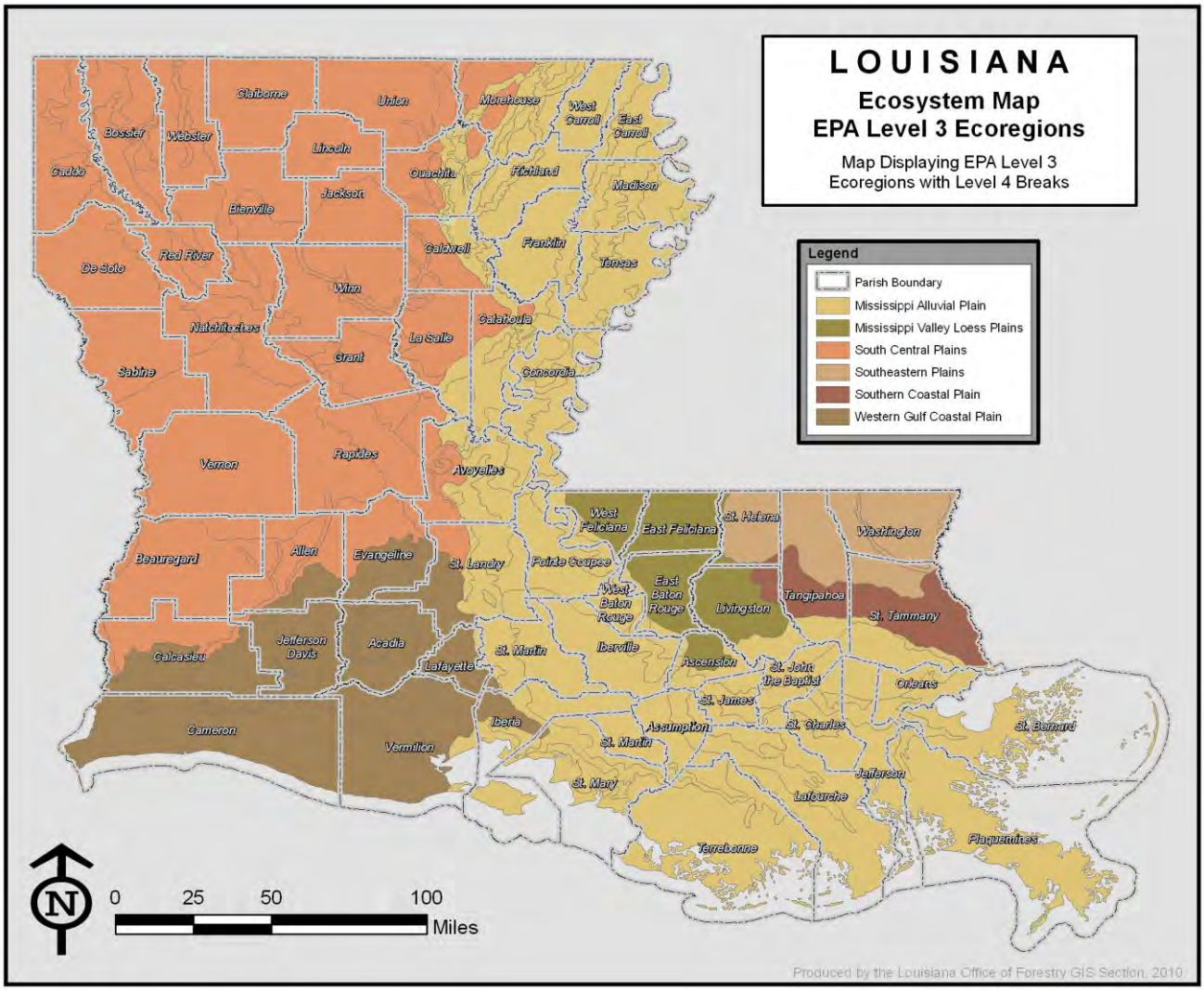
correlated with a flight from New Orleans, based in large part on its proximity to the Gulf and its inherent risk of future hurricane-based disasters.

Figure 4: NLCD Land Cover Statistics

Land Cover Classes - Units in Square Miles	Louisiana
Water	3484
Perennial Ice Snow	0
Developed, Low Intensity	652
Developed, High Intensity	137
Developed, Med Intensity	351
Bare Rock	42
Quarries/Mines	24
Transitional	556
Deciduous Forest	4066
Evergreen Forest	7257
Mixed Forest	4527
Shrub/scrubland	0
Orchards/Vineyard	0
Grasslands/Herbaceous	241
Pasture/Hay	3419
Row Crops	6675
Small Grains	2709
Fallow	0
Urban/Recreational Grasses	175
Woody Wetlands	4891
Emergent/Herb Wetlands	7093
State/Region Total	46299

(8)

Louisiana Ecoregions & Associated Wildlife **Map 2**



(1)

The following text is taken from the Louisiana Forest Legacy Program Assessment of Need, written by The Nature Conservancy in September 2007 for the Louisiana Office of Forestry, LDAF (5). The TNC ecoregion naming descriptions and content have been edited to equate to the EPA ecoregions.

Mississippi [River] Alluvial Plain

The Mississippi River Alluvial Plain ecoregion occupies parts of seven states from southern Louisiana to southern Illinois. Within Louisiana, this region encompasses all lands in the historic Mississippi River floodplain. Bottomland hardwood forests and cypress swamps, also referred to as forested wetlands, are the dominant natural plant communities in this region. A key factor in the development and maintenance of these communities is their ability to survive extended periods of flooding.

Over the past two centuries the extent of bottomland hardwood forests in the region has decreased from 24 million acres to only 4.9 million acres. Of equal importance to the actual absolute loss of habitat is the change from an essentially unbroken forest in pre-settlement times to a landscape of some 40,000 distinct patches scattered throughout the floodplain. This high degree of fragmentation has had dramatic effects on many species including Louisiana black bear and migratory songbirds. The Louisiana black bear, interior least tern, and pallid sturgeon are now listed as threatened or endangered and over 70 species of neotropical migrant songbirds (which are declining significantly as a group) are found in this ecoregion. The future of such well-known animals as Louisiana black bear depends upon successful conservation of the forested wetland ecosystem. Other species not widely recognized, such as freshwater mussels also depend upon protection and restoration of high-quality natural habitats.

Although Louisiana supports about 12% of the nations coastal wetlands, Louisiana marsh loss accounts for over 80% of the nation's total coastal marsh loss. Current data indicate that Louisiana looses an average of 25-30 square miles of coastal marsh each year. Since 1956, nearly 1 million acres of coastal marsh has been lost in Louisiana, most of which has been converted to open water, and an additional 800,000 acres have been converted to other uses such as agriculture or urban development.

Mississippi Valley Loess Plains

This ecoregion ranges from southern Illinois, through much of Mississippi, east to Georgia, and west to Louisiana. Although this region supports only a few species considered at risk from a global perspective, at least 25 state-rare plant species occur in the Tunica Hills of Louisiana, the areas north Baton Rouge, and Mississippi. At least 10 species of plants are known in Louisiana only from the Tunica Hills, including the only known Louisiana locations of wild ginseng and Canada wild ginger. Thirteen state-rare animals are known to occur in the area, including Louisiana black bear, Webster‘s salamander, long-tailed weasel, Coopers Hawk, and Louisiana Waterthrush. This region also supports significant populations of uncommon animals like timber rattlesnakes, and many species of migratory birds, including the Yellow-billed Cuckoo, Wood Thrush and Great-crested Flycatcher, which are apparently declining throughout their range.

South Central Plains

The Louisiana Natural Heritage program estimates that less than 10% of original shortleaf pine-hardwood forests remain today. Shortleaf pine habitats were greatly influenced by periodic fire, which is estimated to have occurred at a frequency of about once every 5 to 15 years in the uplands of this region. Due to fragmentation of landscape, changes in land use and active fire suppression, many sites that were formerly open woodlands with a rich understory and ground layer have undergone significant changes in plant species composition and have often become closed-canopy forests lacking many of the plant species that require a high degree of exposure to sunlight.

Four distinct prairie types are known in this region, including morse clay calcareous prairie, which is considered globally endangered. Unusual upland forests include calcareous forest and western xeric sandhill woodland, the latter considered globally threatened. Thirty species of plants found in this region are considered globally rare, threatened or endangered; ten are found nowhere else in Louisiana. Some of the rare plants include slender blazing star, Texas trillium, Louisiana bluestar, yellow ladies slipper orchid, Arkansas oak, and scarlet catchfly. Twenty-four species of animals found in this region are considered globally rare, threatened or endangered; six are found nowhere else in Louisiana. Some of the rare animals include the pink mucket mussel, several Schoolhouse Springs insects, bluehead shiner, western sand darter, interior least tern, red-cockaded woodpecker, and Bachman‘s sparrow.

Some of the best remaining longleaf pine habitats in the Southeast are to be found in the Louisiana portion of the lower South Central Plain. This ecoregion supports many rare species of plants and animals, only a few found nowhere else. Perhaps the most distinctive rare animal in this ecoregion is the state endemic Louisiana Pearlshell mussel, a threatened species found only in a few small sandy streams in central Louisiana. The best known rare animal in the region is the endangered Red-cockaded Woodpecker, which reaches its greatest abundance in longleaf pine regions through-out the southeast. Additional globally-rare animals associated with longleaf pine, include Bachman‘s Sparrow, Louisiana pine snake, and Kisatchie salamander. The longleaf pine ecosystem is of conservation concern due to excessive habitat loss and the fact that an abundance of species occur exclusively or predominantly in these habitats. Long separated from their eastern counterparts by the Mississippi River Alluvial Plain, longleaf pine habitats of

west Louisiana and east Texas are significantly different in species composition from eastern example of longleaf pine habitats.

Southeastern Plain & Southern Coastal Plain

In the past 30 years, many of the remaining natural longleaf pine and pine-hardwood forests have been converted to pine plantations to maximize timber production. Urban expansion in Livingston and St. Tammany Parishes-among the fastest growing parishes in Louisiana-has been the final straw for much of the remaining longleaf forests. The loss has been so great that the Louisiana Natural Heritage Program contends that the natural habitats in this ecoregion are among the most threatened in Louisiana and the Southeast. For example, the Heritage Program estimates that less than 5% of the original wet longleaf pine forest in this ecoregion remains. Habitat loss, combined with the fact that many eastern species reach the western limit of their range in the Florida Parishes, finds this region supporting more rare, threatened or endangered species of animals and plants than any other Louisiana region. Approximately 35 species of animals and 75 species of plants require conservation attention in this region. Some of the animals considered imperiled include the inflated heelspittter mussel, Gulf of Mexico sturgeon, ringed sawback turtle, gopher tortoise, Red-cockaded Woodpecker and Louisiana black bear, all of which are listed as threatened or endangered in Louisiana.

Some of the globally imperiled plants found in this region are the Louisiana quillwort, bog spicebush and Correll‘s false dragonhead. State rare plants in this region include showy flowers such as the pinewoods lily, pink coreopsis, yellow fringeless orchid and bog flame flower.

Western Gulf Coastal Plain

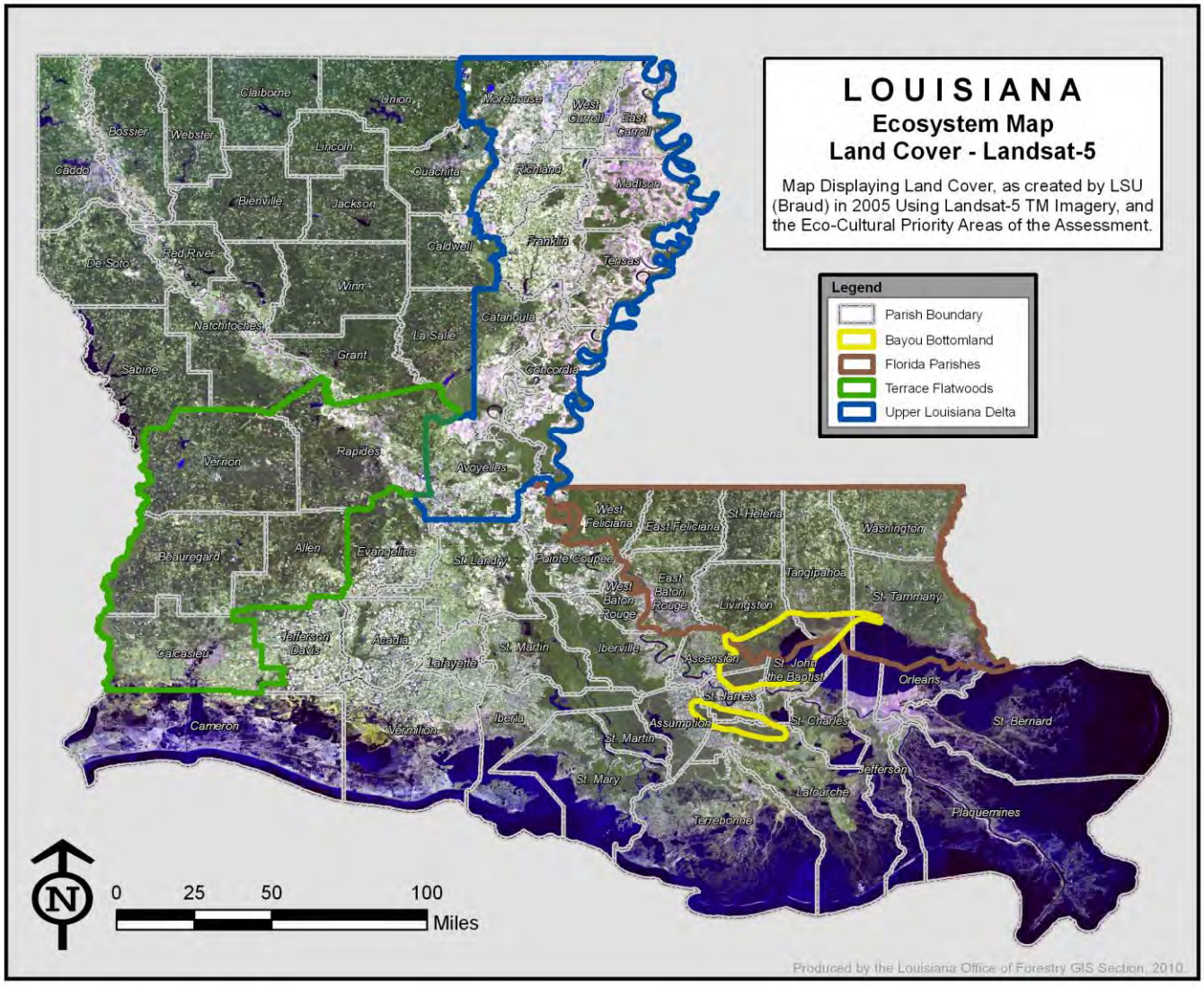
This area includes the Chenier Plain ecosystems and adjacent prairies. This region is part of the larger Gulf Coast Prairies and Marshes Ecoregion, which also includes coastal Texas and northern Tamaulipas, Mexico. In Louisiana, this region covers the western coastline and borders the pinewoods regions of southwestern Louisiana and the expansive forested wetlands in central Louisiana.

Coastal Prairie is one of the rarest habitat types in Louisiana with less than one percent, or about 1,000 acres, of the original 2.5 million acres remaining in a relatively natural condition. Settled in the mid-1800‘s,

the rich productive soils of the coastal prairie proved very suitable for rice production, as well as cattle grazing and other uses. Although the prairies provided a rich resource for many cultures, only small remnants remain of the once vast landscape, mostly in areas that were never plowed, such as railroad rights-of-way or isolated ridges surrounded by marsh.

Species such as prairie chickens, whooping cranes, ornate box turtles and red wolves are no longer found in Louisiana due to the loss of native prairie. In addition, many species of grassland-dependent birds, which as a group are declining in abundance faster than any other bird guild, have experienced significant population declines in Louisiana.

Map 3



(4)

Biomass

A significant portion of this text and the photos are from Biomass Energy Resources in Louisiana: Research Information Sheet 102, produced in November 2006 by the Louisiana Forest Products Development Center, the LSU School of Renewable Natural Resources, the LSU Agricultural Center, and the LSU AgCenter Communications- in cooperation with Louisiana Department of Agriculture and Forestry (2). It has been edited for content.

According to the 2005 FIA reports by the USFS, Louisiana's tree biomass reports to 401,847,750 short tons, with a sampling error of 1.9% (6). Biomass is a general term that refers to all living things (plants and animals), as well as the things derived from them (such as wood, paper, sawdust, grains and straw). ―Biomass energy" or ―bioenergy" refers to energy (such as electricity, boiler fuels and motor fuels) that can be derived from biomass (usually plants, but excluding fossil fuels). The wood burning in your fireplace is biomass energy as is leftover sawdust and sugarcane bagasse burned under a boiler to produce steam in a mill. Because plants use energy from the sun to grow, biomass is a form of stored solar energy. To make it more transportable, biomass can be converted into types of natural gas, gasoline (ethanol) or diesel fuel. Some of these processes are economically feasible and are already on the marketplace. The conversion of biomass energy to transportable forms and electricity is becoming more efficient thanks in part to research funded by the Southeast Biomass State & Regional Partnership (SEBSRP). SEBSRP is administered by the Southern States Energy Board (SSEB) for the U.S. Department of Energy. Funding from SEBSRP for this project was granted to the LSU AgCenter under subgrant SEBSRP-SSEB-2005-LA01-LSUAC-001. Additional sponsorship was provided by the Louisiana Department of Agriculture and Forestry.

Figure 5*: Like most pulp/paper mills, International Paper Company's mill near Pineville, La., burns bark and wood waste in its boilers to generate both heat and electrical power.*

In Louisiana, 46,000 acres are destroyed by wildfire annually. Louisiana's warm, humid climate promotes rapid growth of underbrush and small trees, which burn easily and carry wildfires to bigger trees. Traditionally, foresters use prescribed fires to control the underbrush, thereby preventing devastating fires in the future. Smoke management and liability issues, however, have curtailed burning programs, so alternative ways of controlling underbrush is needed. One alternative is called mechanical forest fuel reduction. Machines chop or remove underbrush and small trees that burn easily, removing the "fuel" that carries a wildfire. This treatment costs hundreds of dollars per acre, but if the removed biomass is utilized for paper and energy, the treatment can be a near break-even operation economically. In effect, foresters, loggers and millers work cooperatively to take the energy that would have been wasted in a forest fire and utilize it at a paper mill boiler for heat and electricity. A handful of these operations are in Louisiana, but many more are needed. Slash (limbs and treetops) leftover from traditional logging operations also could be utilized for biomass energy. Because forest products is one of Louisiana's biggest industries, slash is an untapped resource with great potential.

Figure 6: *These photos show the forest before and after removing biomass that can fuel wildfires. To prevent devastating wildfires, more operations like this are needed, along with more facilities that will utilize this biomass.*

Louisiana has a long-standing tradition of supplying energy for the nation. Recent events have demonstrated that dependence upon only a few sources of energy can be destabilizing to the economies of Louisiana and the nation. By diversifying its sources of energy, Louisiana can stay at the forefront of energy development. This will help assure economic development and continued job growth. Environmental concerns dictate

Figure 7*: Travis Taylor Logging & Chipping, of Winn Parish, removes understory trees and brush on the Kisatchie National Forest and on private timberlands. Here, the loader (right) feeds whole trees into the chipper (left), which blows the chips into the truck behind it. The chips are utilized for paper and energy at a nearby paper mill.*

that something be done with process residues. It is no longer acceptable or legal simply to push waste material into a pile and forget about it. Storm water running off this material may develop problems with dissolved oxygen, robbing fish (and the aquatic life upon which they depend) of life-giving oxygen. Also, landfill space is limited. Research efforts in energy often lead to innovations in nonenergy products. Entrepreneurs often ask, "Can't we develop this material into a product even more valuable than energy?" Thus, innovations in one field lead to innovations in another. Also, ash may be marketed for products such as steel, concrete, absorbents, filters and soil amendments. Much of the world's largest-known petroleum reserves are in politically unstable regions of the globe. Even when petroleum and natural gas prices were low, many companies found biomass energy to be economically feasible. With the current unstable energy prices and supplies, it is critical that our energy sources be diversified. Louisiana is capable of leading the way in biomass utilization, although many other states stand ready to jump to the forefront through business development programs and research funding.

In Louisiana, we are given dominion over many natural resources, including fertile soils, favorable climate, major waterways, port sites, oil, gas, forests and agricultural crops. It is Louisiana's responsibility to manage them wisely.

According to the Renewable Fuels Association, an average ethanol plant (40 million gal/yr) supports 41 full-time jobs and 700 additional jobs throughout the economy and increases state and local tax receipts by $1.2 million. The Minnesota Department of Agriculture reports that its 17 ethanol plants (in 2006) supported 889 direct jobs and 5,500 additional jobs (total 6,400).

Throughout the times of cheap oil, pulp/paper mills, sawmills and syrup mills continued to burn residues to save on disposal costs while saving on energy costs (cogenerating heat and electricity). There have been many technological advances in biomass energy in the last 15 years, making biomass energy increasingly cost-competitive. Environmental concerns also will assure that biomass energy is here to stay. The utilization of residue materials from industrial processes is important from the standpoint of good resource stewardship, environmental protection, minimizing landfill, economics and providing more useful goods for society. The utilization of residues for energy is usually an option, although the utilization of residues for other products also should be considered. And there are many other forms of biomass energy. As we become more concerned about our energy security, this industry will expand regardless of fossil fuel prices. Louisiana is in an ideal location to develop biomass energy because of its climate, fertile soils and transportation, energy and research infrastructure. Expanding Louisiana's fledgling biomass energy industry will diversify the energy, agriculture and forestry sectors and add high-value jobs. With only moderate encouragement, the biomass energy industry will expand and help us ride out any future energy fluctuations.

Figure 8: *Temple-Inland Inc. paper and energy mill, Bogalusa, La.*

With most of the northern, central and Florida parishes covered with timber, the forest products industry is one of the largest manufacturing sectors in Louisiana. This industry is a great asset to our state. As in all businesses, however, there is always room for improved efficiency and performance. For example, logging residues or slash (treetops and limbs) are usually left in the woods. If used for energy, however, slash could provide enough energy to supply 234,000 homes. Milling residues can be expensive to dispose of and can take up large amounts of space in our state's limited landfills. These residues could be used either to generate electricity or to increase available energy within Louisiana. Louisiana's forest products industry includes some 100 sawmills, plywood mills, panel mills, veneer mills and pulp/paper mills scattered throughout the state. Together, they produce more than 7 million tons of wood residues annually, most of which are used by the industry for energy. Most mills utilize what they need for their own energy needs (such as lumber drying kilns or veneer driers) and sell the rest to other mills, usually to pulp and paper mills, which require a lot of energy and generate most of their own electricity. Still, some 54,000 tons of residue annually go unused, enough to provide energy for 1,000 homes. Louisiana's secondary forest products industry (cabinet shops, architectural millwork, furniture makers, pallet manufacturers, etc.) produces 80,000 tons of residues annually, including wood trimmings, sawdust and sanderdust. Most of these residues are already dry – potentially enough energy for 3,000 homes. Yet, nearly all of this material remains untapped.

Figure 9: *Sawdust, planer shavings and bark are used for energy and to make other products.*

Figure 10*: Sawdust, bark and wood trimmings from this hardwood mill are trucked to a paper mill. Some of the material is used to make paper, while the rest is used for energy.*

Forest Ownership

Forests cover 14 million acres, about 50% of Louisiana's land area, making it the state's greatest single land use. There are 148,000 owners of Louisiana forestland. Private non-industrial landowners own 81% of the state's forestland, forest products industries own 10% and the public owns 9%. Louisiana landowners (industrial and non-industrial) reforest the land each year with over 128 million seedlings, an average of 410,000 trees per day (six-day week), and at least 29 trees for each Louisiana citizen (official 2000 census shows a state population of 4,468,876). The impact of forestry and forest-products industries on our economy in 2009 was $2.5 billion, down from $3.3 billion in 2008. Other recent figures were $4.22 billion in 2007, $5.3 billion in 2004,$3.7 billion in 2003 and $3.8 billion in 2002. In 1998 it hit a high of $5.4 billion and in 1997 it was $5.3 billion.

Forest Products and Industry

Figure 11: The following is an account of some the larger forest product industry leaders in Louisiana and what products they manufacture (3).

- **Graphic Packaging West Monroe**

  Beer & soft drink carriers -- 4 pack to 36-pack, brown kraft paper, corrugated medium.

- **West Fraser Joyce**

  Lumber Huttig, Ark.: Lumber

- **Smurfit-Stone Container Arcadia**

  Bags Hodge: brown kraft paper, corrugated medium

- **Boise DeRidder**

  Newsprint, brown kraft paper Fisher: Lumber Florien: Plywood Oakdale: Plywood Boyce: Engineered wood

- **Hunt Forest Products Pollock**

  Plywood Natalbany: plywood (idled at this time) Olla: hardwood timber

- **International Paper Pineville**

  Brown craft paper Mansfield: brown kraft paper, corrugated medium Shreveport: boxes Campti: Red River Mill produces linerboard

- **Georgia Pacific Port Hudson**

  White uncoated paper, tissue line

- **Roy O. Martin**

  Chopin: Plywood Pawnee: OSB mill

- **Weyerhaeuser**

  Holden: Pine Lumber
  Dodson: Veneer and Lumber (closed indefinitely)
  Arcadia: Oriented strand board
  Zwolle: Plywood and lumber
  Natchitoches: Trus Joist Engineered Wood
  Taylor: Small dimension pine lumber
  Shreveport: Packaging operation produces shipping boxes and other packaging

- **TempleInland**

  Bogalusa: Brown craft paper
  DeQuincy: Sawmill

Louisiana State Demographics

Figure 12: The following is a table obtained from the US Census Bureau describing the primary demographics of Louisiana in comparison to the United States as a whole (9). It is based on estimates through 2009.

Residents (from US Census Bureau)	Louisiana	USA
Population, 2009 estimate	4,492,076	307,006,550
Population, percent change, April 1, 2000 to July 1, 2009	0.5%	9.1%
Population estimates base (April 1) 2000	4,468,972	281,424,602
Persons under 5 years old, percent, 2008	7.0%	6.9%
Persons under 18 years old, percent, 2008	25.1%	24.3%
Persons 65 years old and over, percent, 2008	12.2%	12.8%
Female persons, percent, 2008	51.5%	50.7%
White persons, percent, 2008 (a)	64.8%	79.8%
Black persons, percent, 2008 (a)	32.0%	12.8%
American Indian and Alaska Native persons, percent, 2008 (a)	0.6%	1.0%
Asian persons, percent, 2008 (a)	1.4%	4.5%
Native Hawaiian and Other Pacific Islander, percent, 2008 (a)	Z	0.2%
Persons reporting two or more races, percent, 2008	1.1%	1.7%
Persons of Hispanic or Latino origin, percent, 2008 (b)	3.4%	15.4%
White persons not Hispanic, percent, 2008	61.9%	65.6%
Living in same house in 1995 and 2000, pct 5 yrs old & over	59.0%	54.1%
Foreign born persons, percent, 2000	2.6%	11.1%
Language other than English spoken at home, pct age 5+, 2000	9.2%	17.9%
High school graduates, percent of persons age 25+, 2000	74.8%	80.4%

Bachelor's degree or higher, pct of persons age 25+, 2000	18.7%	24.4%
Persons with a disability, age 5+, 2000	880,047	49,746,248
Mean travel time to work (minutes), workers age 16+, 2000	25.7	25.5
Housing units, 2008	1,883,167	129,065,264
Homeownership rate, 2000	67.9%	66.2%
Housing units in multi-unit structures, percent, 2000	18.7%	26.4%
Median value of owner-occupied housing units, 2000	$85,000	$119,600
Households, 2000	1,656,053	105,480,101
Persons per household, 2000	2.62	2.59
Median household income, 2008	$43,635	$52,029
Per capita money income, 1999	$16,912	$21,587
Persons below poverty level, percent, 2008	17.6%	13.2%

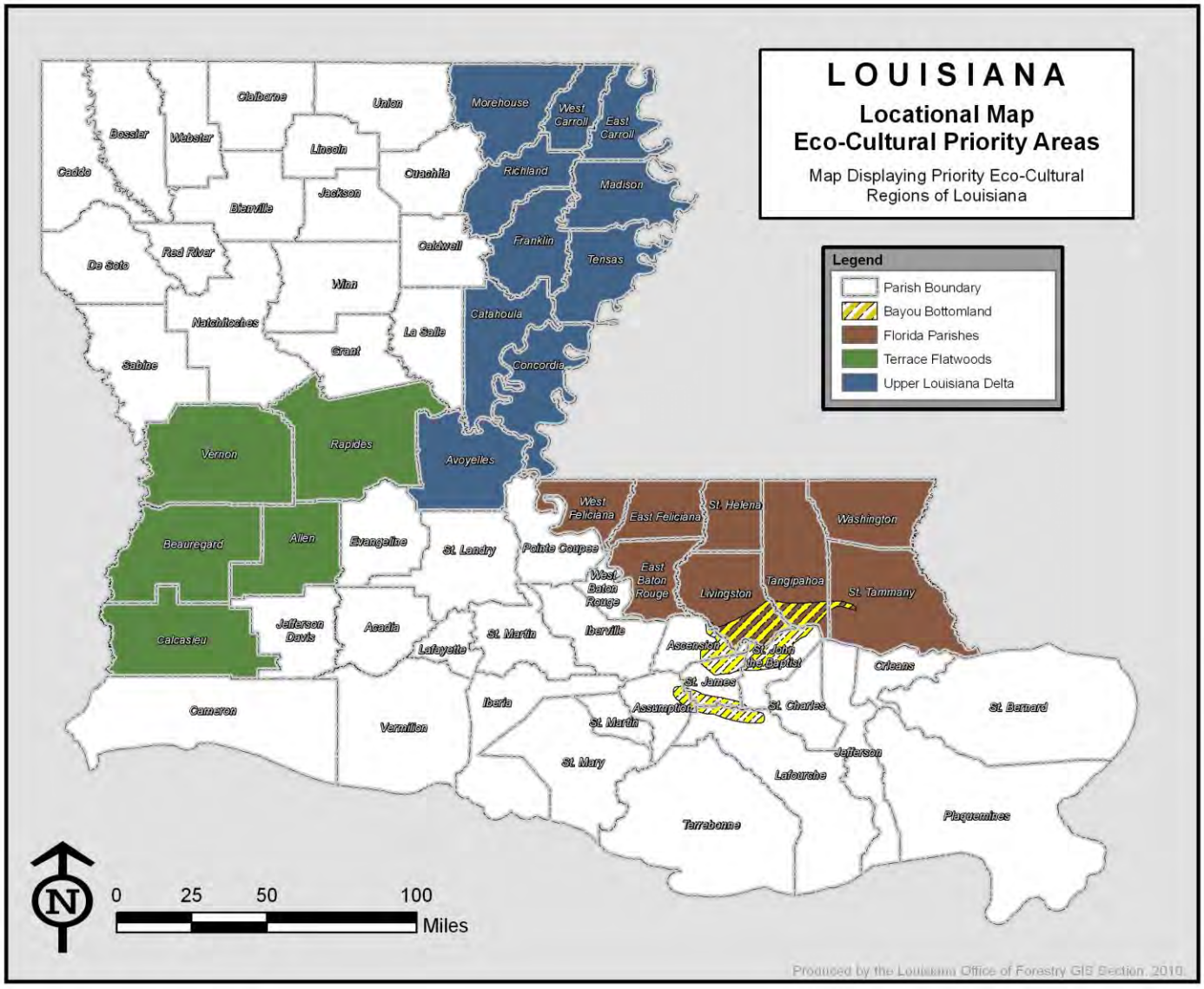
Business	**Louisiana**	**USA**
Private nonfarm establishments, 2007	104,622[1]	7,705,018
Private nonfarm employment, 2007	1,646,151[1]	120,604,265
Private nonfarm employment, percent change 2000-2007	3.4%[1]	5.7%
Nonemployer establishments, 2007	302,715	21,708,021

Geography	**Louisiana**	**USA**
Land area, 2000 (square miles)	43,561.85	3,537,438.44
Persons per square mile, 2000	102.6	79.6

(9)

Louisiana Forestry Eco-Cultural Regions, Priority Areas, and Multi-state Prospects

Map 4



While the diversity of Louisiana's forests make designating forest priority areas a challenging judgment, the areas designated in this map demonstrate either unique or reoccurring regions of significance when the foremost concerns of the Office of Forestry are addressed. This assessment will use these eco-cultural labels while discussing the issues and opportunities that the Office confronts and manages daily. In addition, some of our issues require attention beyond our State's borders and offer the prospect to work with our neighbors to address mutual concerns. These designated priority areas correspond with the following issues:

* Designates an opportunity for a multi-state initiative, by priority area.

Florida Parishes

*Wildfire & Protection**

*Cogongrass**

Urban Sprawl and WUI (Wildland Urban Interface)

*Longleaf Regeneration**

*Storms**

*Insects and Disease**

Terrace Flatwoods

*Wildfire & Protection**

*Longleaf Regeneration**

*Insects and Disease**

Upper Louisiana Delta

Hardwood Regeneration

Storms

Bayou Bottomlands

*Insects and Disease**

Storms

Cypress - Tupelo Management

References and Citations

1 Environment Protection Agency. 2007. Ecoregion Level 3 Data. Baton Rouge, Louisiana: Louisiana GIS Digital Map - May 2007 - Compilation DVD, LOSCO & LSU.

2 Hoop, Cornelis F, et al. 2006. *Research Information Sheet 102: Biomass Energy Resources in Louisiana*. Baton Rouge, Louisiana: LSU AgCenter, Louisiana Forest Products Development Center.

3 Louisiana Forestry Association. 2010. Products made in Louisiana. Alexandria, Louisiana: http://www.laforestry.com/site/ForestFacts.aspx

4 Louisiana State University, Dewitt Braud. 2005. Landsat-5 TM Louisiana State Mosaic of Louisiana. Baton Rouge, Louisiana: Louisiana GIS Digital Map - May 2007 - Compilation DVD, LOSCO & LSU.

5 The Nature Conservancy. 2007. *Louisiana Forest Legacy Program Assessment of Need*. Baton Rouge, Louisiana: Louisiana Department of Agriculture & Forestry.

6 United States Department of Agriculture. 2005. *FIA Report: Tree Biomass Land Condition Attributes - All Line Stocking*. Arlington, Virginia.: Unites States Forest Service. http://www.fia.fs.fed.us/

7 United States Geological Survey. 2001. Land Use - Land Cover Classification. Baton Rouge, Louisiana: Louisiana GIS Digital Map - May 2007 - Compilation DVD, LOSCO & LSU.

8 United States Geological Survey . 2001. NLCD Land Cover Statistics Database. http://landcover.usgs.gov/states_regions_2.php?rec=17

9 United States Government. 2010. State & County Quick Facts: Louisiana. Washington, D.C.: U.S. Census Bureau. http://quickfacts.census.gov/qfd/states/22000.html

Forestry patch used during in the early years after Forestry merged with Agriculture.

Louisiana Forestry Related Issue One: Wildfire & Protection

Wildfire is, annually, one of the most destructive forces acting against Louisiana's forests. This section will outline the history of wildfire protection, the current status of wildfire protection, and what the future holds. It will also include a description of the most incendiary regions of the state.

History of Fire Protection in Louisiana

Forest fire control in Louisiana officially began with the creation of the Department of Forestry in 1904. Act 113 of the Louisiana legislature established the Department of Forestry for the purpose of suppressing and preventing "forest fires." (1)

This act read "An act established a department of forestry, to provide for proper administration, to provide for the preservation of the forest of the state, and the suppression and prevention of forest fires; to provide for the reforestation of denuded forest land, and for the proper instruction relative to forestry in the public schools of the state; to provide penalties for the violation of this act and for other purposes."

With the urging of President Theodore Roosevelt, Louisiana established the Department of Conservation, Act 144, of 1908 (1).

The first forestry act passed was Act 261 of 1910, providing for reforestation contracts between the state and forest landowners. Under this act, "a owner of any denuded forest land worth in the bare state less than five dollars could enter into contract with the state for the purpose of growing timber and protecting it from fire."

During the latter part of 1915, the first funds were directed toward fire protection work by the state of Louisiana. Such funds were earmarked exclusively for the hire of lookout watchmen or patrolmen.

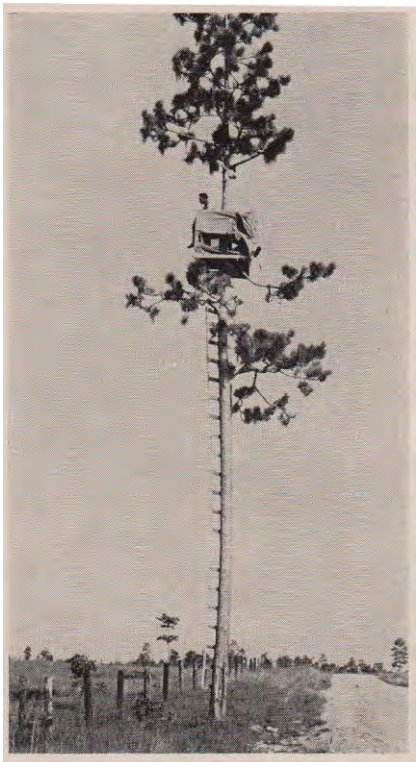
In October of 1917, the first active State Forester in Louisiana took office, Mr. R.D. Forbes. State Forester Forbes recognized early the needs for: fire patrol, railroad fire prevention and publicity and education. He proposed regulations governing the use of spark arrestors on locomotive engines; advised the use of posters, lectures and school courses to start awakening the public to the value of forest fire prevention; and started to work immediately on production of a bulletin explaining forest fire prevention to the general public (1).

Forbes exemplified the growing attitude that "wildfire was the enemy instead of an ally" as had been in the past when he ordered that "automobiles would not be used on patrol because of the tendency of the

patrolmen to stay on good roads when riding in an auto." The call was to –search for the fires and don't come home until they're dead-out!" (1)

Establishment of Fire Towers

In 1922 and 1923, two fire towers were constructed in the state, the first one on Great Southern Lumber Company land near Bogalusa and the second one near Urania which was completed in 1923. These steel towers were beginning to replace the older –steps nailed to a pine tree" towers that were previously utilized.



Since the beginning of fire-fighting efforts, to fight a fire men had to find it first. It soon became obvious that looking out over the area from a high vantage point was much better than riding a horse all over the countryside.

The first type of "tower" shown in Photo No. 1 was crude but served its purpose. After all, the vantage point need not have been very high because there were not many trees obstructing the towerman's view!

Figure 13:

By the end of 1928, a total of 15 fire towers had been constructed.

By the end of 1930, 21 steel towers and 3 wooden fire towers.

By the end of 1942, 39 fire towers covered the state.

By the end of 1949, 56 fire towers had been erected.

Figure 14:

Increase in Fire Patrol Personnel

In 1925, newly appointed State Forester Billy Hine recognized that the ~~"~~state did not have enough ~~"~~rangers" to suppress the wildfires that were destroying the forestlands of the state." By the end of 1926, State Forester Hine had 67 cooperative patrolmen on staff. By 1927 patrolmen numbers had climbed to 136 and parish rangers had been increased to 16. Administrative staff had been established with the addition of five personnel (1).

Fire-fighting Equipment

In 1928, the first tractors---they were Fords---in the history of fire protection in the state (and possibly the South) were purchased during the Hines administration, making it possible to plow more than 3,500 miles of pre-suppression fire breaks in a year and a half (1).

In 1942, mobile fire crews were established and equipped with short-wave radios. This system made it possible to protect 25 per cent more acreage with the same number of personnel.

In 1948 - 49, under the direction of the newly appointed State Forester Mixon, the agency purchased: 42 jeeps, 33 tractors, 88 plows, 180 radios and an airplane for fire spotting, in addition to numerous miscellaneous vehicles. The organization began a –fast-hitting, mechanized war on forest fires, paring the actual time between fire spotting and fire fighting to a matter of minutes." (1)

Civilian Conservation Corps (CCC)

During the –economic depression" of 1930's, the CCC camps came to Louisiana. Roads, fire breaks and telephone lines built under this program would be used by the state forest service. Approximately 185 thousand acres of –cut-over" timberlands were reforested by CCC workers.

The first CCC camp was established in the state in 1933. Overall 27 camps would be built, for which 20 were placed under the direction of the State Forester.

Camp crews built an additional 18 "lookout" towers and more than 72,000 man-days had been spent on fire-fighting alone (1).

Forest Fire Protection Tax

Through Act 179 of the 1944 Louisiana legislation, established the –Forest Protection Acreage Tax." Under this arrangement, individual parishes could levy a tax not to exceed two cents per acre on all forest lands of the parish for the purpose of establishing forest fire protection. In these cases, contracts with individual landowners who had previously –signed up" on a voluntary basis would be eliminated and the state would cooperate directly with the parish to afford protection services to all woodlands in that parish (1).

By 1945, 9 parishes accepted the –Forest Protection Tax." With 6.5 million acres under protection, the average acreage burned was held to 1.11 percent of those lands under protection or approximately 72, 150 acres (1).

Today, this funding source only accounts for approximately $800,000 per year.

This funding source is solely dedicated for the purchase of supplies and equipment utilize for wildfire suppression. Landowners are assessed a $0.08 per acre taxation on lands classified as —timberland." Other acreage such as agricultural land e.g. pasturelands are not part of the Forest Protection tax.

Into the Present

Wildfire Detection and Suppression**:** As mandated by Revised Statue 3:4271, the Office of Forestry (OOF) is directed ~~"~~to protect, conserve, and replenish the natural resources of the state…" The Protection Branch is tasked ~~"~~to protect the citizens, infrastructure and woodlands of the state from destructive wildfires."

Office of Forestry Firefighters

During the early 1980's, the Office of Forestry employed approximately 293 wildland firefighters within its service. This number equated to approximately 129, 426 acres of protection by a 2-man firefighting crew (2).

Due to budget constraints, hiring freezes and non-filling of vacant positions during the previous years, Office of Forestry firefighters had been reduced to 155 qualified personnel. This reduction in personnel has dramatically increased the average acreage of protection to approximately 246,246 acres per 2-man crew (2).

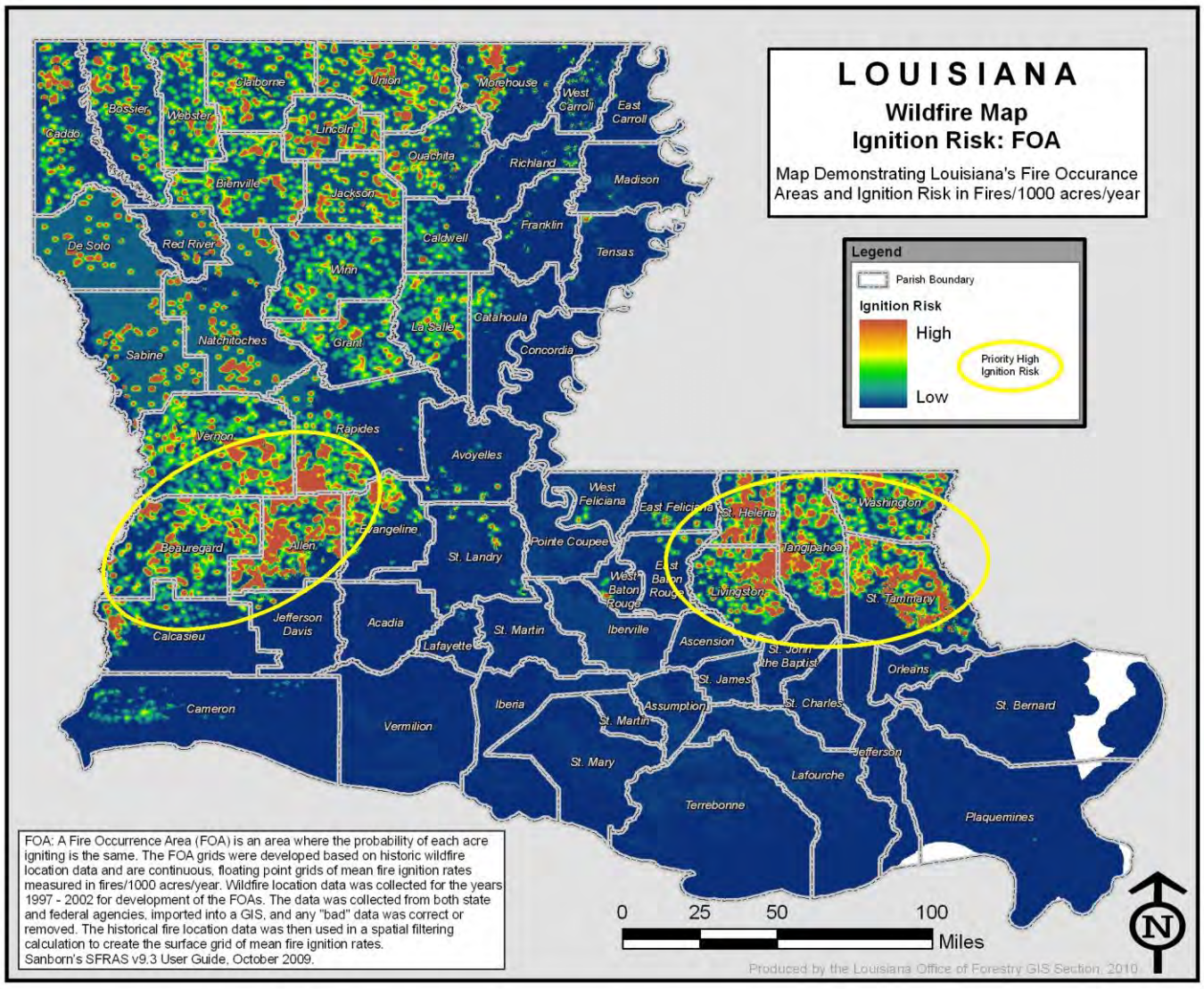
With the addition of ~~"~~Unit Foresters" and other agency personnel trained for wildland firefighting, the Office of Forestry can fill 104 2-man dozer units reducing the average acreage per 2-man unit t approximately 182,317 acres per crew (2).

This increase in ~~"~~average acreage protected by crew" has been off-set by the reduction of wildland fire occurrence during the last decade. However, during extended drought conditions this reduction in available manpower may prove detrimental. The economic impact of ordering ~~"~~outside" resources and the 2-3 day timeframe before these resources may be utilized may enlighten the Governor as to the need for a properly manned workforce (2).

Detection Capabilities

Fire Tower utilization has decreased during the last two decades, being replaced through aerial detection. With the increasing usage of cellular phones during this timeframe detection and notification of a wildfire occurrence by the public sector has increased, accounting for approximately 53% of all wildfires detected.

Another factor that has contributed to the ―public" notification of wildfires is the increased population in the rural areas. As population continues to expand in these wildland areas, a greater presence of ―ownership" will indirectly correlate to ―increased notification" by the public. On the reserve side of that equation is that with an increase in population in the wildland areas comes an increase in the possibility that a man-caused wildfire will occur. **Map 5**



(3)

Wildfire Occurrence

Louisiana experiences approximately 5,000 wildfires per year. Of this count, approximately 2,195 wildfires are suppressed by OOF wildland firefighting personnel. The remaining fires are suppressed by local fire departments.

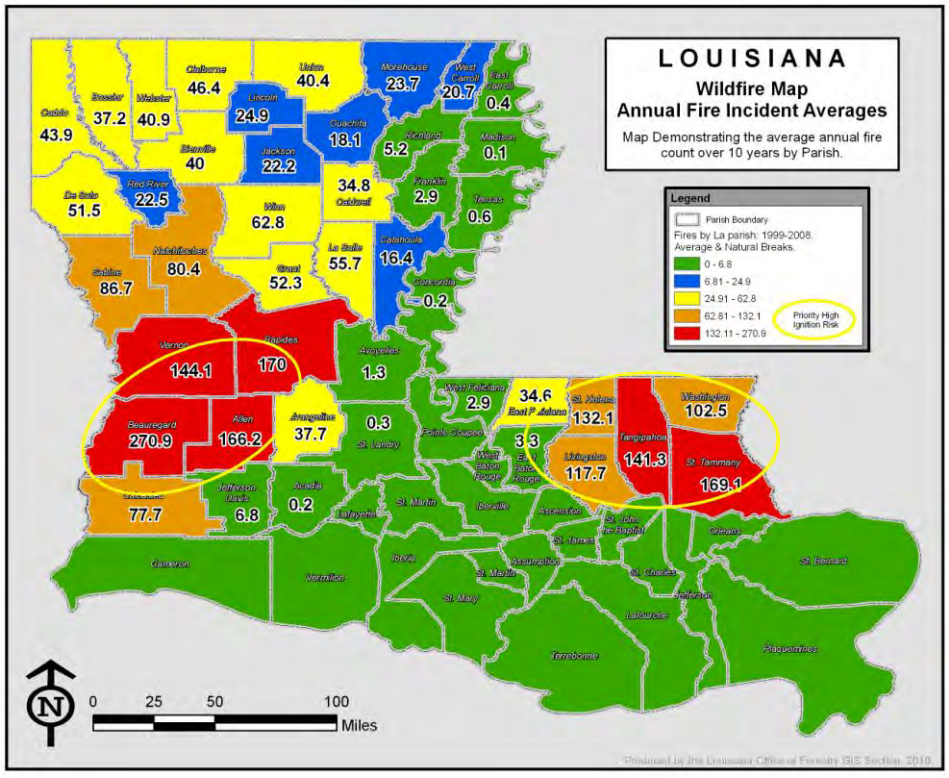
2000 - 2009 Wildfire Figures

Figure 15

YEAR	D-1	D-2	D-3	D-4	D-5	D-6	D-7	D-10	TOTALS
2000	825	989	464	341	351	504	1110	582	**5166**
2001	244	130	70	112	74	67	279	147	**1123**
2002	255	179	159	162	104	199	389	172	**1619**
2003	234	248	229	150	121	173	328	215	**1698**
2004	241	253	107	98	81	134	298	252	**1464**
2005	491	547	436	331	215	390	563	302	**3275**
2006	786	362	274	313	160	296	499	453	**3143**
2007	245	127	125	122	108	143	260	164	**1294**
2008	158	240	158	159	147	199	406	178	**1645**
2009	211	272	138	132	79	129	351	210	**1522**
Avg/annual Fire Count	**369**	**335**	**216**	**192**	**144**	**223**	**448**	**268**	**2195**

Avg Acres: 38,971

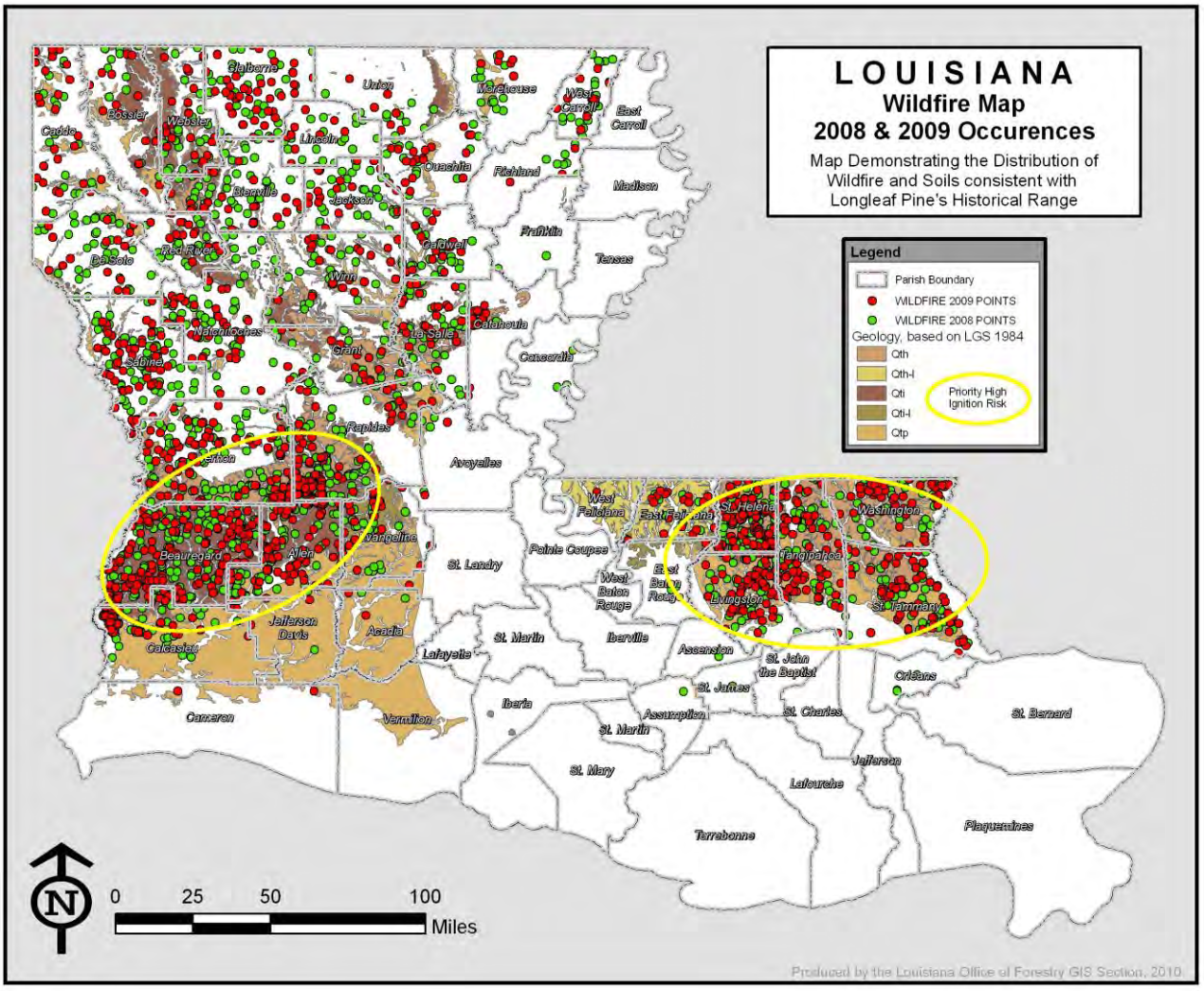
At the present time, the Office of Forestry is working in conjunction with the Louisiana State Fire Marshall office to establish a reporting system to capture –wildland fire suppression data" from rural fire departments throughout the state.



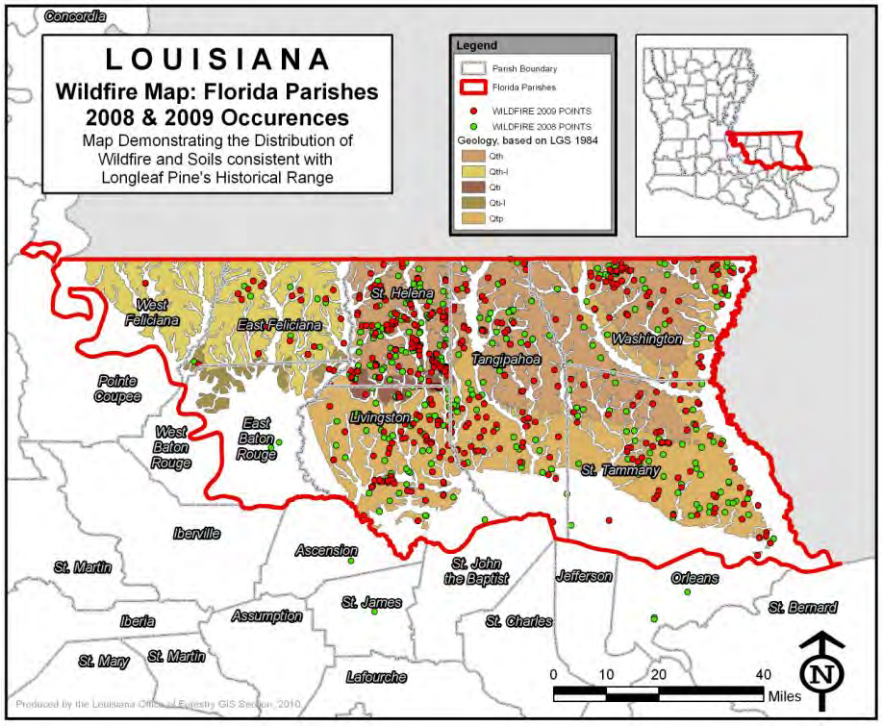
Map 6

The model being promoted is similar to the reporting system utilized by the Texas Forest Service. This information is vital for the calculation of "floor costs", tracking of statewide wildfire occurrence and reporting to the Louisiana Legislation. This "missing" information is important for all federal, state and local cooperators.

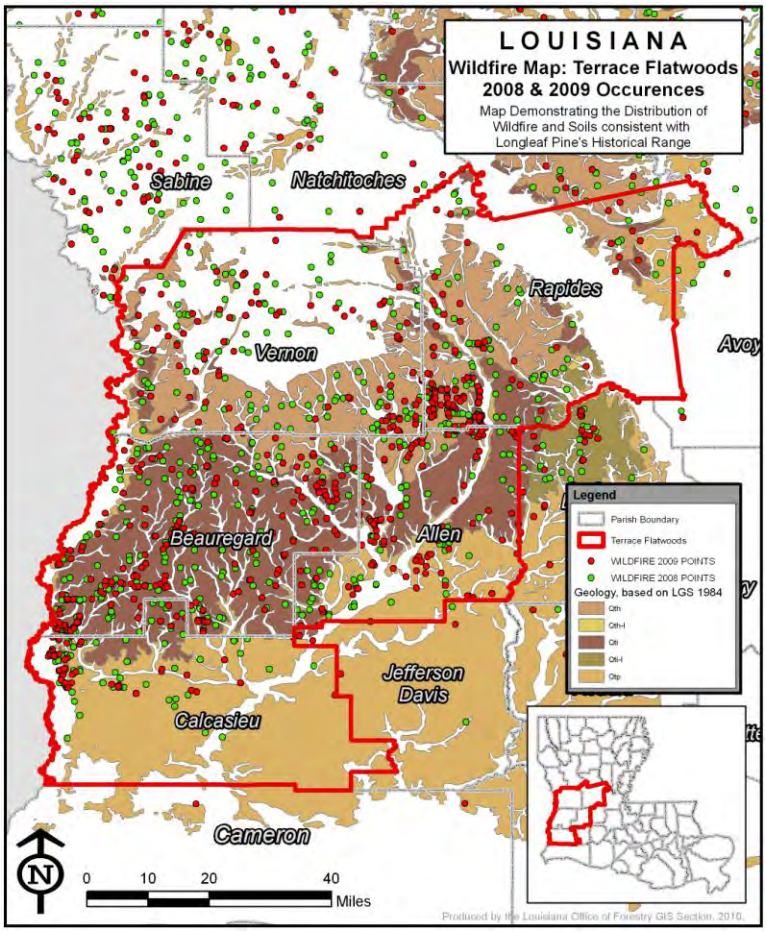
The distribution of fire can be described as displaying two significant foci. One in Southwest Louisiana in the Flatwoods Terrace region and the other in Southeast Louisiana, in the Florida Parishes. And while much of the northwestern portions of the state displays consistent fire activity, the areas in the south, the same areas that were historically longleaf territory, demonstrate an annual high fire risk. The extent of longleaf's range can be tied to unique soils that are favorable for the species. These patterns can be correlated with the continued occurrences of wildfire in the environment, although the anthropological influence on fire should not be under estimated in these fire-prone regions of the state. **Map 7**



(4)


LOUISIANA
Wildfire Map: Florida Parishes
2008 & 2009 Occurences
Map Demonstrating the Distribution of Wildfire and Soils consistent with Longleaf Pine's Historical Range
Legend
Parish Boundary
Florida Parishes
WILDFIRE 2009 POINTS
WILDFIRE 2008 POINTS
Geology, based on LGS 1984
Concordia
West Feliciana
East Feliciana
St. Helena
Washington
Tangipahoa
Pointe Coupee
West Baton Rouge
East Baton Rouge
Livingston
St. Tammany
Iberville
Ascension
St. Martin
St. John the Baptist
Jefferson
Orleans
St. James
St. Bernard
Iberia
Assumption
St. Charles
St. Mary
St. Martin
Lafourche
0 10 20 40
Miles
N
Produced by the Louisiana Office of Forestry GIS Section, 2010

Map 8 (4)


LOUISIANA
Wildfire Map: Terrace Flatwoods
2008 & 2009 Occurences
Map Demonstrating the Distribution of Wildfire and Soils consistent with Longleaf Pine's Historical Range
Sabine
Natchitoches
Rapides
Vernon
Avoy
Beauregard
Allen
Jefferson Davis
Calcasieu
Cameron
Legend
Parish Boundary
Terrace Flatwoods
WILDFIRE 2009 POINTS
WILDFIRE 2008 POINTS
Geology, based on LGS 1984
0 10 20 40
Miles
N
Produced by the Louisiana Office of Forestry GIS Section, 2010

Map 9 (4)

Firefighting Equipment and Personnel Availability

When a wildland fire escapes the capabilities of local fire departments, the OOF will provide additional resources. The majority of local fire departments are equipped and trained to fight "structural" fires; many do not posse equipment specifically made for "off-road" firefighting opportunities nor are the personnel trained with regards to wildland firefighting tactics.

The OOF currently possesses 104 bulldozers specially equipped with fire plows, positioned throughout the state. Sixteen (16) off-road pumper trucks are also part of the wildland firefighting cadre of equipment. Specially trained wildland firefighting personnel are available for assignment 24 hours per day, seven days per week, 365 days per year. Twelve (12) Cessna 182's are utilized for state-wide aerial detection.

The OOF also makes equipment and personnel available for "out-of-state" wildland firefighting assignments through the United States Department of Agriculture, Forest Service and through the South Central - Interstate Forest Fire Protection Compact.

Figure 16: *Office of Forestry Firefighting Dozer and Transport Unit*

Figure 17: *Office of Forestry Brush Truck with "skid" unit*

Figure 18: *Wildfire beyond local VFD suppression capabilities*

Figure 19*: Wildfire encroaching on business. Wildland/Urban Interface continues to expand*

Federal Excess Personal Property (FEPP) program:

The OOF, in cooperation with the U.S. Forest Service, provides excess military equipment to rural fire departments for fire suppression activities. This equipment is ―on-loan" and is tracked and monitored by the OOF. Current inventory in the program has provided approximately 489 pieces of equipment valued at approximately $9.9 million to local fire departments. Equipment includes: pick-up trucks, ladder trucks, generators and tanker trucks.

Figure 20*: Excess military property refurbished by Forest Hill VFD*

Figure 21*: Brush truck configured from FEPP equipment*

Figure 22: A recent survey of those fire departments participating in the FEPP program provided the following information:

1) 98% FEPP equipment is greatly beneficial for the protection of the community.

2% FEPP equipment is Not Required to protect the community.

2) 78% FEPP equipment Requires monetary investment to ready for service.

14% FEPP equipment Does Not require monetary investment to ready for service.

8% FEPP equipment IS NOT economically advantageous to receive.

Overall, the participating departments appreciate the opportunity to receive excess property through the program. Numerous departments have been able to acquire "wildland/urban" type equipment to booster their WUI responsibilities that otherwise would have been financially unavailable.

With Cooperative Agreements, between the participating departments and the OOF required for participation in this program, the OOF and the citizens of Louisiana benefits by having an increased local capability of resources to suppress wildfires.

The OOF will begin the administrative process for acceptance into the FireFighter Program (FFP), administered by the United States Forest Service.

Certified Prescribed Burner program:

As outlined by LA. Revised Statue 3:17, —The application of prescribed burning is a land management tool that benefits the safety of the public, the environment, and the economy of Louisiana." The OOF along with the Louisiana State University Agricultural Center recognizes the importance of this silvicultural activity and has partnered together to provide a training seminar for individuals wishing to become a Certified Prescribed Burner. As of the end of 2009, 1761 individuals have successfully completed the course.

Figure 23: *Setting a "backfire" to reduce fuel loading within the area of concern.*

Currently, Louisiana legislation H.B. 733, is attempting to provide an increase in liability protection for prescribed burners by changing the wording in the current statue R.S. 3:17(E) from —negligence" to —rebuttable presumption of nonnegligence." Government officials have recognized that prescribed burning is a vital management tool with regards to fuel load management and threatened and endangered species maintenance.

This added level of protection from liability litigation should increase the current amount of prescribed burning being conducted within the state by private contractors.

ESF-4 Branch (Governor's Office of Homeland Security and Emergency Preparedness):

The OOF Protection Branch has been tasked as a "co-lead" for the Fire Fighting branch of GOHSEP. Training of personnel for "all-risk" incidents is a priority at this time. Department personnel have been activated during Hurricanes Katrina, Rita, Gustav and Ike. Other assigned tasks by GOHSEP includes: Hay delivery for stranded cattle, transportation of pet cages during emergency evacuations and transportation of fuel during natural disasters.

Figure 24: *OOF transports hay for stranded cattle following Hurricane Gustav.*

158 OOF personnel have completed FEMA training (NIMS 100, 200, 700 & 800) for "all-risk" incidents.

Volunteer Fire Assistance Grant program

The Protection Branch oversees the VFA program for the State of Louisiana. The U.S. Forest Service and the OOF has recognized the importance of rural fire departments with regards to the protection of citizens and natural resources.

It is through the VFA grant program that fire departments can apply for a 50/50 grant, used to purchase equipment for fire suppression duties. Each year, approximately $325,000 is made available to the State of Louisiana. Grant awards average approximately $4,000 per year per approved applicant.

These available funds greatly assist rural fire departments with the purchase of equipment needed for fire suppression activities and the training of personnel. Funding for the purchase of wildland firefighting equipment has greatly increased the participation and efficiency of these departments during wildfire events.

On average, approximately 85 departments are awarded grant funding per year.

Recently surveyed, 100% of fire chiefs stated that ―the VFA Grant was vital for their departments in maintaining or improving the allocated equipment of the department.‖ Any funding allocated to these rural departments are greatly appreciated.

A look to the future in protection.

The original role of the Louisiana Forestry Commission, now the Louisiana Department of Agriculture & Forestry, Office of Forestry, was to provide forest fire detection and suppression for the lands in the state. It is felt that this should remain the most immediate priority of responsibilities. With expanded roles of agency personnel with regards to ―all-risk‖ management, challenges will be faced on how to provide necessary training and equipment within limited budgets.

As the average cost of fire control services increases, it thereby affects the Office of Forestry's budget capability of providing and maintaining manpower and equipment necessary for forest fire protection. The trend toward property fragmentation and extensive plantation management by non-industrial private landowners, forestry industry and investment groups have and will continue to cause challenges for fire suppression in the future.

The Southern Wildfire Risk Assessment (SWRA) will continue to be a valuable tool to assist the Office of Forestry with the implementation of forest fire protection responsibilities. The ability to identify areas of concern based on a ―priority‖ system, will allow for the distribution of current resources in an efficient manner.

Stake Holders Concerns

Results of surveyed stakeholders, including governmental agencies, industry and private citizens reveal two main topics of concern: Smoke Management and Increased Wildland/Urban Interface on the Natural Resources of the State.

Smoke Management

Smoke management has and will continue to be an important issue. Louisiana Department of Agriculture & Forestry has worked with several government agencies such as environmental, wildlife and natural resources organizations along with citizen-driven groups such as the Prescribed Fire Council to promote prescribed burning and proper smoke management.

The ability to balance natural resource management techniques, in a cost-efficient manner while meeting the concerns of the changing demographics will prove to be a challenge. Public education to the importance of natural resources, both from an economical and social aspect will be the focus to meet this challenge. It will be imperative to meeting this goal that both parties are active in reaching a –ecommon ground."

The days of –llooks good, light it" are gone. Prescribed burners will need to consider: smoke sensitive areas, smoke dispersion and numerous other factors before executing a prescribed burn. Proper training opportunities i.e., Certified Prescribed Burner courses will assist in meeting this goal.

Wildland Urban Interface (WUI)

As WUI areas continue to expand, natural resource managers will have to adapt policies and operational standards to meet this change in the local landscape. Through public education, demonstration areas and other means, the OOF will attempt to provide and increase the public's awareness as to the possible hazards associated with the surrounding landscape. Programs such as FireWise and Ready-Set-Go will increasingly become an important tool in providing this message to the public.

Working with local governmental agencies i.e., local fire authorities, permitting offices and other associated entities can provide additional avenues to promote this message.

Figure 25*: 2000+ acre wildfire. Please note the community in the top-left portion of the photo. Construction of residences and other buildings in the "wildland" setting are becoming more prevalent and posse's additional challenges with regards to wildfire suppression.*

Conclusion

As we, the Office of Forestry – Protection Branch move forward, we must remember that our "working environment" is steadily evolving and that we are not operating in a static environment. Projected environmental changes, both atmospheric and landscape demographics, has always caused natural resource agencies to adapt to the needs of the public while attempting to provide scientifically based management of the resources for which we are entrusted. Recognition of these changes is vital for everyone's success.

Reference

1 Burns, Anna C. 1968. A History of the Louisiana Forestry Commission. Natchitoches, Louisiana: Northwestern State College.

2 McFatter, D.L. circa 1981. Forest Resource Planning: Louisiana Forestry Issues. Baton Rouge, Louisiana: Louisiana Department of Natural Resources.

3 Sanborn Map Company, Inc. circa 2005. Southern Fire Risk Assessment Published Results: 1997-2002. Portland, Oregon: Sanborn Map Company.

4 United States Geological Survey - National Wetlands Research Center. 1998. Digital representation of the *Geologic Map of Louisiana: 1984*. Baton Rouge, Louisiana: Louisiana GIS Digital Map - May 2007 - Compilation DVD, LOSCO & LSU.

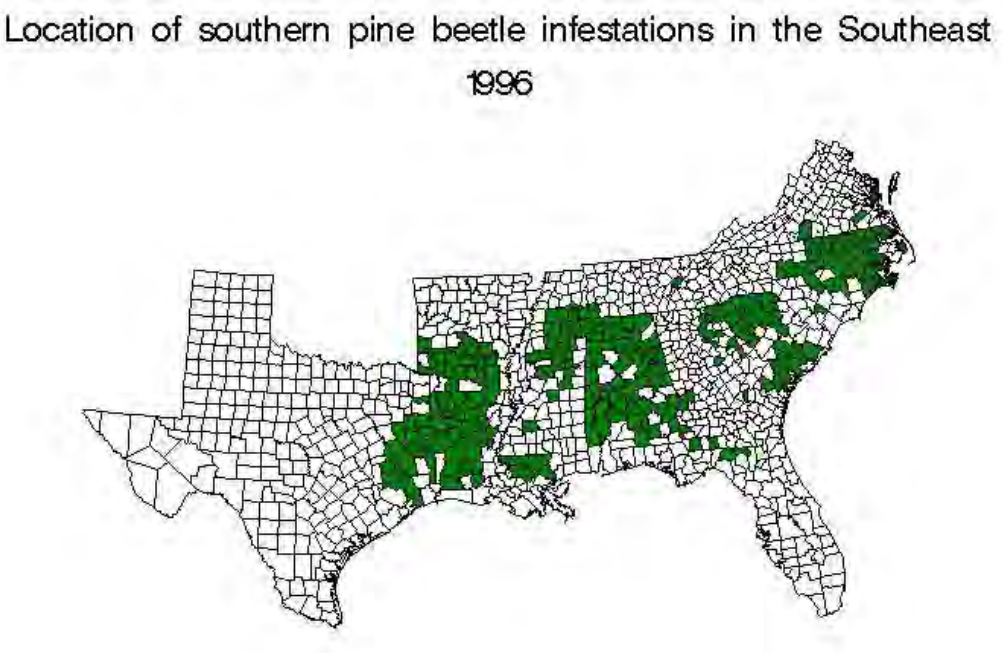
Fire Information Officer patch from the early years after merging with the Department of Agriculture.

Louisiana Forestry Related Issue Two: Forest Health - Insects and Disease

Louisiana has many threats to its pine and hardwood forests from both native and exotic invasive insects. Responding to these threats, the Louisiana Department of Agriculture and Forestry, LDAF, conducts scheduled aerial detection surveys to help find these problems and reduce their potential for spread. Subsequently, landowners with an insect infestation are informed of their situation, the infestation is inspection and technical assistance is offered to arrange for any necessary harvesting or treatment. The LDAF frequently assists landowners with small, yard type inspections that occur in urban, suburban and rural settings. Continued monitoring of our state's forests along with educating of our citizens in forest health is crucial in protecting Louisiana's #1 crop, trees.

Common Disease Infestations

Southern pine beetle is probably the single greatest economic threat to Louisiana's forest industry of any forest insect. Populations of this beetle can expand to kill thousands of acres of pine forests within a couple of growing seasons and then plummet to appear almost non-existent for years. Outbreaks of this insect tend to be cyclical in occurrence. Outbreaks have occurred on 6-12 year intervals and generally last for 2-3 years in areas were SPB has long been a problem (4). Presently, it has been over 13 years since Louisiana has had a significant outbreak of this beetle. (See map below, produced by the University of Georgia Bugwood Network, **green** denotes infestation) (12).



(12) **Map 10**

Pine colaspis, a small beetle that defoliates both pines and baldcypress; occur regularly throughout the southern part of the state. The ―chewed" needles turn brown as though scorched by fire (10). Luckily, pine colaspis has only one generation per year. Most pines affected are usually ones along fence rows and urban settings, however, early summer of 2009, and again in 2010, young pine plantations were being attacked and in much greater numbers. Under forest conditions, no control measures are recommended. On ornamentals and shade trees, insecticides can be used to prevent unsightly damage. Forest Health Protection, Southern Region (10).

The ever-present engraver beetles often infest lightning struck pines. Attracted by pheromones produced when the trees are damaged, the beetles will normally attack only 5 or 10 trees before they dissipate. Immediately following Hurricanes Katrina, Rita and Gustav, large numbers of infestations of engraver beetles developed throughout the damaged areas of Southern Louisiana. Most of the trees attacked were those with damage to their inner bark and root system caused by whipping in the high winds. This was especially noticeable along the interstates and exits where severe winds seemed to have funneled along the corridors.

Approximately 80 acres of pulpwood size loblolly pine plantation was defoliated by Black-headed pine sawflys in Evangeline Parish during 2009. Other small incidences of this insect have been common throughout the pine site portions of the state. Red-headed pine sawfly has had significant increases in the Florida parishes of SE Louisiana during the same period. Most of the defoliation from these sawflys, have been brief. In suitable stands, prescribed burns are performed in the winter to reduce the number of egg cases deposited in the forest duff or on the lower tree trunks.

In most pine plantations, defoliation from Nantucket pine tip moth is often temporary and does not require insecticide treatment. It is recommended, however, for Christmas tree plantations and other high valued trees where form is critical (16).

The defoliation of water tupelo trees by the Forest tent caterpillar, FTC, is a recurring problem in and around the Atchafalaya Basin, near Lake Maurepas and now along the Pearl River, Louisiana‘s southeastern boundary. Over 300,000 acres of water tupelo canopy were moderately to severely damaged in late May and early June of 2010. Similar acreages of defoliation occur annually. Outbreaks or the regular population cycles of forest tent caterpillars are apparently extremely difficult to manipulate or control (5). Some tree growth loss is experienced, but often no action is taken to treat the infestation due to the vastness of the

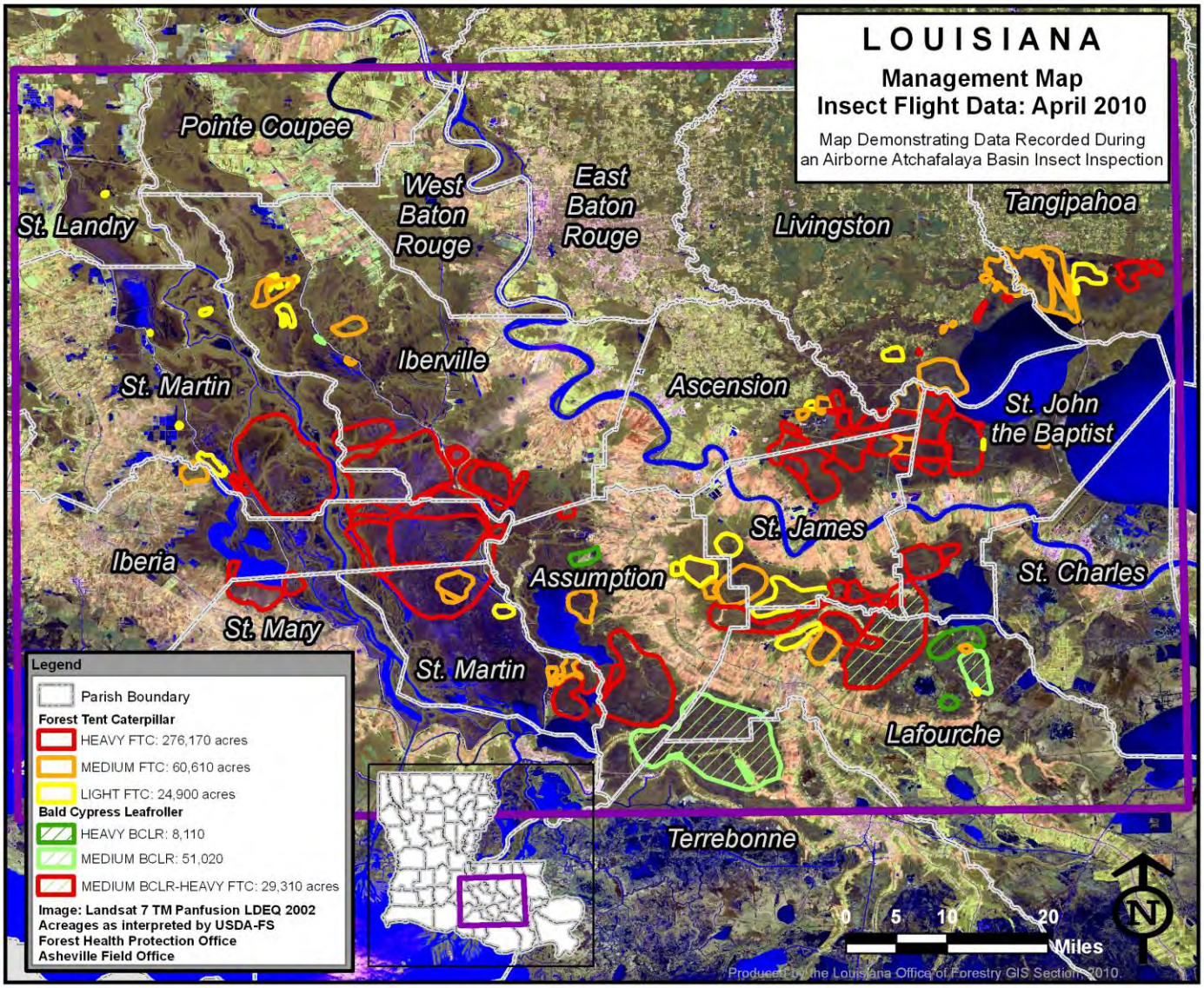
areas, difficult swamp access and prohibitive treatment costs. Normally the foliage recovers quickly after the one generation per year outbreak is over. In close association to the forest tent caterpillar is the Baldcypress leaf-roller both in timing of outbreak and general proximity of the state. Approximately 60,000 acres of moderate to heavy damaged baldcypress canopy was found when the detection survey flight was made for forest tent caterpillar. Baldcypress leaf-roller is allowed to take its course in similar fashion for much the same reasons as the forest tent caterpillar.

Previous and Current Efforts to Eradicate and Control: What's being done, Detection, and Measurement Techniques

LDAF has been incorporating DASM to monitor the annual outbreaks of the Forest tent caterpillar, FTC, and the Baldcypress leaf-roller, BCLR. The Forest tent caterpillar/Baldcypress leaf-roller map below depicts the areas surveyed and the locations of infestations are color-coded to reveal the degree of damage. This map was developed from the combined efforts of Justin Tureau and Bob Smith, LDAF, for flying and plotting the infestations on a DASM and Ed Yockey, USFS, for preparing the map.

One of the more innovative techniques for detecting forest health problems is the use of MODIS, Moderate Resolution Imaging Spectroradiometer. This process employs two NASA satellites which can sense 36 spectral bands (6). Imagery produced, which can then be used to compare vegetative surface reflectivity can be used to detect rapid changes occurring in forest canopies. The United States Department of Agriculture, US Forest Service, Forest Health Protection, USDA USFS-FHP, then relays the maps with areas of concern to the LDAF which can be used to ground check for verification of an infestation or provide valuable feedback for improvement of the process. The FTC defoliated area along the Pearl River was found by this method.

In cooperation with Dr. Ron Billings, Forest Entomologist with the Texas Forest Service, the LDAF annually installs over 30 SPB Lindgren traps across the pine regions of our state in early to mid March. The survey is initiated when flowering dogwood (*Cornus florida*) begins to bloom or loblolly pine pollen appears. These physiological events coincide with the long-range dispersal of SPB (Billings, unpublished data). It is during this spring dispersal period that airborne populations of adult SPB and associated insects can be most effectively monitored with pheromone-baited traps for predictive purposes (2).



Map 11

Once all of the traps are collected, any SPB and Clerid beetles, a predator of SPB and are separated from the other insects and counted. This data is then sent to Dr. Ron Billings to determine the probability and severity of an outbreak occurring later that year.

Coordinated efforts by the Forest Health Technologies Enterprise Team, FHTET, the USFS-FHP and the LDAF have been initiated to develop further the capabilities of the Southern Pine Beetle Portal. This website now accepts SPB DASM point data from all southern states and displays their information congruently in reports and maps. Soon, shape files collected by the LDAF are expected to be easily uploaded into the Portal.

Staying proactive while the SPB populations are low, FHTET has devised SPB risk maps which use various remote sensing techniques to locate tracts of dense forested areas with 30 meter resolution that are most susceptible to SPB when a future outbreak occurs. Beal and Massey recommended fire prevention, slash disposal, thinning and regulating stand composition and density as beetle reduction measures (1). The LDAF has helped to ground verify selected areas of the color-coded map to assist in fine tuning its accuracy. Parameters such as coordinates, tree species, diameter and spacing are recorded and shared. Additionally, LDAF is working with FHTET to use similar maps in locating areas of the state that are in need of pre-commercial thinning as another means of reducing SPB hazard.

The Louisiana Department of Agriculture and Forestry makes asserted efforts to educate teachers in good forest health practices through Project Learning Tree workshops and the annual Teacher‘s Tour. Over 4000 5th and 6th grade students throughout the state are brought on nature trails and taught how proper forestry practices promote good forest health during Forestry Awareness. Information and training is provided to department employees to better identify and address various forest health issues. Assistance had been provided by the Louisiana State University, (LSU) with the latest technical advances in forest health concerns.

Future Threats

With the introduction of new exotic invasive insects via imports, species such as the Gypsy moth and the Emerald ash borer are poised to alter much of Louisiana‘s natural forest landscape. The Gypsy moth has caused heavy hardwood defoliation and mortality in the Northeast and appears to be slowly progressing southward. In cooperation with the Louisiana Office of Agricultural and Environmental Science (AES), Office of Forestry employees, part of the LDAF, distributes over 200 Gypsy moth pheromone traps statewide. These traps are deployed each spring and checked periodically throughout growing season.

One of the most alarming exotic invasive insects from a tree mortality standpoint is the Emerald ash borer, EAB. Louisiana‘s major ash species, Green ash and white ash are susceptible to this pest (14). EAB is another insect that seems firmly established in the Northeast and moving southward. County quarantines on transporting firewood or logging, insecticide treatment and updated management techniques are all being used to slow EAB progress (15). The Office of Forestry has provided assistance to AES in locating ash sites to install traps.

Louisiana's forests are exposed to more than enough native insects along with known and unknown exotic invasive species now present in the United States. An equal threat to consider is the tree damaging insects yet to come ashore via imports as our global economic trend continues.

Forest Health - Diseases

Many tree disease problems occurring in Louisiana forests can be handled through sanitation thinning and other proper forest management techniques. However, the control measures for the same problems in an urban or shade tree situation vary considerably.

The Louisiana Department of Agriculture and Forestry, LDAF responds to multiple shade tree requests each year advising landowners on options for treating their nuisance. Louisiana State University, Louisiana Tech University, other state universities and the US Forest Service-FHP are often consulted by the LDAF for technical information directly, online or through other literature.

Common Disease Infestations

Dutch elm disease was identified in the Netherlands but was actually native to Asia (13). This fungus, carried by beetles continues to damage many of the American elms in the state. Urban plantings of resistant tree varieties such as Chinese elms have helped to re-establish elms in our communities. The LDAF has provided homeowners with seedlings of this variety by including them in the sale of urban packets.

Fusiform rust – FR is one of the more destructive diseases in pine. This fungus will form bright orange fruiting bodies in the early spring that release spores which infest other trees. Sanitation thinning of forests is often recommended to guard against this disease.

Hypoxylon Canker is a very common fungus on oaks in Louisiana. It is a usually found on oaks stressed by wounds such as root damage from adjacent construction work, compaction of soil by heavy equipment or nearby paving. In most cases, removal of the tree becomes necessary.

Needle casts generally occur during wet, cool springs. The various fungi that make up needle casts become more prevalent on the foliage of pines. Needles appear scorched as the outer halves die and turn brown. Pine needle rust is also very unsightly on pine needles where the fruiting bodies of this fungus can be quite showy and dense. In both cases, no practical control available. High-valued Christmas trees may benefit

from the use of fungicides or herbicides to remove any nearby alternate hosts. These diseases will normally disappear on it own in forest situations.

Red heart – This fungus usually develops in the xylem of older pines causing decay and weakening the structure of the tree. Large, dark fruiting bodies may be the only sign of a problem, other than sounding the tree with a hammer. When near houses or other valuable structures, it is often recommended to have a licensed arborist safely remove the tree. Rotted openings within the trunks may serve as housing for the endangered Red-cockaded woodpecker.

The Annosus Root Rot fungus attacks both loblolly and slash pine usually by wounds or root graphs. Signs of the disease include conks near the base of the pines and numeroud wind thrown trees. When most of a pine stand is infected with this fungus, the best course of action is to clear-cut the entire stand. When thinning an uninfected stand, Sprinkling borax on the stumps is an effective way of preventing the fungus from becoming established in a stand. The biocide (*Phlebia gigantea*) containing the antagonistic fungus, should be used on stump surfaces in stands that are already infected. A Guide to Common Forest Pests in Georgia Terry Price, Forest Health Specialist, Georgia Forestry Commission (7).

Ozone is a naturally occurring oxygen compound, while in the upper atmosphere is beneficial at reflecting excess ultraviolet light, but is damaging to plant life at ground level. Most of the ground level ozone is produced for the burning fossil fuels such as car or factory emissions. Ground level ozone is being looked at as being more detrimental to healthy plant growth than increased temperatures or Carbon dioxide, CO2 levels (9).

Symptoms of Ozone damage have been found on indicator plant species mostly near Baton Rouge and other larger cities of the state where the exhaust of numerous industrial plants and cars collect in denser quantities.

Wind damage from hurricanes whipping trees can damage the trunk cambium layer and inner bark or the roots of exposed trees. Many of the trees stressed by Hurricanes Katrina, Gustav and Rita were made more susceptible to insects such as bark beetles. Other trees died simply from the physical damage or from various fungi that later entered newly-formed cracks, abrasions or breakage.

Future Threats

A newly developing threat is Sudden oak death, SOD. This fungus-like organism presently killing oaks in California and has the potential to destroy the oaks of our entire nation. The LDAF's office of Agricultural and Environmental Sciences, AES is testing for this disease on a regular basis.

Thousand canker walnut disease has been killing thousands of walnut trees in several western states. It is another fungus that is introduced into the trees by bark beetles. At present, this disease has not been found in our state.

Dogwood anthracnose is a fungus that has been devastating much of the Flowering dogwoods in the Eastern and Northwestern United States since the 1970's (8). Good sanitation, fertilization, spacing and the use of several fungicides has help to protect trees in yards situations.

References and Citations

1 Beal, James A. and Calvin L. Massey. 1945. Bark beetles and ambrosia beetles (Coleoptera: Scolytidae). Duke University School of Forestry Bulletin 10.

2 Billings, R.F. 1988. Forecasting southern pine beetle infestation trends with pheromone traps. In: Saarenmaa, H. Integrated control of Scolytid bark beetles. International Congress of Entomology. At: Vancouver, B.C., Canada.

3 Louisiana Department of Environmental Quality. 2002. Landsat-7 TM Panfusion Mosaic of Louisiana. Baton Rouge, Louisiana: Louisiana GIS Digital Map - May 2007 - Compilation DVD, LOSCO & LSU.

4 Meeker, J. R., Dixon, W. N., and Foltz, J.L. March/April 1995. The Southern Pine Beetle (*Dendroctonus frontalis)* Zimmermann. Entomologoy Circular No.396. Florida Department of Agriculture and Consumer Services. Division of Plant Industry. www.bionica.info/Biblioteca/Meeker1995Dendroctonus.pdf

5 Myers, J. H. 1993. Population outbreaks in forest Lepidoptera. American Scientist 81: 240-251. http://entomology.ifas.ufl.edu/creatures/trees/forest_tent_caterpillar.htm

6 National Aeronautics and Space Administration. MODIS Website. June 2010. http://modis.gsfc.nasa.gov/about/.

7 Price, Terry. 2004. *A Guide to Common Forest Pest in Georgia: Annosus Root Rot*. Macon, Georgia: Georgia Forestry Commission. http://www.forestpests.org/georgia/annososrot.html

8 Purdue University. 2001. *BP-48-W Ornamental Diseases: Dogwood Anthranconose*. West Lafayette, Indiana: Cooperative Extension Service. http://www.ces.purdue.edu/extmedia/BP/BP-48.html

9 Science Daily with Massachusetts Institute of Technology. 2007. *Human-Generated Ozone Will Damage Crops, Reduce Production.* http://www.sciencedaily.com/releases/2007/10/071027203000.htm

10 United States Department of Agriculture. 2008. *Pine colaspis: Colaspis pini.* Atlanta, Georgia: United States Forest Service: Forest Health Protection, Barber. http://www.fs.fed.us/r8/foresthealth/forestpests/insects/pcolasp.shtml

11 United States Department of Agriculture. 2010. Aerial Survey - Defoliation - Louisiana - 2010. Asheville, North Carolina: Forest Service Forest Health Protection Asheville Field Office.

12 University of Georgia Bugwood Network. 1996. Bark and Wood Boring Beetles of the World.: Single Year Map of Outbreaks- 1996. http://www.barkbeetles.org/spb/SYMofO.html.

13 Wikipedia. 2010. *Dutch Elm Disease*. http://en.wikipedia.org/wiki/Dutch_elm_disease

14 Wisconsin Department of Natural Resources. 2008. *Emerald Ash Borer: Host Trees*. Madison, Wisconsin: http://dnr.wi.gov/forestry/fh/ash/eab-host.htm

15 Wisconsin Department of Natural Resources. 2009. *Emerald Ash Borer: Management Options*. Madison, Wisconsin: http://dnr.wi.gov/forestry/fh/ash/eab-management.htm

16 Yates, H. O., III, Overgaard, N.A., and Koerbere, T. W. 1997. *Forest Insect & Disease Leaflet 70: Nantucket Pine Tip Moth*. U.S. Department of Agriculture Forest Service. http://www.na.fs.fed.us/spfo/pubs/fidls/nantucket/nantucket.htm

Patch previously used to designate staff at Louisiana's only State Forest at Woodworth, Louisiana.

Louisiana Forestry Related Issue Three: Invasive Species - Cogongrass

Cogongrass (*Imperata cylindrical)* is a warm-season, perennial grass that originates from Asia. It was first introduced into the United States through Mobile in the early 1900‘s as packing material for oranges. The leaves can reach 5 feet in length but are typically shorter. They are easily recognized by their sharp edges and middle, whitish midrib that is slightly off-center. Their below ground root system is extensive, growing as a solid, dense mat of underground stems called rhizomes. Cogongrass typically grows in a circular pattern from small patches to many acres. Cogongrass can grow in open areas and under the shade of a forest. Cogongrass has some distinctive vegetative features that aid identification. Cogongrass rarely is found as a single plant but quickly forms patches or infestations, often circular in outline. Plants vary in height, even in the same patch from 1 to 4 ft. tall (1,5). Taller leaves will lean over in late summer. Leaves measure ½-1 inch in width and are commonly 12-30 inches long. They rarely have a lush green color; instead, they appear mostly yellowish green. A reddening of the leaves sometimes has been observed in the fall, and is correlated to extreme changes in temperature. The whitish upper midrib of a mature leaf is often not centered on the blade as with most grasses thus making identification somewhat easier. Also leaf margins are rough to the touch due to tiny saw-like serrations, which is a common trait of other grasses as well. It is this rough margin, which may cut the tongue of a grazing animal, along with high silica content that make cogongrass a useless forage crop. The leaves appear to arise directly from the soil, giving the impression that the plant is stemless, but short stems are present. A few short hairs may arise at the node, or the place where the leaf arises from the stem, but otherwise the plant is hairless.

Another key identifying feature is the production of fluffy, white, plume-like seedheads in early spring. This spring flowering is contrary to most summer grasses, which flower later in the season. Cogongrass also has been documented to initiate flowering at other times of the year in response to disturbance such as herbicide application, fire, mowing, or the first hard frost (4). Seedheads range from 2 to 8 inches in length and may contain as many as 3000 seed. Each seed has silky, white hairs that aid in wind dispersal. Seed viability is variable and seed must land on bare ground for germination (3). Rhizomes of cogongrass are white, segmented and branched and have been found extending 48 inches below the soil surface, but more commonly completely occupy the upper 6-8 inches (2,5). Rhizomes are sharp-pointed and often pierce the roots of other plants and unprotected human feet and hands. Each rhizome segment can give rise to a new plant, which can occur with cultivation or partial herbicide control (3).

Cogongrass is a world-class invasive grass and a federally-listed noxious weed that continues to invade more lands and is widely regarded as the worst invasive threat in the Southern U.S. Since its multiple introductions in the early 20th century, it has spread to infest 1 million acres in Florida and tens of thousands of acres in Alabama, Georgia, Louisiana, Mississippi, South Carolina and Texas. Annual spread rates are estimated in the thousands of acres and its tolerance to shade means that infested acreage includes interior forests. (7). Cogongrass is an aggressive invader of natural and disturbed areas throughout the Southeast. It disrupts ecosystem functions, reduces wildlife habitat, decreases tree seedling growth and establishment success, and

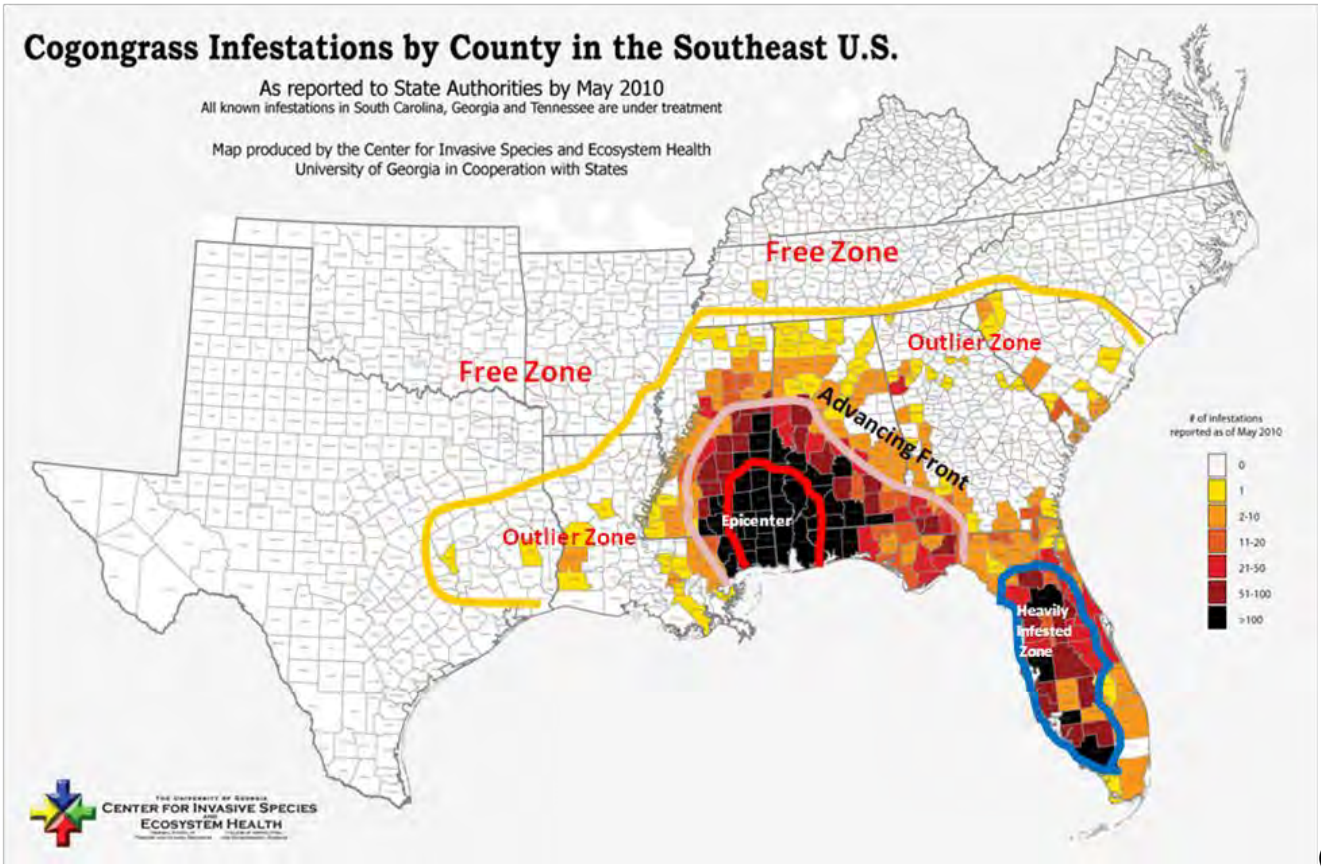
alters fire regimes and intensity. Recognizing the presence of cogongrass is necessary before beginning any management activities. Cogongrass is a fire adapted species, meaning that it thrives where fire is a regular occurrence (1,4) As a result, cogongrass burns hot and readily, creating safety and property loss concerns. Wildfire in Cogongrass can kill mature and seedling trees and native plants, furthering its domination. Rights-of-way managers loathe cogongrass for its unsightly growth habit, difficulty in mowing, and displacement of more manageable species.

Cogongrass spreads by both seed and rhizomes. Windblown seed can move several miles in air currents and both seed and rhizomes move even farther when hitchhiking on equipment, mulch, and fill materials. Spread along highway right-of-ways through road construction and other maintenance activities have resulted in widespread movement throughout Alabama, Mississippi, Louisiana and Florida. To date, most infestations in Georgia and South Carolina have been introduced by contaminated equipment used for site preparation, tree planting, wildlife food plot preparation, powerline installation, as well as movement of contaminated fill dirt and other direct movement by man.

Cogongrass spreads by both wind-blown seeds and underground creeping rhizomes. The rhizomes can form a dense mat in the upper 6-8 inches of soil and may comprise as much as 80% of the total plant mass (1,2). It is the rhizome system that makes this plant particularly hard to control. Elimination of aboveground portions of the plant can be easily accomplished, but if the rhizomes are not killed or removed, rapid re-sprouting and re-growth will occur.

Conservative estimates put the infested acreage between 500,000 and one million in Alabama, Mississippi, and the Florida panhandle. In Alabama, cogongrass has been found in 32 counties and as far north as Winston County (see map). Regionally, cogongrass can be found throughout Mississippi and Florida, and

in scattered infestations in Georgia, Louisiana, S. Carolina, Texas, and Virginia. Once cogongrass gains a foothold in an area, it's just a matter of time before it spreads from the infested site. Therefore, it is very important to recognize and eliminate cogongrass before it spreads from an infested site and understand ways to prevent its movement and introduction. **Map 12**



(1b)

Cogongrass is an opportunistic plant and invades a wide range of non-cultivated habitats including rights-of-way, forests, pastures, orchards, and waste areas. Cogongrass thrives in full sunlight, but may extend well into a mature forest stand, especially if there is no intermediate tree or shrub layer. Cogongrass will not grow in saturated soils, but tolerates periodic flooding reasonably well. Although cogongrass will not tolerate continued soil disturbance, it is a rapid invader of recently disturbed soil such as that found in road construction areas, industrial lands, mechanically site prepared forest land, and even the container-grown ornamental industry. Cogongrass has never been a pest of row-crop agriculture in the U.S., but the rapid adoption of reduced tillage practices could present a potential threat. Other industries potentially impacted by cogongrass include sod production and wildlife. Increasingly, homeowners in forested areas are placed at risk by cogongrass fueled wildfires. (6)

Louisiana is assessing the cogongrass infiltrations within our state. LDAF has been recording the locations of cogongrass infestations by GPS locations and acres. These areas are being monitored and assessed annually. LDAF will continue to work toward making landowners aware of the problems that cogongrass causes, as well as the importance of the control of cogongrass. Offering information to the landowners in Louisiana is an important goal in fighting the spread of this invasive species.

References and Citations

1 Bryson, C.T. and R. Carter. 1993. "Cogongrass, Imperata cylindrica, in the United States." *Weed Technology* 7:1005-1009.

2 Colvin, D.L., J. Gaffney, and D.G. Shilling. 1994. *Cogongrass: biology, ecology, and control in Florida*. Gainesville, Florida: University of Florida Institute of Food and Agricultural Sciences. Circular No. SS-AGR-52.

3 Dickens, R., 1973. "Control of Cogongrass (*Imperata cylindrica*)." Alabama Highway Research Report No. 69. State of Alabama Highway Dept & Federal Highway Administration. pg 90.

4 Dickens, R. 1974. "Cogongrass in Alabama after sixty years." *Weed Science* 22(2):177-179.

5 Dozier, H., J.F. Gaffney, S.K. McDonald, E.R.R.L. Johnson, and D.G. Shilling. 1998. "Cogongrass in the United States: history, ecology, impacts, and management." *Weed Technology* 12:737- 743.

6 Faircloth, Wilson H., et al. 2005. *WANTED Dead not Alive: COGONGRASS*. Auburn, Alabama: Alabama Cooperative Extension System.

7 Miller, James H. 2007. "The Context of the South's Cogongrass Crisis." *The Cogongrass Management Guide.* ed. Nancy J. Loewenstein and James H. Miller. Auburn, Alabama: Alabama Cooperative Extension System.

8 Willard, T.R., D.G. Shilling, J.F. Gaffney, and W.L. Currey. 1996. "Mechanical and chemical control of Cogongrass (*Imperata cylindrica*)." *Weed Technology*. 10: 722-726.

Map Reference:

1b University of Georgia. 2010. *Cogongrass Infestations by County the Southeast U.S.* Center for Invasive Species and Ecosystem Health. http://bugwood.org/index.cfm

Louisiana Forestry Commission patch from the era before Louisiana Forestry merged with Agriculture.

Louisiana Forestry Related Issue Four: Urban Sprawl and WUI

The population of Louisiana has been in flux through recent years. Following four major hurricanes in the last five years, the exodus and return of the state's population has led to increased movement out of urban areas into the rural frontier. Without question, the Florida Parishes, the area of the state north of Lake Pontchartrain and New Orleans, has been impacted the most. This section will discuss this impact and show the regions of the state that are being impacted by interface and intermix.

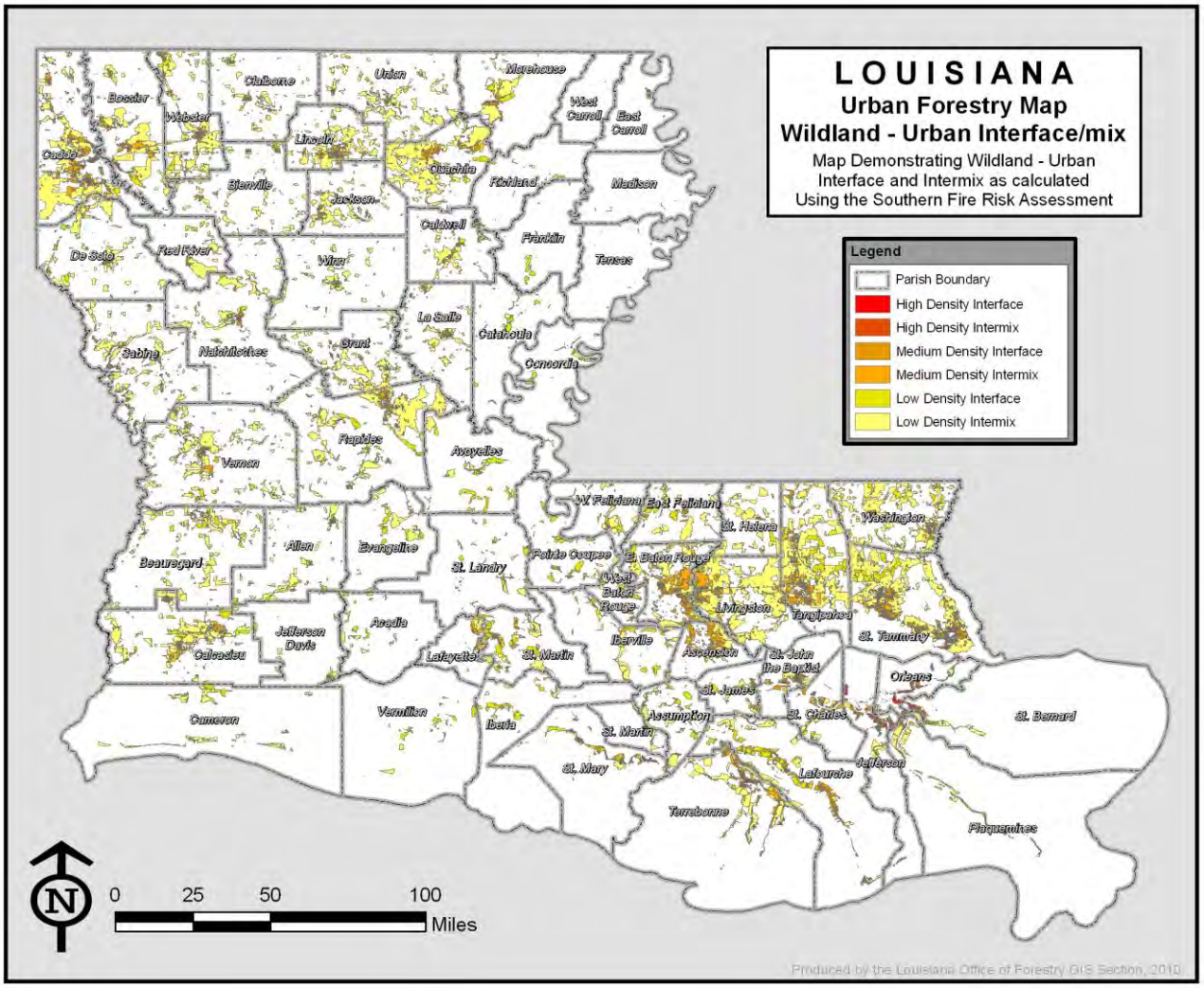
Unprecedented population growth and the urbanization of Louisiana lead the list of forces that could undermine forest sustainability in decades to come. Areas of Louisiana experienced rapid population growth throughout the _90s, but it really escalated after Hurricane Katrina in 2005. Effects of this rapid growth include declining air and water quality and increased need for stormwater management resources. Partly, as a result of the loss of tree cover, some communities may not be able to meet clean air and water standards. Increasing population threatens to accelerate this trend.

Figure 26: Description of High, Medium, and Low Intermix and Interface criteria

Description	GIS data attribute value
Low density interface: Areas with housing density >= 6.177635 (housing units/km^2) and < 49.42108 (housing units/km^2), Vegetation <= 50%, within 2.414 km of an area with >= 75% Vegetation.	Low Density Interface
Medium density interface: Areas with housing density >= 49.42108 and < 741.3162, Vegetation <= 50%, within 2.414 km of an area with >= 75% Vegetation.	Medium Density Interface
High density interface: Areas with housing density >= 741.3162, Vegetation <= 50%, within 2.414 km of an area with >= 75% Vegetation.	High Density Interface
Low density intermix: Areas with housing density >= 6.177635 and < 49.42108, Vegetation > 50%.	Low Density Intermix
Medium density intermix: Areas with housing density >= 49.42108 and < 741.3162, Vegetation > 50%.	Medium Density Intermix
High density intermix: Areas with housing density >= 741.3162, Vegetation > 50%.	High Density Intermix

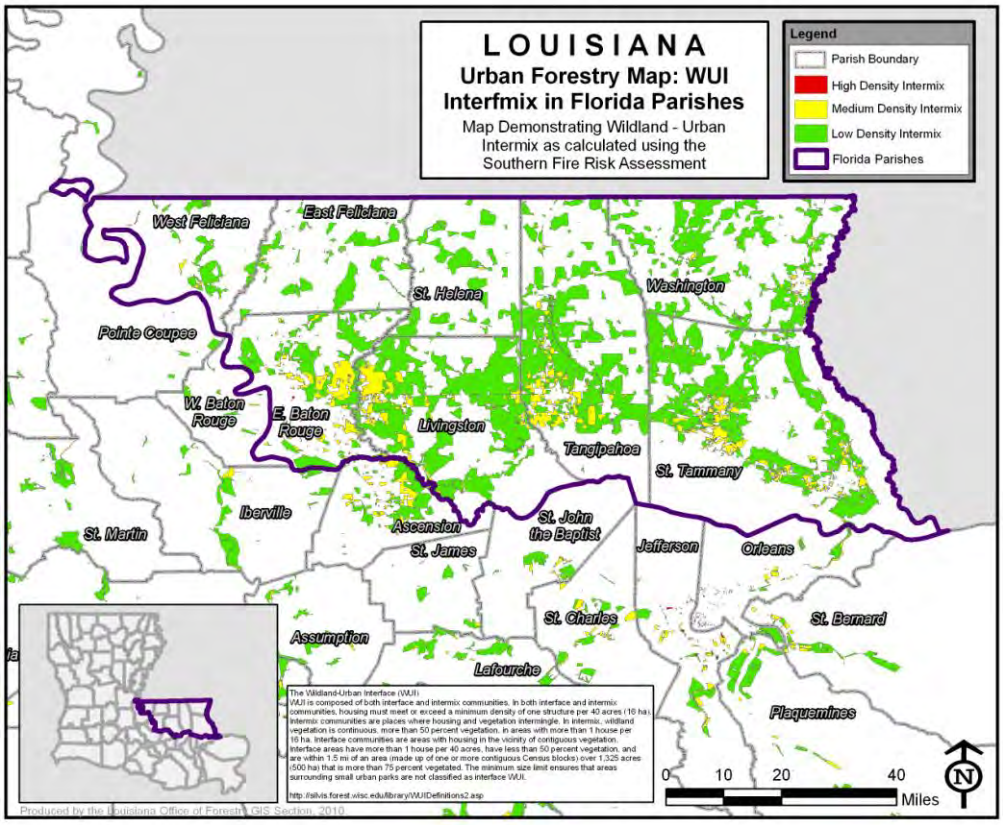
(1)

Map 13

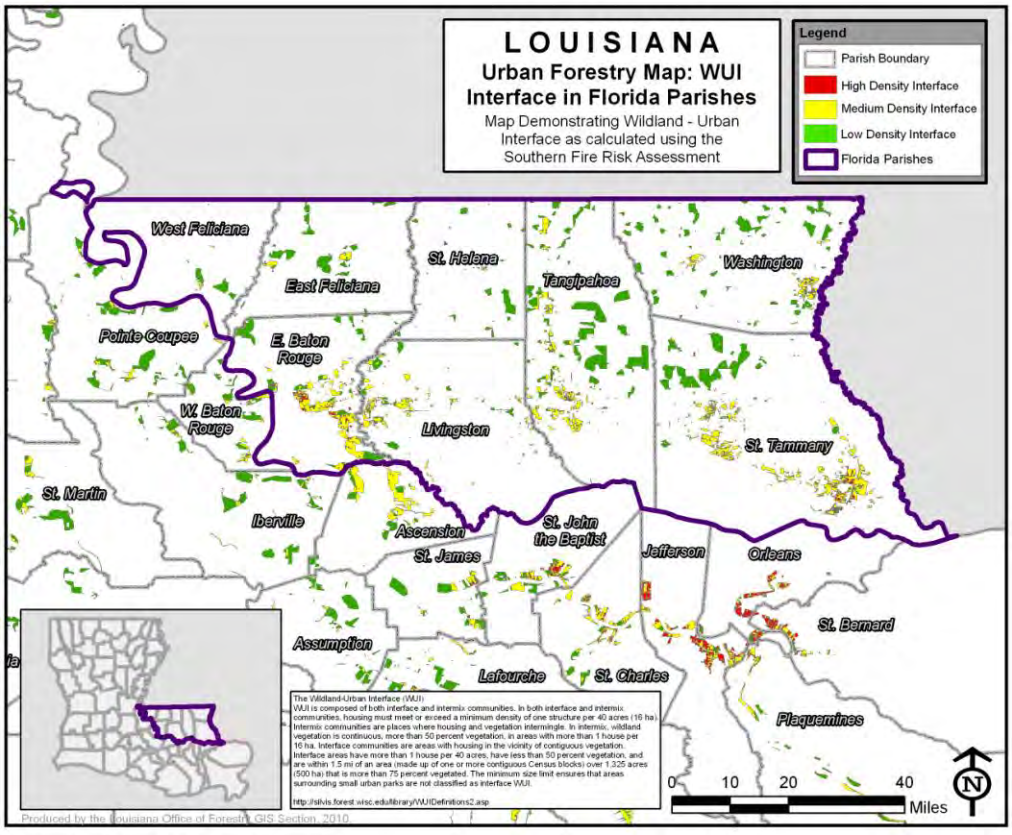


(3)

- *The Wildland-Urban Interface (WUI)*
  WUI is composed of both interface and intermix communities. In both interface and intermix communities, housing must meet or exceed a minimum density of one structure per 40 acres (16 ha). Intermix communities are places where housing and vegetation intermingle. In intermix, wildland vegetation is continuous, more than 50 percent vegetation, in areas with more than 1 house per 16 ha. Interface communities are areas with housing in the vicinity of contiguous vegetation. Interface areas have more than 1 house per 40 acres, have less than 50 percent vegetation, and are within 1.5 mi of an area (made up of one or more contiguous Census blocks) over 1,325 acres (500 ha) that is more than 75 percent vegetated. The minimum size limit ensures that areas surrounding small urban parks are not classified as interface WUI.
- *Buffer Distance for Interface*
  The California Fire Alliance (2001) defined "vicinity" as all areas within 1.5 mi (2.4 km) of wildland vegetation, roughly the distance that firebrands can be carried from a wildland fire to the roof of a house. It captures the idea that even those homes not sited within the forest are at risk of being burned in a wildland fire. We adopt this buffer distance to identify interface areas. With minimum housing densities, vegetation types, and interface buffer distances determined, the operational definition of the WUI is complete. (1)



(3) **Map 14**



(3) **Map 15**

The following text has incorporated language and concepts from the Georgia Statewide Assessment of Forest Resources (2).

Urbanization and Water

Conversion of forest land to urban use is one of the threats to the sustainability of Louisiana's water quantity and quality. Urbanization effectively and permanently removes acreage from forest cover, resulting in increased storm runoff and increased streamflow that causes streambank erosion, sedimentation and flooding. Further effects of forest cover loss include higher levels of pollutants and increased water temperatures that degrade fish and wildlife habitat. Development in the wildland-urban interface often occurs in the headwaters of streams and rivers that are home to many of Louisiana's endemic species which are vulnerable to environmental changes and pollutants (2).

Urbanization and Biodiversity

Over time, some species have successfully adapted to extensive landscape changes resulting from residential and commercial development, agriculture, intensive forestry, stream impoundment, pollution and additional factors that have accompanied human population growth and a high rate of natural resource consumption. However, other species are less adaptable and are in need of careful management to prevent further declines in the face of extensive habitat loss. For example, populations of the northern bobwhite, red-cockaded woodpecker, gopher tortoise and many others that once occupied the extensive and highly diverse longleaf pine savannas, characterized by open forest canopy with herbaceous ground cover maintained through frequent fire, have all decreased as their habitats have dwindled (2).

Urbanization and Wildfire

Urbanization places more lives and property at risk from wildfire and reduces options for proper fire management. The most important function/work management challenge for forestry professionals is to ensure public safety by providing fire prevention services through prescribed fire as well as wildfire suppression. The sustainability of Louisiana's forest is dependent on attention to both of these critical services. Urbanization makes wildfire management complex. Tactics and strategy, roles and responsibilities, coordination of responders, media relations, liability, planning, logistics, finances and firefighter safety become more difficult to manage in the wildland-urban interface (WUI). Preparation of

forest rangers and cooperators for WUI wildfires requires additional, intensive training at considerable expense (2).

Prescribed Burning Challenges

Increasing urbanization challenges Louisiana's ability to maintain, much less increase the prescribed fire program. This program is Louisiana's best fire prevention tool for mitigating wildfire threat. As Louisiana's population increases in the WUI, it takes extra time and effort to consider how every prescribed fire impacts communities. Prescribed fire managers are trained to minimize smoke impacts on the public and to communicate fire projects to neighboring communities. Planning and execution of prescribed fires become increasingly complex, requiring critical decisions and better trained practitioners. However, extra precautions increase costs and reduce the cost/benefit ratio of

prescribed burning. Although the threat of wildfire may be reduced for communities through prescribed fire, few communities have been motivated to help alleviate costs for this practice that ensures forest health and reduces wildfire risk. Apprehension about fire and smoke increases with urbanization. Air quality has become a major concern in Louisiana, and prescribed fire has been targeted as one of many sources of harmful emissions. Drift smoke from prescribed fire and wildfires concerns urban dwellers. An important mission is to help Louisianans understand the life sustaining properties of healthy forests, and the natural role that fire plays in ecosystems (2).

References and Citations

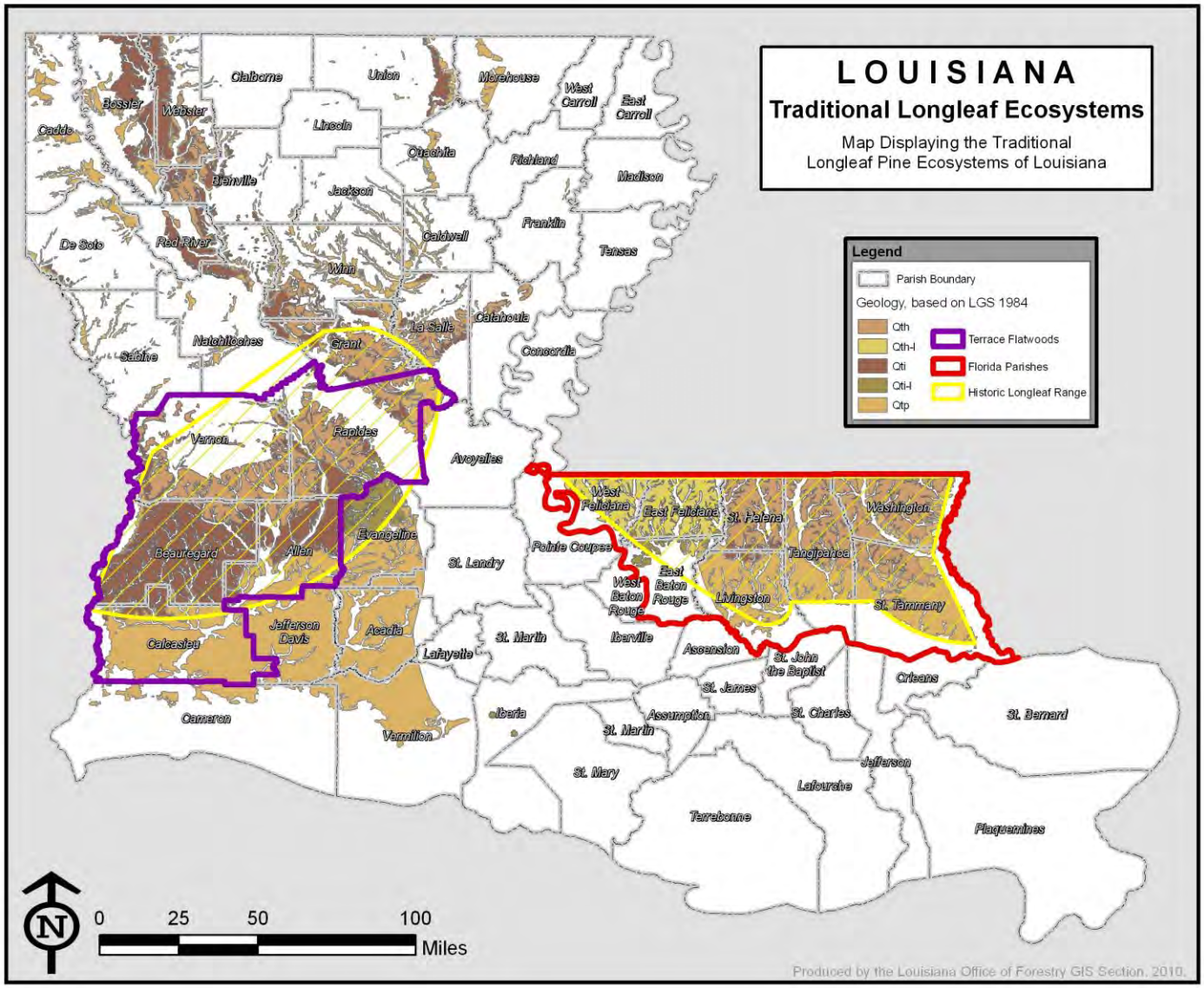
1 Silvis Lab. 2001. The Wildland-Urban Interface (WUI) defined. Credited to Vogelmann, J.E., et al. 2001. *Completion of the 1990s National Land Cover Data set for the conterminous United States from Landsat Thematic Mapper data and ancillary data sources.* Photogrammetric Engineering & Remote Sensing 67: 650-662. http://silvis.forest.wisc.edu/library/WUIDefinitions2.asp

2 Georgia Forestry Commission. 2010. *Georgia Statewide Assessment of Forest Resources.* Macon, Georgia: Georgia Forestry Commission

3 Sanborn Map Company, Inc. circa 2005. Southern Fire Risk Assessment Published Results: 1997-2002. Portland, Oregon: Sanborn Map Company.

Louisiana Forestry Related Issue Five: Longleaf Regeneration

There are two distinct regions of Louisiana that are part of longleaf pine's historical range. These are the Florida Parishes in the east and the Terrace Flatwoods to the west. Both these regions were heavily logged early in Louisiana's timber industry history and both have shown a reticence in re-establishment. The primary factors to this challenge are based in time and finances. Loblolly pine has successfully and profitably been grown in these areas in recent years. Although these regions of the state are no longer primarily in longleaf, they have retained the incendiary nature typically observed in longleaf ecosystems.



Map 16 (4)

Map 17 (5)

Recent literature has suggested that returning longleaf to its natural ecosystems could be a successful way to increase terrestrial carbon, based upon longleaf's low mortality rate and increased time between harvests. (2). Further, as longleaf would return to areas of the state that have continued to show a high fire threat, there may be a coinciding reduction in loss of investment as longleaf is better suited to survive fire.

The open, fragrant longleaf ~~–~~piney woods" are as much a part of the Southern culture and history as cornbread. Yet, these forests are truly ~~–~~America's Longleaf," literally building our fledgling nation. First, the forests were a worldwide source of naval stores—gum, pitch and other products absolutely necessary to keep wooden boats of the day afloat. Then, as a source of lumber—prized for its rot resistance, straight grain and lack of knots, longleaf pine was used to build the cities of Savannah and Williamsburg (among

many others) and the country's largest wooden building (a Sears warehouse in Chicago). More recently, longleaf forests have been cleared for agriculture, converted into plantations of other pines or removed in the wake of expanding human development (1).

The longleaf pine ecosystem is one of the most ecologically diverse in the world and is home to some of the most rare and unique plants and animals on the continent:

- Nearly 900 plant species are found in longleaf forests, and nowhere else in the world.
- In some portions of healthy longleaf forests, 140 different kinds of plants can be found in an area the size of a house and 40 different species in a single square yard.
- 26 federal listed endangered species are part of the longleaf ecosystem including the red-cockaded woodpecker, gopher tortoise and roughleaf loosestrife. (1)

These endangered species require a habitat becoming rare in Louisiana and throughout the southern United States. To thrive, they need open pine forests, known as longleaf pine savannahs. In addition to the woodpecker and tortoise, these forests are home to a spectacular array of plants and animals (3).

As longleaf pine forests have disappeared over the past century to less than10 percent of their original extent in Louisiana, many of these species have made their way onto the state's list of Species of Conservation Concern. Active management, especially prescribed burning, will be required to maintain these elements of Louisiana's natural heritage.

Longleaf pine forests once covered vast areas of central, southwestern and southeastern Louisiana north of Lake Pontchartrain. About 4 million acres were once longleaf pine forest in Louisiana. Botanists and geologists often subdivide the longleaf forests into flatwoods and savannahs, depending on the topography and soils, but the basic structure remains the same. Longleaf pine trees form a sparse overstory, the midstory is open, and the ground vegetation includes lush growth of grasses and other herbaceous vegetation (3).

Persistence of longleaf pine forests requires one regular disturbance – fire. Maintaining and increasing this biodiversity will not be accomplished through hands-off protection efforts alone. In fact, quite the opposite is needed. Longleaf ecosystems require considerable effort to restore, and are only maintained through the frequent use of prescribed burning. The result is a unique situation where timber production, game management and biodiversity conservation are not only compatible, but mutually beneficial (1). Fire

stimulates flowering by many of the herbaceous plants, reduces invasion by woody species common in hardwood forests, and allows dominance by longleaf pine (3).

- **Timber production.** Harvesting high value, mature trees provides valuable forest products and vital economic incentives for private landowners. And, longleaf forests are more resistant to hurricane winds and some pests the other pines.

- **Game management.** Bobwhite quail, wild turkey, and white-tailed deer thrive in managed longleaf forests. Most of the traditional quail plantations manage for longleaf pine.

- **Biodiversity conservation.** Given careful management, the same forests that provide timber and game also provide a home to countless unique species of plants and animals (1).

Indeed, the entire system has evolved over millennia in response to lightning-induced fires during the growing season. Most areas historically burned every one to four years. In the absence of fire, the midstory becomes crowded, ground vegetation thins, and the canopy eventually closes with a mixture of hardwoods and pines. These conditions eliminate many of the specialized plants and animals of the open forest (3).

Although these forests get their name from the magnificent tree that dominates the park-like landscape, the heart of the biological diversity resides in the sublime vegetation underfoot. Some 300 plant species grow in Louisiana‘s savannahs, with as many as 30 species in an area the size of a hula hoop. At this scale, not even rainforests have a diversity of species comparable to our native grasslands. Characteristic plants include dozens of species of grasses, sedges and rushes, as well as showier plants like orchids, asters and pitcher plants. Many of these species are said to be endemic to fire-maintained habitats, which means that they do not occur in other habitats. Indeed, according to the Louisiana Natural Heritage database, the savannahs of southeastern Louisiana host more of the state‘s rare plants than any other habitat (3).

Animals of the longleaf pine forests show a similar pattern. Several species, including the red-cockaded woodpecker, require longleaf pine trees. Most species, however, are more closely associated with the ground vegetation. The Louisiana Department of Wildlife and Fisheries‘ list of Species of Conservation Concern includes more than 25 vertebrate species from longleaf pine forests. More than half of the amphibians, terrestrial reptiles and terrestrial mammals on the list occur in these habitats. Among birds, these grasslands are home for some of the most habitat-specific species in the state, including Bachman‘s and Henslow‘s sparrows, as well as game species like turkey and bobwhite quail (3).

LSU AgCenter researchers have been studying Henslow‘s sparrows in longleaf savannahs for six years. Results demonstrate how fire helps to maintain habitat quality for savannah species. Henslow‘s sparrows breed in grasslands of the Midwest and Northeast, where their numbers have declined precipitously in tandem with the conversion of native prairie to agriculture. They arrive in Louisiana in October and November and remain here until March or April. By tracking bird abundance in the same savannahs over multiple years, we have shown how birds respond to growing-season fire. Henslow‘s sparrow abundance peaks in the first winter after burning, then declines with each successive year without burning. After three years without fire, the birds are gone. Data suggest that the important change in vegetation during this period is the gradual closing of herbaceous vegetation right at ground level. These birds are extremely secretive, moving like rodents at ground level beneath the leaves of herbaceous plants. They probably use the small openings between bunches of grass as they forage for a diverse variety of seeds available on the ground (3).

The research with Henslow‘s sparrows reinforces historical data in showing that longleaf forests require regular burning. In 21st Century Louisiana, this means prescribed burning by managers. Central to this management is public recognition of the critical importance of fire. Fortunately, the extensive areas of longleaf forest in Kisatchie National Forest and Fort Polk are being actively managed with fire, as are smaller areas such as Sandy Hollow and Lake Ramsay Wildlife Management Areas and the Nature Conservancy‘s Abita Flatwoods Preserve. Some of these areas have required removal of undesirable plants to recover from years of fire suppression (3).

Given the limited extent of longleaf forests in Louisiana, even small areas could support native biodiversity, especially for plants. Although using fire makes management more difficult for owners of small parcels of land, some landowners are attempting to restore or maintain longleaf forests. Longleaf pine doesn‘t produce the return of short-rotation loblolly pine, but it is valuable timber when harvested (3).

What does the future hold for Louisiana‘s longleaf savannahs and their wildlife? Savannahs on public land should persist, if managed properly. These large blocks of forest hold the most promise for wildlife, as some species have already disappeared from smaller remnants. Unfortunately, some species have declined to such small populations that their survival remains in the balance. Gopher tortoises, red-cockaded woodpeckers, and dozens of less charismatic plants and animals need every bit of longleaf savannah that remains (3).

References and Citations

1 America's Longleaf. 2008. *A Restoration Initiative for the Southern Longleaf Pine Ecosystem.* The Steering Committee of the Regional Working Group. Draft: June 17, 2008. Lark Hayes, Coordinator.

2 Kush, John C. et all. 2003. "Longleaf Pine: The Southern Pine for Increasing Storage of Terrestrial Carbon?" *Proceedings of the Fourth Longleaf Alliance Regional Conference*. Southern Pines, North Carolina: Longleaf Alliance Report No. 6.

3 Stouffer, Philip C. 2006. "Longleaf Pine Forests: Wildlife of Louisiana's Threatened Grasslands". *Louisiana Agriculture.* Spring 2006.

4 United States Geological Survey - National Wetlands Research Center. 1998. Digital representation of the *Geologic Map of Louisiana: 1984*. Baton Rouge, Louisiana: Louisiana GIS Digital Map - May 2007 - Compilation DVD, LOSCO & LSU.

5 United States Geological Survey. 2001. Land Use - Land Cover Classification. Baton Rouge, Louisiana: Louisiana GIS Digital Map - May 2007 - Compilation DVD, LOSCO & LSU.

Enforcement patch from the era of the Louisiana Forestry Commission.

Louisiana Forestry Related Issue Six: Cypress-Tupelo Management

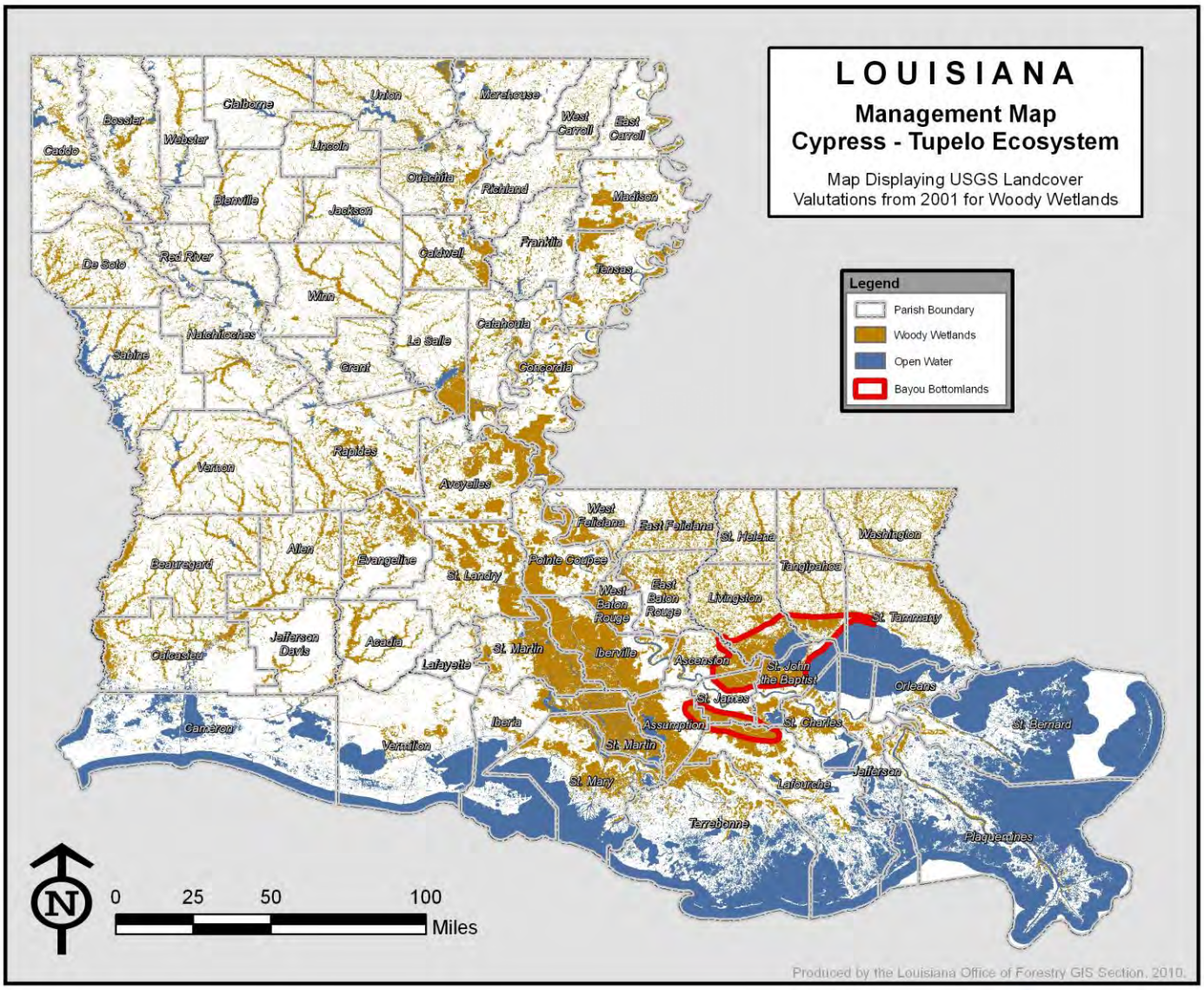
A significant portion of this text is from "The Truth About Cypress in Louisiana" by Janet Tompkins, editor for the Louisiana Forestry Association.

For those who live in south Louisiana, a public campaign predicting the annihilation of cypress in the state has been ongoing for the last several years. "Battle over cypress" was a headline in the *Baton Rouge Advocate* quoting forestry officials on one side and so-called environmentalist on the other. So, what is the truth and how did it all get started? (2). Four years ago an ordinary logging job in Livingston Parish got the attention of some people around the Lake Maurepas area in southeast Louisiana. The EPA did not have a problem with the cut because it fell under the status of an ongoing silvicultural activity. But the U.S. Army Corps of Engineers stepped in using an 1899 Rivers and Harbors Act to shut it down. (2). In these wetland forests where cypresses grow, harvest usually takes place during the dry season. Mat logging is the recommended practice for the sites to prevent soil disturbance. The logger fells a row of trees to use as a road for the heavy equipment to travel on. When the logger is finished, the log mats are removed. (2). Only the New Orleans District of the Corps is invoking the Rivers and Harbors Act. In fact in Florida, the forestry community and the environmental community have agreed to a set of Best Management Practices that call for mat logging in these forests.

Why are these trees dying?

It is not a new problem in Louisiana. In short, the problem is water and salt. Water control measures to prevent flooding in some areas have dumped more water in others. Some areas like the lower Atchafalaya have trees dying from too much water and too much saltwater. Canals cut into the landscape of the state have brought saltwater further inland to further erode the viability of standing trees and to prevent the growth of new cypress which typically grows from sprouts by natural regeneration. (Tompkins. 2007).

Regional increases in flooding are likely to reduce the productivity of baldcypress-water tupelo swamps in coastal Louisiana. Although these trees are merchantable for lumber production, it will be important to design appropriate management plans for these sites. Given the demand for the wood but reduced site productivity in many natural stands, establishing baldcypress plantations may be a more appropriate long-term strategy for commercial timber production. More baldcypress silviculture research is needed to support intensive management. (1)



Map 18 (3)

The situation is the same in Louisiana as we have in all of the South. Private, non-industrial landowners own about 80% of the commercial forests. If they cannot manage their forest, what incentive is there to keep them in forests? The biggest loss of forestland across the South has been development for homes and commercial properties (2). More than 800,000 acres of second-growth stands of baldcypress-water tupelo grow in the swamp forests of coastal Louisiana. Most of these stands regenerated naturally after the timber extraction period in the early 20th century and received little subsequent attention. These trees are now large enough to be once again attractive for harvest. People are particularly interested in baldcypress because of the perception that it is naturally rot-resistant (1). Louisiana harvest about 30 million board feet of cypress

each year but there is also about 21 million board feet of cypress dying in our forest due to various reasons, mostly saltwater intrusion. (2). Markets for baldcypress dimensional lumber and garden mulch are developing despite the fact that the second-growth trees are not yet old enough to contain substantial rot-resistant heartwood (1). Less than 2% of the trees harvested in Louisiana are cypress. Less than 20% of that 2% goes to mulch. Most landowners sell their cypress for higher value products like cypress lumber that is found in homes throughout the state. The by-products from these sawmills should go into other markets like mulch. Otherwise, these operations would have to deal with the disposal of debris in a non-beneficial way (2). Cypress grows across the state, not just in south Louisiana. Loblolly/shortleaf pine forests are the most prevalent in the state, but gum/oak/cypress forests are the next most common forest type. The Louisiana Forestry Association, a program facilitator for the Sustainable Forestry Initiative, supports the harvesting of cypress in a sustainable manner. Louisiana Best Management practices guide landowners, loggers and foresters in management of cypress forests. If landowners stopped cutting cypress trees, there would be no fine wood for furniture or other products. But also consider that landowners would have no economic incentive to keep their land in productive forests. The forest value would disappear (2).

References and Citations:

1 Keim, Richard F., Chambers, Jim F., and Dean, Thomas J. "Baldcypress Site Relationships and Silviculture". *Louisiana Agriculture*. Spring 2006

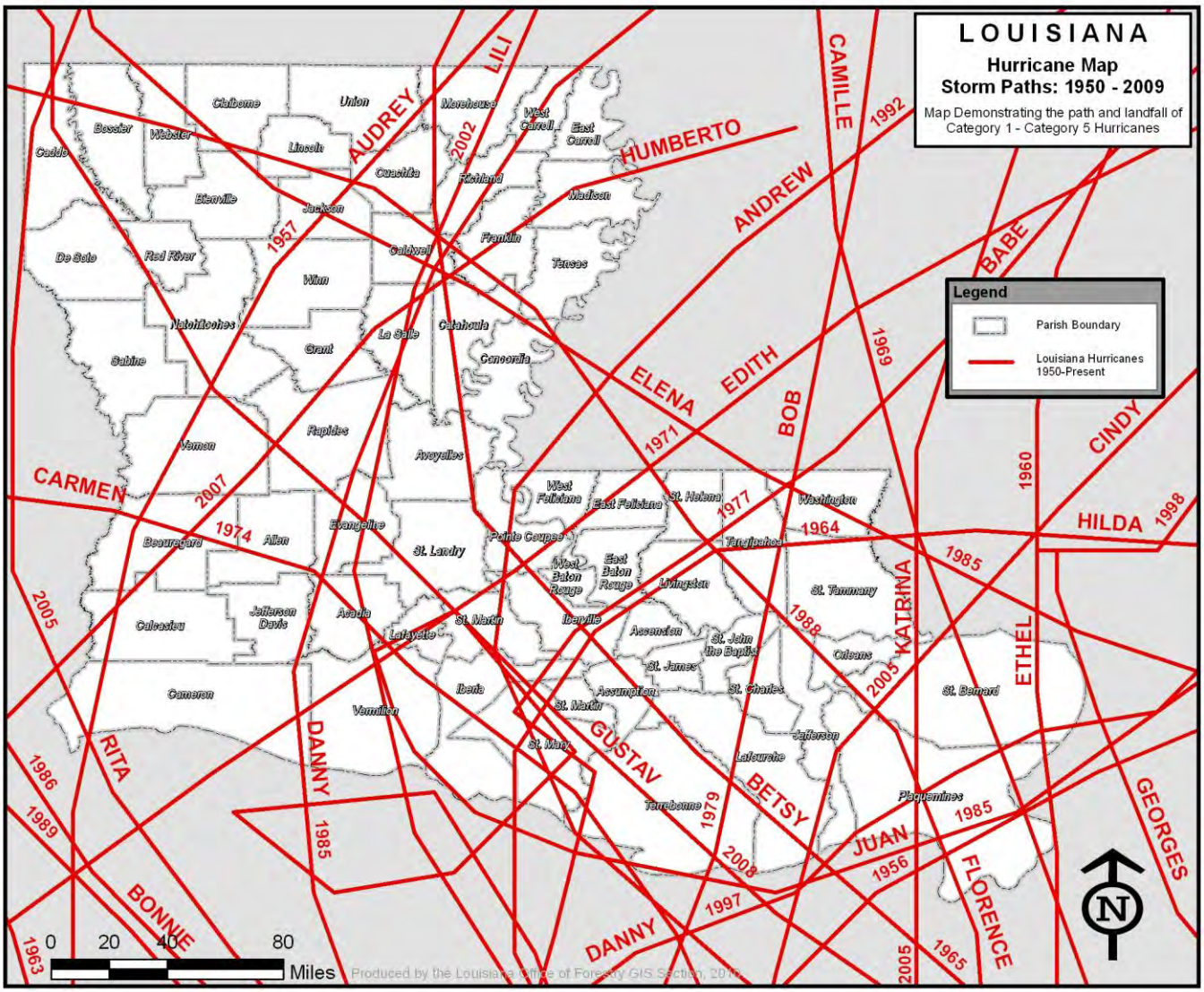
2 Tompkins, Janet. "The Truth About Cypress in Louisiana" *Forest & People*. Second Quarter. 2007. 4 & 5.

3 United States Geological Survey. 2001. Land Use - Land Cover Classification. Baton Rouge, Louisiana: Louisiana GIS Digital Map - May 2007 - Compilation DVD, LOSCO & LSU.

Louisiana Forestry Related Issue Seven: Storms

The ubiquitous Gulf hurricane will always be a potential risk to the Louisiana forestry industry. The quantifiable risk to the landowner and the timber market in general will be typically in flux, based in large part on the current health of our timber industry before a storm impacts the environment. Once a Gulf storm has laid trees on the ground, the market floods, supply exceeds demand, and the price to the land owner, generally attempting to salvage something out of ecosystem devastation, will plummet. The Office of Forestry's Management Branch has, in the past, attempted to assist landowners who are caught suffering after a storm and promotes immediate reconnaissance of the impacted areas to determine the degree of loss across the region.

Map 19



(1)

At greatest risk, the Louisiana coastal zone, including the Florida Parishes and the Bayou Bottomlands (see the Eco-cultural map in the Conditions and Trends section) will likely be the most impacted. However, examining the historical hurricane map, another potential hot spot for damage lies in the Upper Louisiana Delta, where storm tracks eventually converge before moving north, across the region.

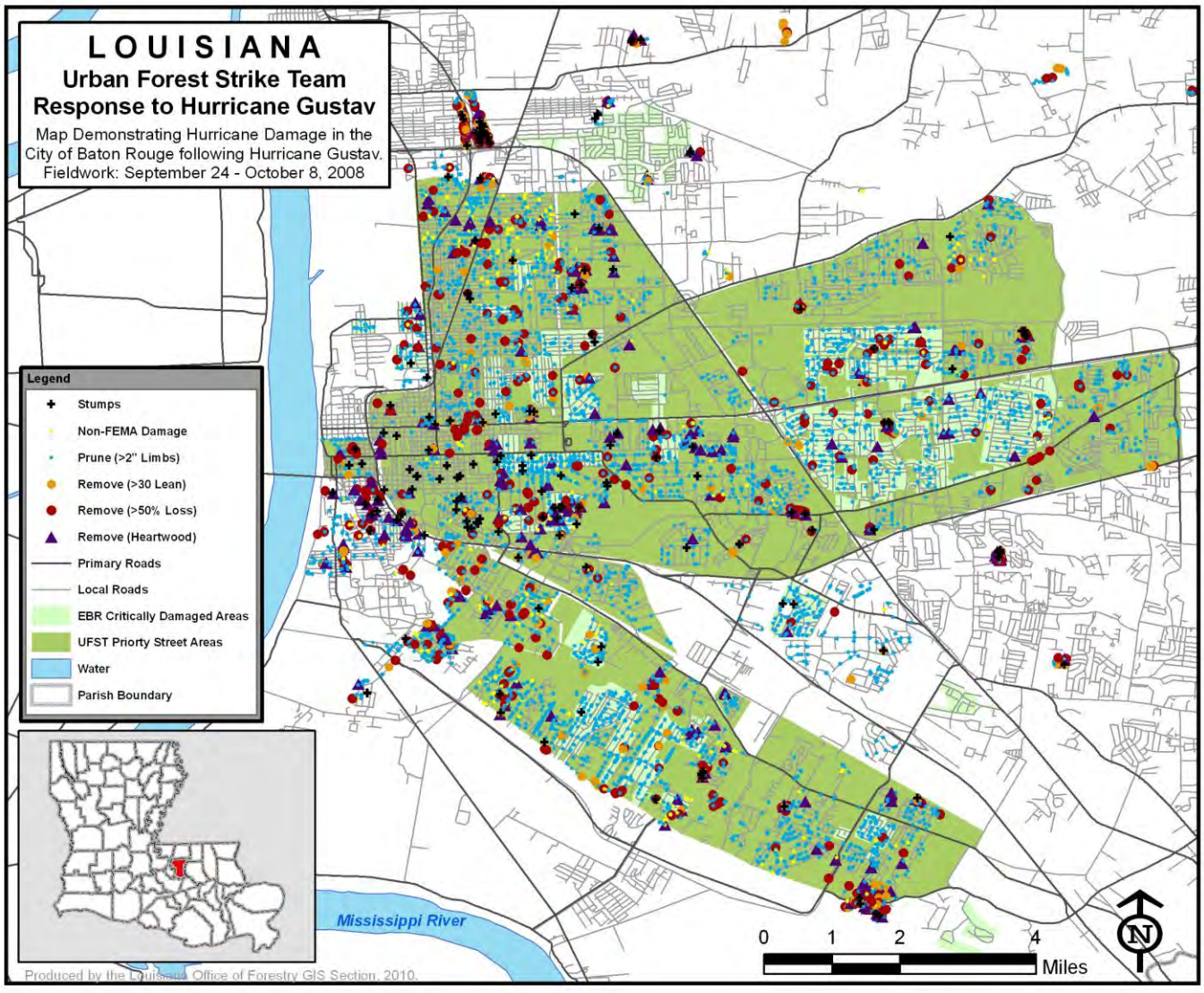
Hurricane Gustav

While this section may fit equally well in a discussion of Urban Forestry, the Louisiana Office of Forestry participated in an exhaustive tree inventory of the City of Baton Rouge and a considerable portion of East Baton Rouge Parish during the end of September and the beginning of October, 2008. Following the destructive forces of Gustav, which landed with winds surpassing 100 mph and brought gusts of up to 90 mph across the City of Baton Rouge, significant damage was sustained by the urban forest. The Urban Forest Strike Team, headed by Dudley Hartel, congregated in Baton Rouge and, with the assistance of the Office's urban foresters and GIS Section, conducted a street by street examination of the storm's damage.

Figure 27: *Office of Forestry after Hurricane Gustav*

During this storm, the Office of Forestry received massive structural damage to the Baton Rouge Headquarters as water penetrated the roof, portions of which were torn away. Following the storm, all equipment was removed by clean-up crews and stored as the walls were rebuilt and flooring replaced. For weeks, the Office of Forestry operated out of a small, cramped computer lab. The GIS Section re-acquired

enough hardware to provide GIS support to the Strike Team, collecting field data at day's end and creating maps for work accomplished and work planned. The accompanying map displays the results of these inventories over Baton Rouge proper. **Map 20**



(2)

References and Citations:

1 National Oceanic and Atmospheric Administration. 2010. Historical Hurricane Tracks. http://csc-s-maps-q.csc.noaa.gov/hurricanes/viewer.html

2 Hartel, Dudley. 2008. Data from the Urban Forest Strike Team following Hurricane Gustav.

Louisiana Forestry Related Issue Eight: Hardwood Regeneration

The Mississippi Alluvial Valley (MAV) is located along the course of the Mississippi River, including portions of seven states (Illinois, Missouri, Kentucky, Tennessee, Arkansas, Mississippi, and Louisiana), extending south from Cairo, Illinois to the Gulf Coast of Louisiana. The Mississippi River flows southward through the central United States and Drains roughly 41% (approximately 79 million acres) of the conterminous United States (15). The MAV is made up of 6 drainage sub-basins including the St. Francis, Western Lowlands, Arkansas Lowlands, Yazoo, Boeuf, and Tensas Basins, with major tributaries to the Mississippi River including the St. Francis, Arkansas, White, Bayou Bartholomew, and Yazoo Rivers (18). The rich alluvial soils of this 25-million acres floodplain have historically supported vast expanses of mixed-species, deciduous forest (5), known as the bottomland forest of the MAV.

The MAV is a highly productive environment as result of abundant water and the substrate of alluvial deposits high in mineral and organic nutrients. Bottomland hardwood systems are described as among the most productive and diverse ecosystems in North America (15). They are maintained by the natural hydrologic regime of alternating wet and dry periods and historically these forests served as an integrated system linked by flood waters to import, store, cycle and export nutrients (26,15). These bottomland hardwood forest contain a diversity of overstory species, are characteristically rich in wood vines and shrubs sand may feature an understory with large monocots such as cane (*Arundinaria gigantes*) and palmetto (*Sabal minor*) (26,15,5). Natural regeneration within bottomland hardwood stands is typically imitated by localized damage to overstory trees such as single tree snapping or wind throw (9,12), periodic catastrophic fire or windstorm damage or prolonged gowning season flood inundation (3). Seasonally wet Oak-hardwood woodlands reach an ~~–o~~ld-growth" condition with a multi-layered overstory and tree age greater than 150 years. Reproduction occurs in openings created by dead trees or wind throws (11) and down woody debris is rapidly decomposed by high temperatures and humidity (6). Forest types are associated with distinctive landforms resulting from the interaction of species specific physiological requirement of vegetative components and site characteristics (5).

Anthropogenic effects began as early as 5,000 YBP, when Native American cultures permanently or semi-permanently resided in the MAV. These cultures likely modified the landscape by clearing and burning the vegetation and through subsequent cultivation (5). Even so, early European explorers to the area, prior to

1700, described it as a vast and largely pristine wilderness with scattered Native American communities and clearings (12). A dramatic reduction in Native American populations from the 1500s through the 1700s muted Native American anthropogenic impacts on the landscape, resulting in abandoned agriculture fields regenerating with forest and cane. Impacts from the new European populations at this time included clearing of lands for small farms, largely along natural levees and point bar deposits with provided well drained and fertile soils and access to river travel routes (4,14).

As settlements became established, land clearing and alteration of hydrology increased in scope and intensity. Local communities cleared, ditched, and drained lands for agriculture and utilized the river system for travel and transport. The late 1800s brought the railroad system to the MAV and made large scale commercial timber harvest, market hunting, and settlement possible (20,4,14). Following the great flood of 1927, the United States Congress passed the 1928 Flood Control Act, which paced flood control under Federal authority. Consequently, landscape-scale flood control of the Mississippi River was initiated by the U.S. Army Corps of Engineers and has ultimately resulted in over 3,700 miles of levees on the Mississippi River and its tributaries (8).

Improved flood control, drainage, and technology increased acreage suitable for agriculture. These activities, combined with a spike in soybean prices, resulted in unprecedented land clearing activities across the MAV in the 1960s and 1970s. By the time Congress passed Farm Bill legislation in the mid-1980s, which introduced ~~–s~~wampbuster" provisions to slow wetland conversions, the forested landscape of the MAV had been reduced t a highly fragmented 20% of its former extent (2,7). Subsequent legislation authorized the Wetland Reserve Program and other private land conservation programs that encouraged restoration of bottomland forests. According to Haynes (7), these new conservation programs, combined with the land acquisition and reforestation activities by numerous state and federal agencies, resulted in approximately 450,000 to 550,000 acres of bottomland hardwood restoration in the MAV.

Alteration of the forest conditions within the MAV has impacted with wildlife species that are dependent upon these forests. Forest-dependent wildlife species that are of conservation concerns within the ecoregion have been identified through regional, nation and international conservation planning. For example, species-specific plans have been developed for the recovery of threatened and endangered species such as Louisiana black bear (*Ursus americanus luteolus*) (21), and ivory-billed woodpecker (*Campephilus principalis*) (22). Conservation plans for more relatively abundant species that are of conservation concern have been addressed via habitat conservation plans. Other species remain abundant, such as mallards (*Anas*

platyrhynchos), wood ducks (*aix sponsa*) and American woodcock (*Scolopax minor*), but are of management concern for annual harvest (16,17,10). These priority species may function as umbrellas for the other bottomland wildlife species, wherein meeting their habitat needs provides habitat for many other species.

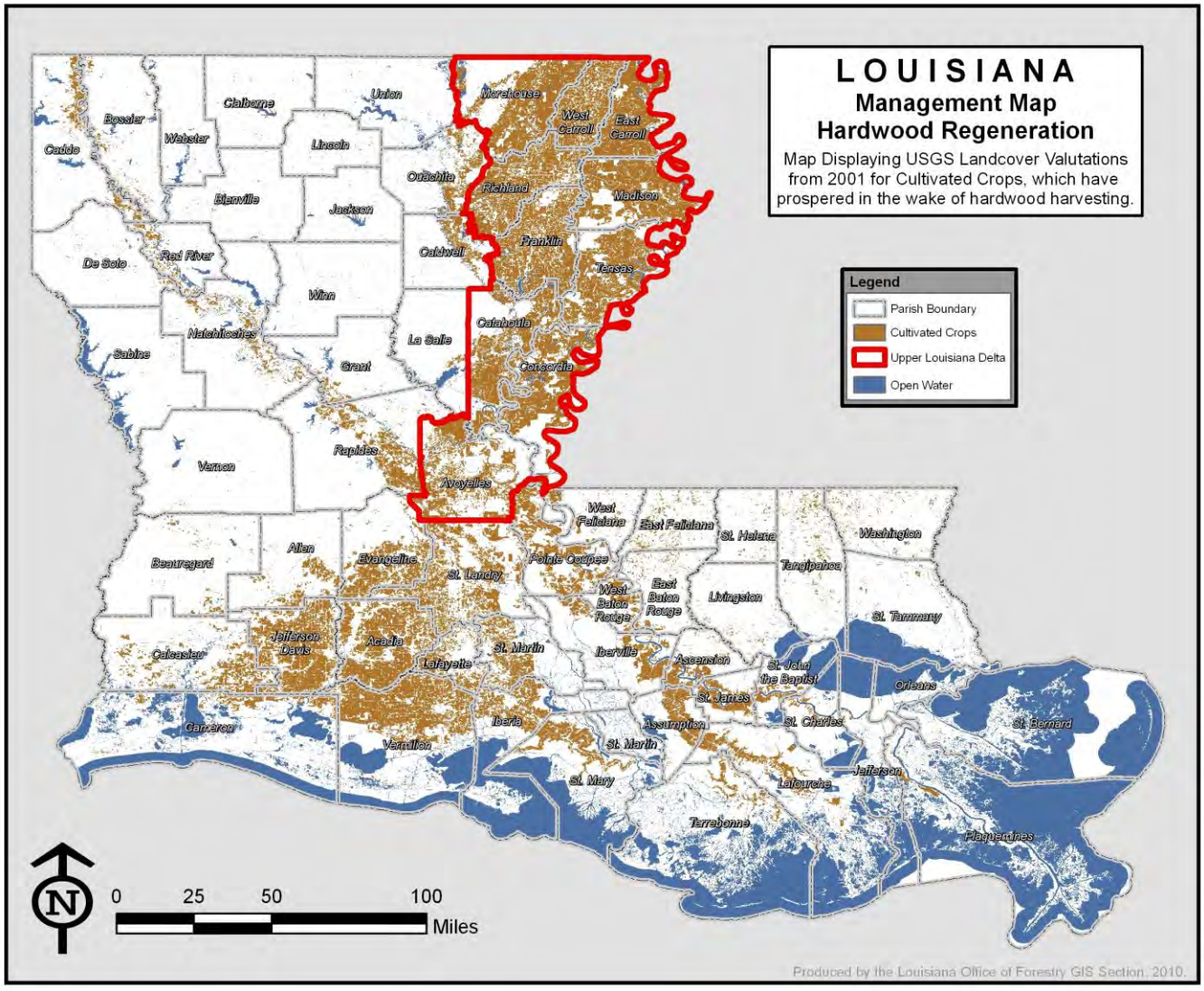
Priority wildlife species within the MAV are often dependent on habitat characteristics obtained from extensive forest conditions, forest connectivity, higher site forests and forest disturbance events. The extensive manipulation of bottomland forests within the MAV since European settlement, and especially since the advent of a stronger national flood control polity and ensuring agriculture development, have resulted in a serious degradation of those habitat characteristics. The remaining sub-quality habitat has effectively resulted in declining populations of many wildlife species associated with these forest resources, thus heightening our awareness and accelerating their stature to —priority."

Characteristics exhibited in mature bottomland hardwood forests also provide particular habitat variables important to many priority species such as dens, cavities, canopy gaps, species diversity, vegetative diversity and natural senescence. However, the MAV forest resources have historically been extracted for forest products with only slightly consideration for their regeneration and even less for wildlife habitat. More recent awareness of the importance of these forest resources to our nation has encouraged sustainable management of these forests for wildlife as well as forest products.

Historically, hardwood forest restoration was intended to crate diverse forest habitat for wildlife and a sustainable timber harvest (25). Unfortunately, most of the early restoration occurred opportunistically, resulting in isolated blocks of restored forest (i.e., little contribution t the reduction of forest fragmentation). Additionally, many of the restored sites had relatively low topography, were flood prone, coupled with a failure to properly match tree species with site conditions (19) that resulted in poor tree survival. These mis-matches of tree species and site conditions are less frequent in current practice.

Despite high diversity of tree species in bottomland forests (1), plantings on bottomland sites have historically focused only on a few species of slower-growing, hard-mast producing trees. The species selected for restoration are typically based on their mast-production, their seed dispersal method, and their value as timber. Indeed, one study (13) indicated that within the MAV >80% of all planted species have been oaks or sweet pecan, although the diversity of plantings has increased more recently.

Forest restoration is the most important method by which we can achieve largely forested landscapes. However, reforestation has historically been extensive with an intent to ~~"~~plant as many acres as possible," despite a lack of clearly defined site-specific objectives linked to succinct landscape objectives (25). Although this approach may have been initially warranted, it fails to recognize important components of successful ecosystem restoration (e.g., succinct objectives linked to wildlife population response) (27). Obviously, the establishment of clearly defined focal areas and restoration priorities is necessary to effectively meet landscape conservation objectives. Over the last 5-10 years, conservation objectives have been used more effectively in prioritizing bottomland hardwood restoration.



(23)

Map 21

To facilitate natural stand development processes and to increase wildlife habitat, it is recommended to increase the initial planting rate to 435 seedlings per acres (10ft spacing), recognizing that 680 seedlings per acres (8 ft spacing) would be even better. On most sites, hard mast species, including multiple species of oak, sweet pecan, and other hickories (*Carya* spp.), should represent 30% to 60% of planted trees. These proportions are based on three assumptions: (1) that oak-hickory was part of the previous forest composition, (2) that >30% oak composition is needed to ensure an adequate abundance of oak in future stands to maintain high merchantability, thereby enhancing future management options, and (3) that sufficient hard mast production will occur for resident wildlife species (e.g., black-bear, white-tailed deer, wild turkey, squirrels, as well as for migratory waterflowl, mallard and wood ducks). The remaining 40% to 70% of the planted trees should represent a mixture of light seeded, soft mast, and fast growing species (e.g., red maple, permission, elm, green ash, sweetgum, sugarberry, blackgum, American sycamore, and black willow) that would naturally occur on site. Other trees that are native to many sites, such as honey locust, ironwood, swamp dogwood and boxelder should not be forgotten from the mix of available species. Achieving stocking rates of >300 trees per acre three years post planting, including 75-180 hard-mast producing trees per acres, will also promote these objectives. To increase density of trees, naturally colonizing species should be encouraged. Once established, species composition within these stands can be altered using prescribed silvicultural management. Not only does natural colonization increase species diversity and stem density, these benefits are incurred at essentially no additional cost. This cost savings can be enhanced through judicious planting, wherein locations within restoration sites that are likely to have considerable colonization (e.g., near forest edges) are not planted or selectively planted at lower densities.

References and Citations:

1 Allen, J. A. 1997. "Bottomland hardwood restoration and the issue of woody species diversity." *Restoration Ecology* 5:125-134.

2 Creasman, L., Craig, N. J., and Swan, M. 1992. *The forested wetland of the Mississippi River: an ecosystem in crisis.* The Nature Conservancy, Baton Rouge, Louisiana.

3 Dickson, J. G. 1991. "Birds and Mammals of Pre-Colonial Southern Old-Growth Forests." *Natural Area Journal* 11:26-33.

4 Fredrickson, L. H. 2005. "Contemporary bottomland hardwood systems: structure, function, and hydrologic condition resulting from two centuries of anthropogenic activities." Pages 19-35 in L. H. Fredrickson, S. L. King, and R. M. Kaminski, editors. *Ecology and management of bottomland hardwood systems: the state of our understanding.* University of Missouri-Columbia, Gaylord Memorial Laboratory Special Publication No. 10, Puxico, Missouri.

5 Gardiner, E.S., and Oliver, J.M. 2005. "Restoration of bottomland hardwood forests in the Lower Mississippi Alluvial valley, U.S.A". Pages 235-251 in J.A. Stanturk and P. Madsen, editors. *Restoration of boreal and temperate forests.* CRC Press, Boca Raton, Florida, USA.

6 Harmon, M. E., Franklin, J. F., and Swanson, F. J. 1986. "Ecology of coarse woody debris in temperate ecosystems." *Advances in Ecological Research* 15:133-302.

7 Haynes, R. J. 2004. "The development of bottomland forest restoration in the lower Mississippi Alluvial Valley." *Ecological Restoration* 22: 170-182.

8 IFMRC (Interagency Floodplain Management Review Committee). 1994. *A Blueprint for Change – Sharing the Challenge: Floodplain Management into the 21st Century, report of the IFMRC to the Administration Floodplain Management Task Force.* (U. S. Government Printing Office) 191 p.

9 Johnson, R. L., Deen, R. T. 1993. "Prediction of oak regeneration in bottomland forests." Pages 146-155 in D. L. Loftis and C. E. McGee, Editors. *Oak regeneration: serious problems, practical recommendations*. Symposium proceedings. 8-10 September 1992, Knoxville, Tennessee. U. S. Forest Service, Southeastern Forest Experiment Station, General Technical Report SE-84, Asheville, North Carolina.

10 Kelly, J. R., Jr., and Rau, R. D. 2006. "American wood-cock population status, 2006." U. S. Fish and Wildlife Service, Laurel, Maryland. 15pp.

11 Kennedy, H. E., Nowacki, G. J. 1997. "An old-growth definition of seasonally wet oak-hardwood woodlands." U. S. Forest Service, Southern Research Station, General Technical Report SRS-8, Asheville, North Carolina.

12 King, S. L., Antrobus, T. J. 2001. "Canopy disturbance patterns in a bottomland hardwood forest in northeast Arkansas, USA." *Wetlands* 21:543-553.

13 King, S. L and Keeland, B. D. 1999. "Evaluation of reforestation in the lower Mississippi River alluvial valley." *Restoration Ecology* 7:348-359.

14 King, S. L., Shepard, J. P., Ouchley, K., Neal, J. A., and Ouchley, K. 2005. "Bottomland hardwood forests: past, present, and future." Pages 1-17 in L. H. Fredrickson, S. L. King, and R. M. Kaminski, editors. *Ecology and management of bottomland hardwood systems: The state of our understanding.* University of Missouri-Columbia, Gaylord Memorial Laboratory Special Publication. No. 10. Puxico, Missouri, USA.

15 Klimas, C. V., Muray, E. O., Pagan, J., Langston, H.L., and Foti, T. 2004. "A regional guidebook for applying the hydrogeomorphic approach to assessing wetland functions of forested wetlands in the Delta Region of Arkansas, Lower Mississippi River Alluvial Valley." U.S. Army Corp of Engineer Research and Development Center Technical Report ERDC/EL-TR-04-16.

16 NAWMP (North American Waterfowl Management Plan). 1986. "North American Waterfowl Management Plan: A Strategy for Cooperation." Online at: http://www.fws.gov/birdhabitat/NAWMP/files/NAWMP.pdf (accessed 5 Jan 2007).

17 NAWMP (North American Waterfowl Management Plan). 2004. "North American Waterfowl Management Plan: 2004 implementation framework, strengthening the biological foundation. " Online at: http://www.fws.gov/birdhabitat/NAWMP/files/ImplementationFramework.pdf (accessed 5 Jan 2007).

18 Saucier, R. T. 1994. "Geomorphology and Quaternary geologic history of the Lower Mississippi Valley." US Army Engineer Waterways Experiment Station, Vicksburg, MS. Volume I (report: 364pp plus appendices) and Volume II (map folio: 28 plates).

19 Stanturf, J. A., Schoenholtz, S. H., Schweitzer, C. J., and Shepard, J. P. 2001. "Achieving restoration success: myths in bottomland hardwood forests." *Restoration Ecology* 9:189-200.

20 Smith, R. D., Klimas, C. V. 2002. "A regional guidebook for applying the hydrogeomorphic approach to assessing wetland functions of selected regional wetland subclasses, Yazoo Basin, Lower Mississippi River Alluvial Valley." U. S. Army Engineer Research and Development Center Technical Report ERDC/EL TR-02-4.

21 U. S. Fish and Wildlife Service. 1995. "Louisiana black bear recovery plan. United States Fish and Wildlife Service, Jackson, Mississippi, USA." Online at: http://ecos.fws.gov/docs/recovery_plans/1995/950927.pdf (accessed 3 Jan 2007).

22 U. S. Fish and Wildlife Service. 2006. (Draft). "Recovery Plan for the ivory-billed woodpecker (campephilus principalis)." U. S. Fish and Wildlife Service, Atlanta, Georgia. 170pp.

23 United States Geological Survey. 2001. Land Use - Land Cover Classification. Baton Rouge, Louisiana: Louisiana GIS Digital Map - May 2007 - Compilation DVD, LOSCO & LSU.

24 Wilson, R. R., Oliver, J. M., Twedt, D. J., and Uihlein, W. B., III. 2005. "Bottomland hardwood restoration in the Mississippi Alluvial Valley: looking past the trees to see the forest." Pages 59-532 in L. H. Fredrickson, S. L. King, and R. M. Kaminski, editors. *Ecology and management of bottomland hardwood systems: the state of our understanding.* University of Missouri-Columbia, Gaylord Memorial Laboratory Special Publication No. 10, Puxico, Missouri.

25 Wilson, R. R. and Twedt, D. J. 2005. "Bottomland hardwood establishment and avian colonization of reforested sites in the Mississippi Alluvial Valley." Pages 341-352 in L. H. Fredrickson, S. L. King, and R. M. Kaminski, editors. *Ecology and Management of Bottomland Hardwood Systems: The State of Our Understanding.* University of Missouri-Columbia. Gaylord Memorial Laboratory Special Publications No. 10, Puxico.

26 Wharton, C. H., Kitchen, W. M., Pendleton, E. C., and Sipe, T. W. 1982. "The ecology of bottomland hardwood swamps of the Southeast: a community profile." FWS/OBS-81/37. United States Fish and Wildlife Service Biological Services Program, Washington, D.C., USA.

27 Young, T. P. 2000. "Restoration ecology and conservation biology." *Biological Conservation* 92:73-83.

Patch used by Forestry Enforcement officers during a period after merging with Agriculture.

Goals, Objectives, Management Strategies, and Resources Needed

1) Wildfire & Protection

Goal (1G):To reduce the risk and damage to our communities, environment, and infrastructure

Objective 1(1O1): Keep wildfire average size low.

Objective 2 (1O2): Maintain safe operational techniques.

Strategy 1 (1S1): Maintain rapid response times through aerial detection and education of dispatchers in GIS techniques.

Strategy 2 (1S2): Maintain consist instate and out-of-state training opportunities.

Strategy 3 (1S3): Provide the best equipment available to wildfire responders.

Strategy 4 (1S4): Provide appropriate prescribed burning and mechanical fuel reduction.

Resources Needed

Collaborations: Agreements or MOU with Volunteer and municipal Fire Departments, Wildlife and Fisheries, Fisheries and Wildlife, homeowner's associations, prescribed fire council and industry
Regulations: State and local policies allowing rapid detection to wildfire and policies regarding smoke management and emissions
Personnel: Foresters, firefighters, trained natural resource managers, trained forestland owners, certified prescribed burn managers
Legislation: State laws to support certified burners, control burns, smoke management and emissions
Research: Continue to monitor fire occurrence and size by means of cutting edge technology, as well as methods to integrate safe fire in the forest ecosystem
Funding: Grants, state-funding, cost-share programs
Other: Educational materials, mappings, demonstration projects, training, equipment

2) Longleaf Regeneration

Goal 1 (2G1): The return of longleaf as a prominent timber option in its native range.

Goal 2 (2G2): Successful stewardship of longleaf ecosystems.

Objective 1 (2O1): Maintain existing longleaf ecosystems in good conditions.

Objective 2 (2O2): Encourage the regeneration and success of longleaf pine in its natural range.

Strategy 1 (2S1): Continuing growing bare root and containerized longleaf in our nurseries.

Strategy 2 (2S2): Promote longleaf through cost share and non-cost share management programs.

Strategy 3 (2S3): Coordinate with Conservation Easement Programs.

Strategy 4 (2S4): Coordinate conservation efforts with America's Longleaf Initiative.

Strategy 5 (2S5): Develop I & E materials that promote establishment and sustainable management of longleaf ecosystems.

Resources Needed

Collaborations: Agreements with The Nature Conservancy and Longleaf Alliance, as well as other states in promoting the planting of longleaf in its native range
Regulations: State and local rules, regulations and ordinances supporting planting and control burns
Personnel: Foresters, firefighters, pilots
Legislation: State laws regarding certified burners, control burns, smoke management and emissions.
Research: Continued research into longleaf establishment, management and markets
Funding: Grants, state-funding, cost-share programs
Other: Educational materials, mappings, demonstration projects, training, equipment

3) Cogongrass.

Goal (3G): The halt of Cogongrass' spread in Louisiana and the eventual eradication of Cogongrass in the state.

Objective 1 (3O1): Use public education,

Objective 2 (3O2): Use Office interaction with the public

Objective 3 (3O3: Use mechanical resources to stop the spread of Cogongrass and begin to eliminate it from Louisiana.

Strategy 1 (3S1): Promote education of the public about the threats of Cogongrass though literature.

Strategy 2 (3S2): Use cost share and non-cost share management programs to help prevent the spread of Cogongrass.

Strategy 3 (3S3): Seek funds for the eradication of Cogongrass in Louisiana.

Strategy 4 (3S4): Develop or participate in a program to monitor the occurrence and spread of Cogongrass.

Resources Needed

Collaborations: Agreement to coordinate natural resource groups‘ efforts
Regulations: State level prohibition of importation and sale of recognized invasive species
Personnel: Invasive Species Coordinator position, trained lead individuals in each state natural resource agency
Research: State university driven studies to address the most invasive species
Funding: Grants, state-funding, cost-share programs
Other: Educational materials, mappings, demonstration projects, training, equipment

4) Urban Sprawl and WUI

Goal (4G): To help maintain a balance between urban/suburban growth and the environment by reducing the negative impacts of development and progress on the forested environment.

Objective 1 (4O1): Educate the public about the impacts of urban growth on the forests and wildlife.

Objective 2 (4O2): Promote the creation of urban forest landscapes.

Objective 3 (4O3): Discourage parcelization.

Strategy 1 (4S1): Use cost-share and non-cost share programs to maintain larger tracks of land.

Strategy 2 (4S2): Promote public education about the surrounding environment through Tree City and CWPP implementation.

Strategy 3 (4S3): Work with city planners as urban areas grow to encourage urban forests.

Resources Needed

Collaborations: Agreement with State, Parish and Local communities to incorporate forest resources and practices

Regulations: State and local planning guidelines to sustain forest resources during development

Personnel: Foresters, natural resource professionals, urban planners, hydrologists, Extension.

Legislation: Guidance to parishes and communities regarding urban development and natural resource conservation

Research: State university studies to determine methods and values of sustaining forest resources during development

Funding: Grants, state-funding, cost-share programs

Other: Educational materials, mappings, demonstration projects, training, equipment

5) Insects, Disease, and Forest Health

Goal (5G): Maintain a healthy forested landscape for Louisiana landowners.

Objective 1 (5O1): Reduce the impacts of disease and insects on the forested landscape of Louisiana.

Objective 2 (5O2): Respond to outbreaks of insects and disease early.

Strategy 1 (5S1): Use aerial detection and reconnaissance to observe where the landscape is being impacted by insects or disease.

Strategy 2 (5S2): Use trapping techniques to determine if insects are impacting at risk environments.

Strategy 3 (5S3): Monitor areas that have suffered from insect or disease outbreaks in the past.

Strategy 4 (5S4): Use cost share and non-cost share management opportunities to put in place preventative measures and to educate the public.

Resources Needed

Collaborations: Agreement among LDAF, LDAF Agriculture Environmental Sciences, Extension, APHIS-PPQ, Ag & Industries to coordinate efforts

Regulations: Federal and state controls to identify and eradicate introduced pathogens

Personnel: Entomologists, pathologists, foresters

Legislation: State laws to support state agencies role in protecting natural resource from forest pests

Research: State university-driven studies to increase state‘s forest resiliency

Funding: Grants, state-funding, cost-share programs

Other: Educational materials, mappings, demonstration projects, training, equipment

6) Cypress-Tupelo Management

Goal 1 (6G1): Landowners who are supported in their stewardship of cypress and tupelo stands

Goal 2 (6G2): Public support for healthy timber management.

Objective 1 (6O1): Assisted maintenance of a healthy ecosystem that permits the management and harvest of cypress and tupelo stands.

Objective 2 (6O2): Realize an end to litigation surrounding the harvest of cypress and tupelo in Louisiana.

Strategy 1 (6S1):Use public outreach opportunities to promote the ideals and results of responsible management of cypress and tupelo stands.

Strategy 2 (6S2): Partner with organizations who support the responsible and sustainable harvest of cypress and tupelo timber.

Strategy 3 (6S3): Use cost share, non-cost share, and Legacy programs to project forests that require protecting and to support landowners who promote sustainable silviculture.

Resources Needed

Collaborations: Agreement among state and federal agencies concerning sustainable management practices
Regulations: Federal and state controls to all sustainable timber and ecosystem management
Personnel: Foresters, natural resource professionals, Extension
Legislation: Federal and state support of sustainable timber management
Research: Studies to increase knowledge and growth of sustainable timber and ecosystem management with the cypress-tupelo areas
Funding: Grants, state-funding, cost-share programs
Other: Educational materials, mappings, demonstration projects, training, equipment

7) Gulf Storms and Climate

Goal (7G): A Louisiana timber industry that is prepared and resilient against annual hurricanes.

Objective 1 (7O1): Prepare landowners, program participants, and management planners for the eventual result of storm damage.

Objective 2 (7O2): Determine how landowners can mitigate their losses following a storm event.

Strategy 1 (7S1): Use early aerial detection to determine the degree of damage following a storm.

Strategy 2 (7S2): Provide landowner assistance to establish an avenue for return on investment following downed trees resulting from a storm.

Strategy 3 (7S3): Use management programs and planning to establish tree farms that are prepared for wind and storm damage.

Strategy 4 (7S4): Use close relations with cooperators and the Louisiana Forestry Commission to determine which mills are taking timber following a storm event.

Resources Needed

Collaborations: Partnerships between natural resource agencies and Louisiana Homeland Security and Emergency Response
Regulations: State and local policies that incorporate forest resource issues in emergency management protocol
Personnel: Foresters, natural resource professionals, urban foresters, Extension
Legislation: State laws to support state agencies role in protecting natural resource from storm events and responding to storm events and natural disasters
Research: State university-driven studies to increase forest resiliency due to storm events
Funding: Grants, state-funding, cost-share programs
Other: Educational materials, mappings, demonstration projects, training, equipment

8) Hardwood Regeneration

Goal (8G): Increase the prevalence of bottomland hardwood ecosystem within its native range.

Objective 1 (8O1): Maintain existing bottomland hardwood ecosystems in good conditions. Provide technical assistance services that support sustainable management of existing stands.

Objective 2 (8O2): Coordinate conservation efforts with southern Mississippi and eastern Texas.

Strategy 1 (8S1): Coordinate cost-share programs: Conservation Reserve Program, Wetland Reserve Program and Lower Mississippi Alluvial Valley.

Strategy 2 (8S2): Coordinate conservation efforts with Lower Mississippi Alluvial Valley project.

Strategy 3 (8S3): Promote utilization of federal and state cost share programs for reforestation efforts.

Strategy 4 (8S4): Produce adequate supply of seedlings for regeneration activities.

Strategy 5 (8S5): Develop I & E materials that promote establishment and sustainable management of bottomland hardwood ecosystems and restoration.

Resources Needed

Collaborations: Partnerships between natural resource agencies and LDAF
Regulations: State and local policies that support a sustainable hardwood ecosystem
Personnel: Foresters, natural resource professionals, Extension
Legislation: State support to increase the prevalence of the bottomland hardwood ecosystem within its native range
Research: State and university-driven studies to grow and produce healthy hardwood seedlings and varieties
Funding: Grants, state-funding, cost-share programs
Other: Educational materials, mappings, demonstration projects, training, equipment

Renewable Energy, Climate Adaptation & Climate Offsets

Renewable Energy

The goal of the Louisiana Office of Forestry is to encourage effective and efficient use of woody biomass for renewable energy

Objective A: Promote efforts to assess supply and demand opportunities for woody biomass

Strategy 1: Support development of FIA assessments that provide improved data sets

Strategy 2: Monitor market and research trends to determine emerging opportunities for utilization of woody biomass

Strategy 3: Evaluate opportunities for incorporating more effective utilization of woody biomass as part of fuel reduction, pest control measures and other silvicultural activities

Objective B: Provide information and technical assistance to support programs and services that promote utilization of woody biomass

Strategy 1: Encourage effective harvesting and other management practices that achieve sustainable management of forests engaged in expanded production of woody biomass

Strategy 2: Promote disaster recovery efforts that improve utilization efficiency of woody biomass for renewable energy

Strategy 3: Promote local and regional government planning efforts that may create opportunities for utilization of woody biomass, particularly from urban landscapes

Climate Adaptation

The goal of the Louisiana Office of Forestry is to promote management measures that enhance the adaptability of forests and trees to projected changes in climate

Objective A: Encourage programs and initiatives that improve information and guidance about climate adaptation opportunities

Strategy 1. Support research and other efforts that provide high precision and accuracy in estimating and predicting climate change impacts on forests

Strategy 2. Support expansion of FIA to provide data and information that can effectively guide forest climate adaptation efforts

Strategy 3. Indentify forest sites that may be particularly susceptible to climate change stress

Objective B: Maintain effective afforestation and reforestation capabilities

Strategy 1. Support research and genetic selection measures to improve forest tree resilience to climate stress factors

Strategy 2. Support forest tree seedling nursery production to meet anticipated needs adaptation activities

Objective C: Provide technical assistance services to guide adaptation efforts as may be appropriate

Strategy 1. Make adjustments in Forest Stewardship Plan components to address adaptation strategies as appropriate

Strategy 2. Promote management measures that minimize or prevent insect, disease or invasive infestations, increased fire risk, as well as intensified storm damage that might occur as a consequence of long term change in climate factors

Objective D: Identify areas of particular need or opportunity to achieve adaptation strategies

Strategy 1. Emphasize forest adaptation measures in forested watersheds that are at risk of critical changes in water quality and supply as a consequence of long term shifts in climate conditions

Strategy 2. Promote management measures that achieve increased diversity in forest species and conditions where such diversity can help mitigate adverse impacts of climate change

Strategy 3. Consider opportunities for achieving climate adaptation strategies through Forest Legacy projects

Carbon Offsets

The goal of the Louisiana Office of Forestry is to monitor opportunities for potential involvement of Louisiana Division of Forestry in carbon offset policies and programs

Objective A: Support projects and initiatives that advance appropriate and responsible carbon market activities

Strategy 1: Track and evaluate progress of federal and state legislation regarding development of carbon market opportunities

Strategy 2: Provide information and education services about carbon market opportunities as appropriate

Strategy 3: Participate in conferences, meetings and other events that are helpful in updating the status and potential development of carbon market opportunities

Appendix

National Themes compared to Strategies

The three national strategies for the statewide assessment of forest resources, as indicated by the forest service and addressed in the document are:

- Conserving working forest landscapes
- Protecting forests from threats
- Enhancing public benefits from trees and forests

Figure 28

Strategy Code	Protect forests from harm	Conserve working forest landscapes	Enhance public benefits from trees and forests
1S1	X	X	X
1S2	X	X	X
1S3	X	X	X
1S4	X	X	
2S1		X	X
2S2		X	X
2S3	X	X	X
2S4	X	X	X
2S5	X	X	X
3S1	X	X	X
3S2	X	X	X
3S3	X	X	X
3S4	X	X	X
4S1	X	X	X
4S2	X	X	X
4S3	X	X	X
5S1	X	X	X
5S2	X	X	X
5S3	X	X	X
5S4	X	X	X
6S1	X	X	X
6S2	X	X	
6S3	X	X	X
7S1	X	X	
7S2		X	
7S3	X	X	
7S4	X	X	X
8S1	X	X	X
8S2	X	X	
8S3	X	X	
8S4	X	X	X
8S5	X	X	X

The Louisiana Process: Coordination & Incorporation of Materials from other Agencies

The Louisiana Office of Forestry's assessment preparers spent a significant amount of time deriving the priorities and issues for the State. This process was significantly aided by the redistricting process, which is described subsequently in this document. Throughout the process of redistricting, the Office derived where the heavier management loads and fire protection duties were occurring. For the assessment, the process involved carrying this practice further, by determining the impetus behind these trends, over time. With the assistance of Mike Countess, of the Southern Group of State Foresters, the preparers of this document paired down the issues and developed priority areas. These priority areas trended towards ecological and cultural patterns and were thus categorized this way.

During preparation for assembling the Louisiana Statewide Assessment of Forest Resources, the Office of Forestry sought out authoritative documentation from and coordination with those agencies, associations, and committees with a vested interest in the welfare of the State's forest resources. The Louisiana Comprehensive Wildlife Conservation Strategy (Wildlife Action Plan), developed by the Louisiana Department of Wildlife and Fisheries in December 2005, was combed over and provided valuable source material and direction, saving our preparers a great deal of time in hunting down appropriate source material. And while not sited specifically, the WAP has been used to confirm and corroborate information from other sources that made it into the Assessment. Additionally, as with other agencies, the Louisiana Department of Wildlife and Fisheries has been provided the initial draft of the Assessment for comment and feedback. A representative of this agency sits on the Louisiana Forestry Commission and is regularly updated on the status and progress of the Office.

During the preparation process, the Office of Forestry sought out public and professional comment by hosting a stakeholders meeting in Baton Rouge and later by participating in a series of public meetings across the state, hosted by the Commissioner of Agriculture and Forestry and consisting of members from the other Ag & Forestry offices. The stakeholders meeting included many of the organizations from which the Office requested comments following our initial first draft, such as representatives from LFA, LDNR, LDEQ, USDA-NRCS, LDWF, LSU AgCenter, Kisatchie National Forest, The Nature Conservancy, as well as private timber interests. The public meetings, original intended as an opportunity to share the services of our agency with the public, offered an opportunity to educate the public on the services and responsibilities

of the Office of Forestry as well as providing the citizens of the State an opportunity to ask questions and convey comments and opinion.

Louisiana's state Stewardship Coordinating Committee is relatively small and consists of personnel in the Baton Rouge Headquarters of the Office of Forestry as well as wildlife experts from the Louisiana Department of Wildlife and Fisheries. A representative of this Committee attended GIS Task Force meetings and conference calls as well as regional Management Branch meetings in the years and months preceding the development of the Assessment and provided direction in the initial stages of its planning. In addition, the former Stewardship Program Director for Louisiana wrote the Hardwood Regeneration portion of this assessment.

Preparation for the mapping and analysis portions of this document were made by the GIS Section through participation in the Southern Group of State Foresters GIS Task Force meetings and conference calls as well attendance at the national strategies meeting held in Denver, Colorado during the winter of 2009. The Texas document as well as assessments from other Southern states were relied upon for structure and appropriate content.

Where possible, the preparers if this document incorporated existing texts that represented the Office's outlook on our issues and current conditions.

The initial draft of the Assessment has been made available to and feedback encouraged from the following agencies:

Louisiana State University (LSU)
Louisiana Technical University
Louisiana Forestry Association (LFA)
Louisiana Department of Wildlife and Fisheries (LDWF)
United States Department of Agriculture (USDA)
Louisiana Department of Environmental Quality (LDEQ)
USDA Forest Service (USDA-FS)
Kisatchie National Forest

continued:

Louisiana Office of Soil and Water Conservation

The Nature Conservancy (TNC)

LSU Agricultural Center

Black Bear Conservation Coalition (BBCC)

Louisiana Wildlife Federation (LWF)

Louisiana Department of Natural Resources (LDNR)

Louisiana Landowner's Association

Parkway Partners Association

USDA Natural Resources Conservation Service (USDA-NRCS)

-including the State Conservationist

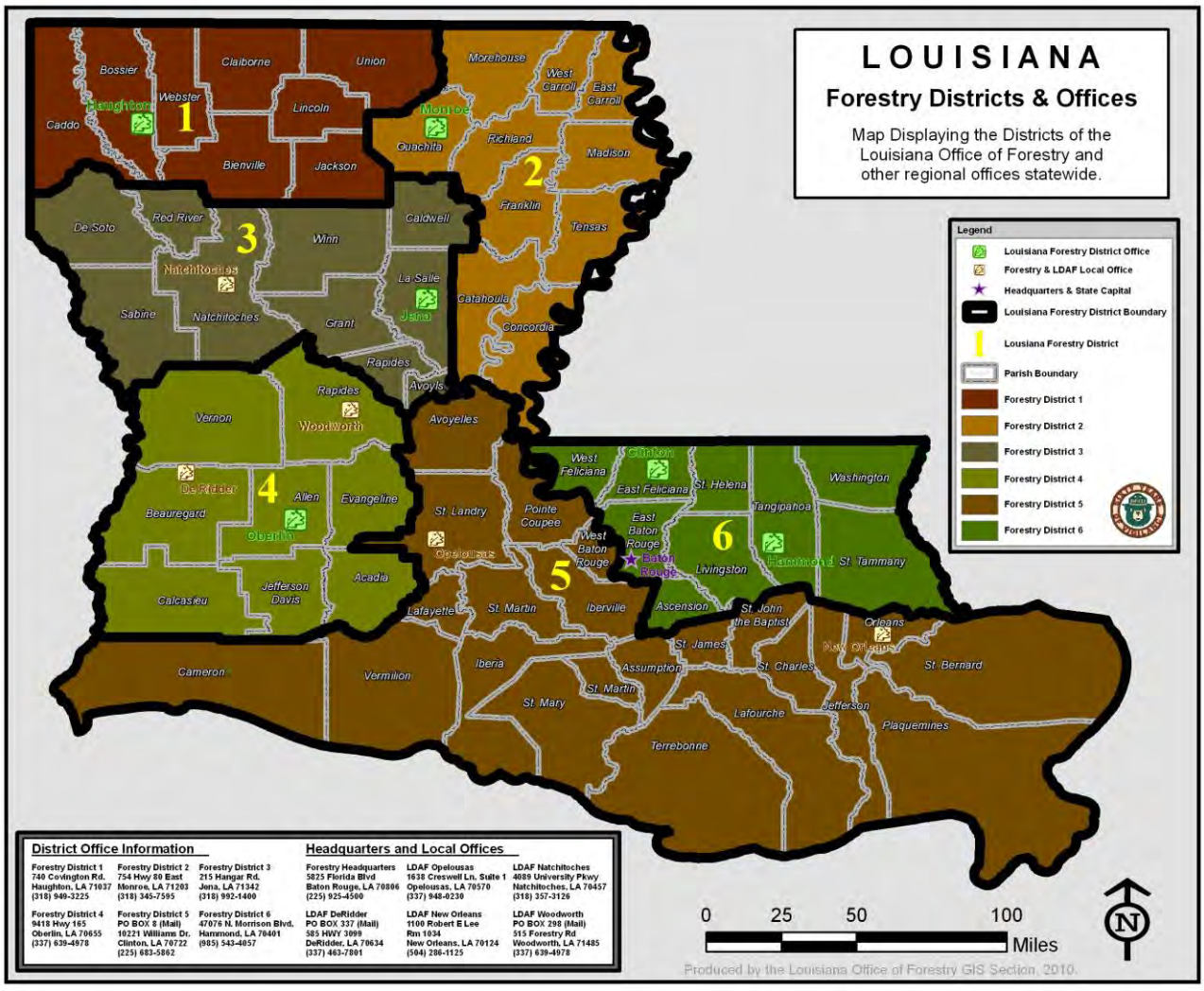
National Wild Turkey Federation

Louisiana Urban Forestry Council

Farms Services Association (FSA)

Summary of Office of Forestry Re-districting

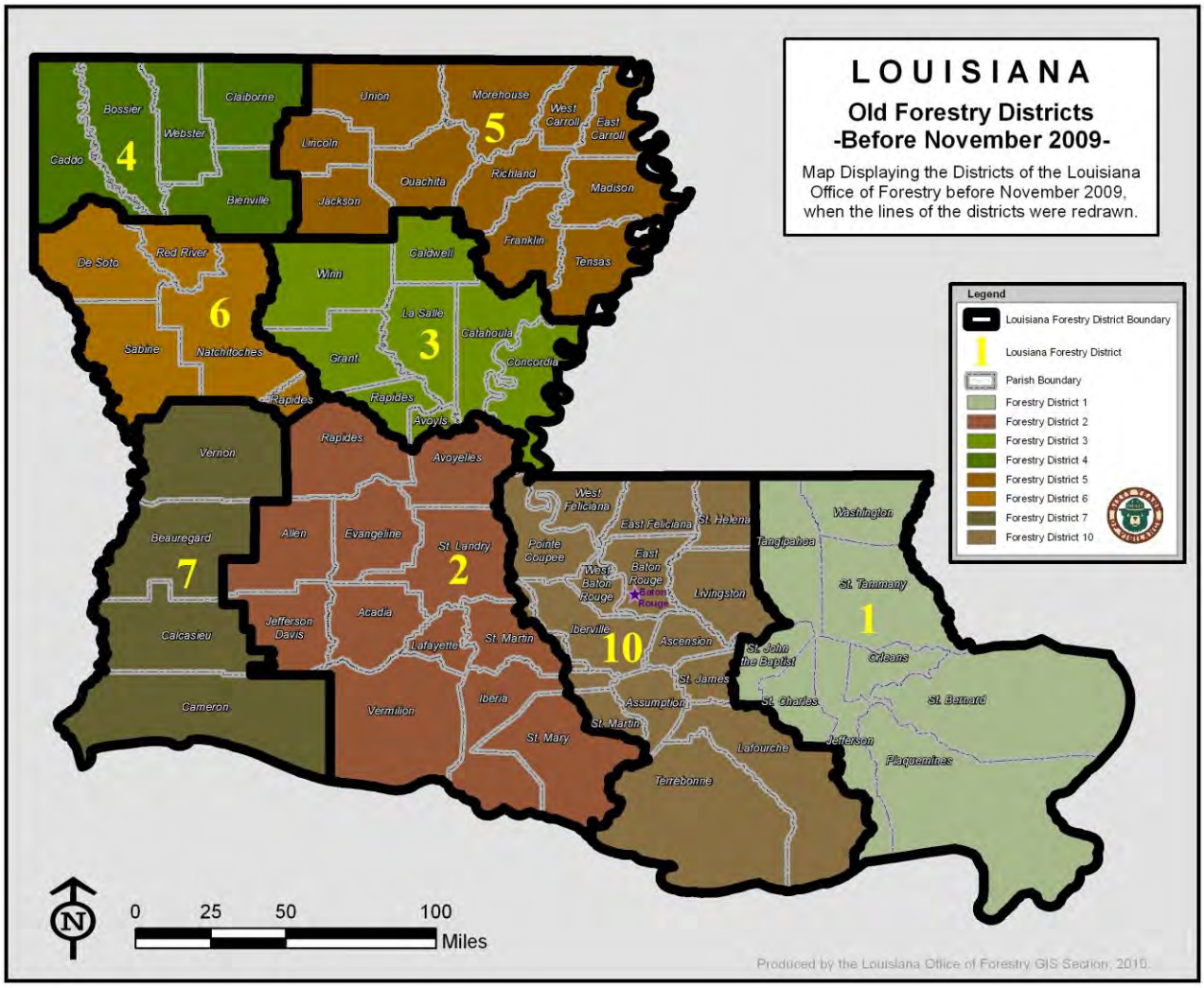
In the fall of 2009, the Louisiana Office of Forestry suffered one of the most devastating blows to its operating budget in its history. The Office faced almost certain layoffs, estimations of which were originally around five dozen employees. The Office's administration, under the leadership of State Forester Wade Dubea, began the immediate process of assessing how to save as many jobs as possible. Program viability was addressed for each branch. Statutory responsibilities of the Office became paramount. The result of this process initiated a statewide redistricting course in the hope that closing offices might mitigate the number of layoffs the Office would be forced to endure.



Map 22

Significant work was undertaken to evaluate the diversity of work that the Office participates in around the state. Management workload and fire protection variations were addressed. The diversity of the State's ecosystem was evaluated. Areas of the state that showed consistent eco-types and workloads were

consolidated. This eventually led the office to reduce its divisions from eight to six. Additionally, unit foresters would either be assigned to primarily management or fire protection duties- with a default understanding that every forester is considered a fire protection forester whenever the need for expanded protection duties should arise.



Map 23

Using this system, the Office was capable of saving dozens of jobs. And while not all positions could be salvaged and some of the Office's dedicated employees would eventually be laid off, the actions of the Office of Forestry's administration and the State Forester rescued as many as possible from this budgetary disaster.

Due to the dire nature of our budget this past year, all available funds were used to save as many jobs as possible. This left the Office of Forestry unable to hire assistance in the development of this state assessment, as no funds were available to spend up front. The assessment has been completed by the

administration of the office with the assistance of other professionals, especially Mike Countess, who volunteered their time to assist with our efforts to organize.

While the redistricting process was considerably taxing, both professionally and personally, on many of the employees of the Office, and while much of the time allotted the states for completing the assessment process was consumed during this period, the results of the process provided the sort of re-alignment around efficiency and responsibility that self-evaluation through the assessment may eventually provide the other states in the future. To conclude, as an Office, we have come to know ourselves, our tasks, and our responsibility to the citizens of Louisiana far better than we might otherwise. Which may be the silver lining of the past year for the Louisiana Office of Forestry. More budget cuts are expected this year.

GIS Section Report and Web-based Data Access

The Louisiana Office of Forestry, recognizing the potential of Geographic Information Systems in the practice of applied Forestry techniques, established the GIS Section during the winter of 2008 in an effort to provide a resource of technological support for the other Forestry branches. The primary tasks of the GIS Section are to assist in digital data collection efforts and production, to provide a source for the most current statewide digital data sets, to distribute new technologies and assist in field training, to create Forestry oriented map and web service products, and representation of the Office of Forestry in statewide, regional, and national settings involved with GIS or spatial data and its impact on the interests of the Louisiana Office of Forestry.

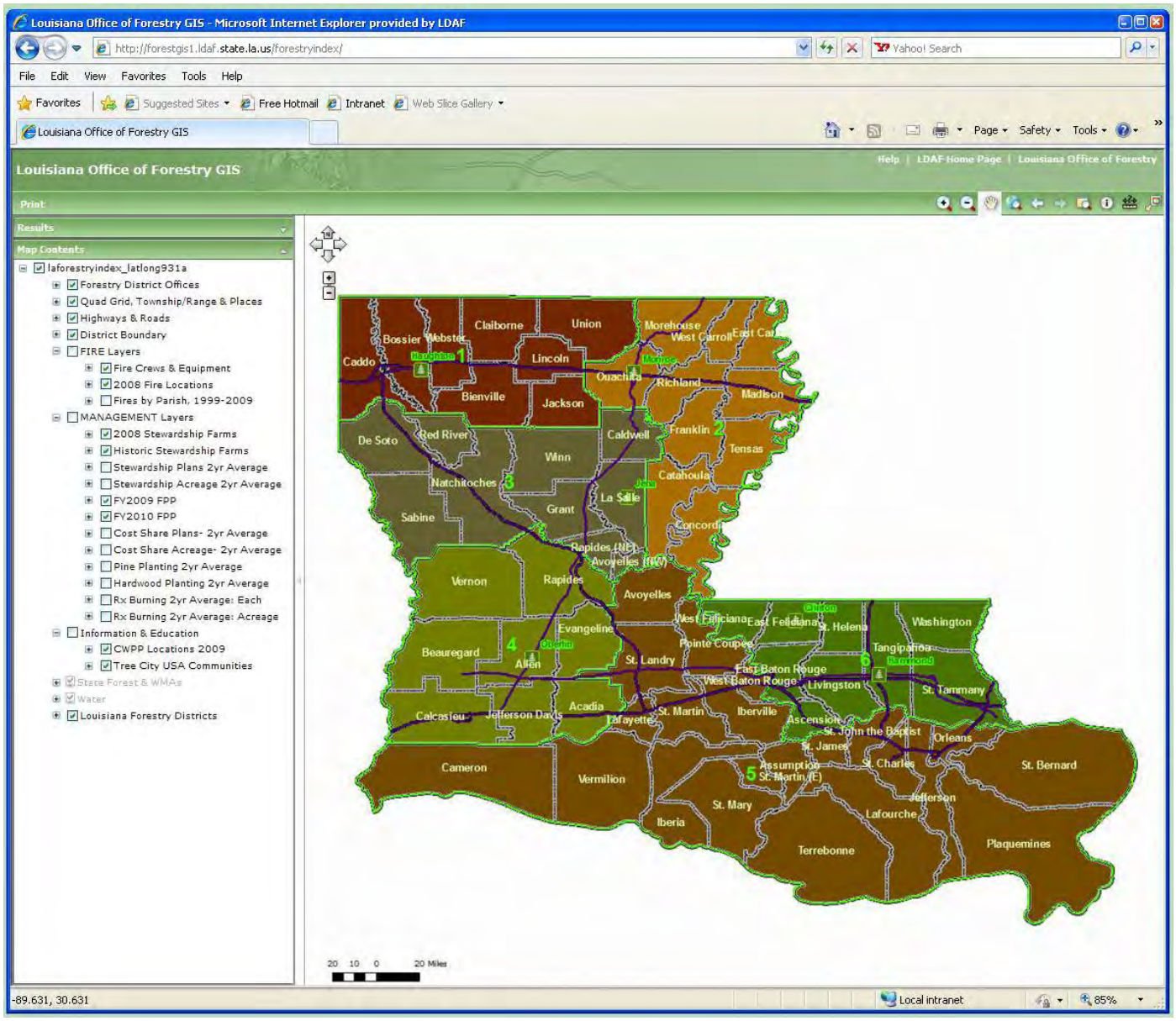
Throughout each year, the Louisiana Office of Forestry GIS Section participates in data assimilation and analysis. Annual wildfire data interpretation, digital representation and attribution of management program implementation, and federal reporting on spatial-based data are typical products.

The Louisiana Office of Forestry is also the primary center of GIS technology for the Louisiana Department of Agriculture and Forestry and regularly provides support to other, adjacent offices as the need arises. In the past, Forestry GIS personnel have assisted in EPA Project 319 data collection and interpretation, department asset mapping, and marketing and informational layouts.

Since its inception, the GIS Section has focused on improving the ability of the State's foresters to collect and attribute field data. The section has pushed the latest GIS technologies into the field and offered technical instruction and advice to improve efficiency and accuracy in reporting the efforts and accomplishments of the Office's foresters statewide.

To better serve the public, the GIS Section implemented the Louisiana Office of Forestry GIS Web Portal. The portal provides public access to data from the other Forestry branches. The web portal runs upon ArcGIS Server and is managed from the GIS lab in Baton Rouge.

Figure 29: *Louisiana Office of Forestry GIS Web Portal (Screenshot)*



http://forestgis1.ldaf.state.la.us/

Stamps used by the GIS Section to designate maps created through this office.

Aviation Branch Report

The Louisiana Department of Agriculture & Forestry – Office of Forestry, recognizing the cross-utilization history and potential of the Aircraft Detection Fleet, established an Aviation Section Branch during the spring of 2009. This was done in an effort to provide support for all branches within the Office of Forestry that have need of this service.

The primary objective and principle use of supporting the Protection Branch through the use of aerial detection to search for wildfires in the 18.9 million acres of forestlands under the protection of our agency. Aircraft have been used as a viable mobile observation platform to supplement fire tower locations for many years in Louisiana. (During a typical patrol flight LDAF-Pilots scan the horizon first, for known smoke types to locate fires that have been turned into the district as a controlled burn and secondly, for fires of an unknown nature. LDAF-Pilots have training and years of acquired specialized experience that play a key role once smoke is spotted. Fire and surrounding areas are scouted and the potential threat assessed; if required crews can be directed to the fire by the most direct routes and help with the placement of men and equipment on the fire can be given.)

The Aviation Section performs over 4000 flight hours per year. A random sampling review of our Aerial Fire Detection Report‘s indicates that from May 2009 until April 2010, statewide a total of 5025 –smokes” were detected, evaluated or investigated and only 627 were determined to need suppression. This clearly shows that 87.5% of all –smokes” that were detected, evaluated and assessed during that time were –controlled burns” of some type and did not require fire crew personnel. The bulk of our responsibility is to save the valuable time and precious limited resources of our ground crews and ensure that there efforts are focused on serious threats.

Throughout a typical year our secondary objective is to support the Management Branch by providing aerial platform whereby observations and inspections to locate insect infestations can be made. Parish Foresters typically ride along when a –Bug Flight” (Forest health and inventory survey) is performed; in this way the Aviation Section can help the Management Branch in the prevention, detection, and control of insects and diseases. All pine types are flown on a schedule during the late spring to early fall for the Southern Pine and Ipps beetles; during the spring flights are conducted over the swampy regions looking for signs of Forest Tent Caterpillar and Cypress Leaf Roller‘s. Flights have also been conducted to verify logging operations and Best Management Practices.

Increasingly flights are beginning to be performed in conjunction with Office of Forestry-GIS using aerial digital sketch-mapping computers to assist other Branches within the Office of Forestry. We are being used more as an aerial platform from which personnel can map occurrences. For example, after a bad fire we fly GIS-trained personnel to map the area in order to acquire and retain an accurate depiction of the area affected. Similarly, we can fly urban areas after storms with the same personnel to locate and tract storm or natural disaster damages and changes to topography.

Aerial surveillance has been used in the past to assist the Enforcement Branch especially when collecting photographic evidence that shows the damaging effects of wildfires as well as direction of fire movement and location of origin. Aerial images can be taken by Enforcement to verify actual logging areas versus the contracted area to protect the landowner from timber theft.

The Aviation Section is looking forward to working with all branches of Forestry, other Offices within the Department of Agriculture and Forestry as well as other state agencies that may have need of the resource that our current 11 personnel (one mechanic and 10 pilots) and remaining fleet (12 Cessna 182T‘s purchased in 2003) can provide throughout the state.

Reforestation Branch

Two of forestry‘s greatest challenges are the increasing demand for forest resources and a decreasing forest land base. In the past several years this demand has been compounded by a major shift in forest production from the northwestern United States to the southern United States. This shift has put even more pressure on forest production in Louisiana.

Not only are demands increasing for forest products like lumber, paper, furniture and the numerous items made of wood, but demands on other forest resources continues to increase, such as those for recreational opportunity, soil and water conservation, and wildlife habitat.

Competition for land use continues at a rapid pace as more and more acres available for growing and harvesting trees are converted to agriculture, highways, and urban development.

In the decade from 1964 to 1974, Louisiana's forestland decreased nine percent. The rate of decline has slowed considerably since then. From 1974 to 1984, Louisiana's forestland decreased four percent, and from 1984 to 1991 (the last forest survey) the state's forestland decreased less than one percent.

Thus, the Office of Forestry must help meet the challenge of producing more raw material on less acreage, and among the most direct ways the agency contributes toward a solution is through its Reforestation Division.

Research has indicated that Louisiana's unique geography and climate make the state's forestland potentially the most productive in the South for pine species. In order to meet landowners' demands for seedlings, the state's three tree nurseries grow some 25 million pine and 3-4 million hardwood seedlings each year. The seedlings are sold at cost to Louisiana landowners for reforestation purposes.

In addition to production of millions of tree seedlings, the Office of Forestry's reforestation activities include a tree improvement program. Through participation in the Western Gulf Forest Tree Improvement Program, a cooperative organization with members from five contiguous states, the agency selects superior pine parents from the state's forests. The selection process is complicated and stringent, taking into consideration such characteristics as a straightness and taper of trunk, size and angle of branches, insect and disease resistance, prunability and crown size. Scions (cutting or twig) from the superior parents are then

grafted onto stock in two seed orchards operated by the Office of Forestry, and, in six to ten years, begin to produce their own seeds.

Loblolly, slash and longleaf pines are the orchard's focus with hardwood improvement projects underway. The seed orchards currently provide enough seed to produce the Office of Forestry's entire pine crop each year. Resulting superior stock is then planted by Louisiana's landowners to replenish one of our most important renewable resources, the state's forests.

Reference:

Louisiana Office of Forestry. 2010. http://www.ldaf.state.la.us/portal/Offices/Forestry/Reforestation/tabid/136/Default.aspx

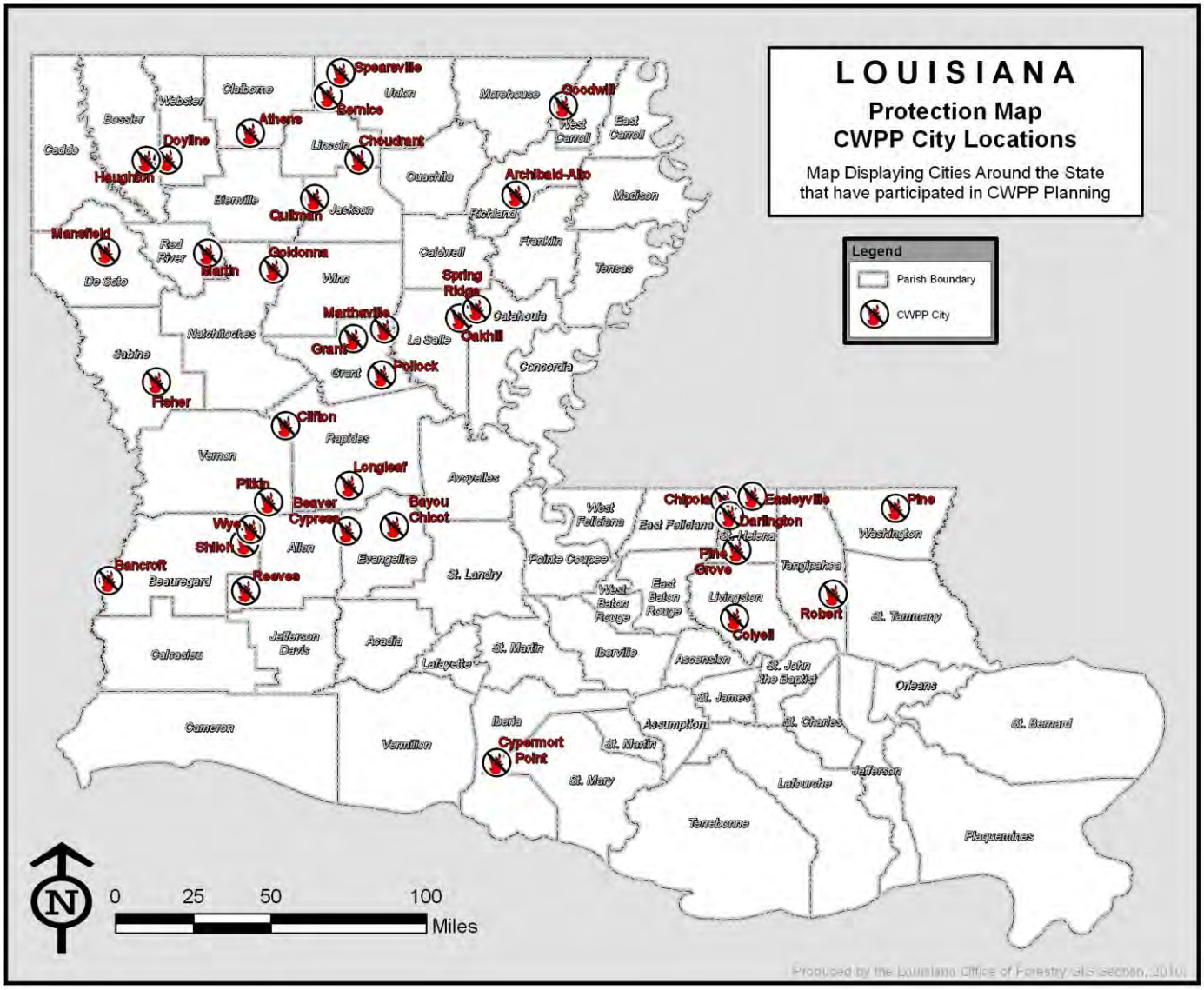
Louisiana Forestry Outreach: Tree City USA & CWPP

The Louisiana Office of Forestry annual participates in public outreach programs that assist in reducing the risk to fire and educate the public about the benefits of urban forestry.

CWPP: Community Wildfire Protection Planning

The Louisiana Office of Forestry offers the opportunity for communities around the state to organize and create a protection plan that can help manage the communities risk for wildfire and give guidance in the event of wildfire incident. Proper planning can help save lives and property.

Map 24



Tree City USA

Taken from the Louisiana Office of Forestry website (3).

The Tree City USA® program, sponsored by The Arbor Day Foundation in cooperation with the USDA Forest Service and the National Association of State Foresters, provides direction, technical assistance, public attention, and national recognition for urban and community forestry programs in thousands of towns and cities that more than 93 million Americans call home.

Figure 30: Louisiana Tree Cities & Parishes (2)

CITY	YEARS	POPULATION
ALEXANDRIA	16	50000
AMITE CITY	9	4110
BARKSDALE AFB	20	10000
BRUSLY	6	2416
COVINGTON	16	9155
CROWLEY	23	14228
DENHAM SPRINGS	7	8767
DERIDDER	3	10109
HAMMOND	16	20000
HARAHAN	10	10123
JEFFERSON PARISH	7	444655
KENNER	3	70973
LAFAYETTE	19	110257
MANDEVILLE	15	10489
MORGAN CITY	9	13320
NATCHITOCHES	9	19000
NEW ORLEANS	27	295450
PINEVILLE	9	15000
PORT ALLEN	9	5496
RUSTON	6	21676
SHREVEPORT	19	200000
SLIDELL	3	31500
TERREBONNE PARISH	5	115000

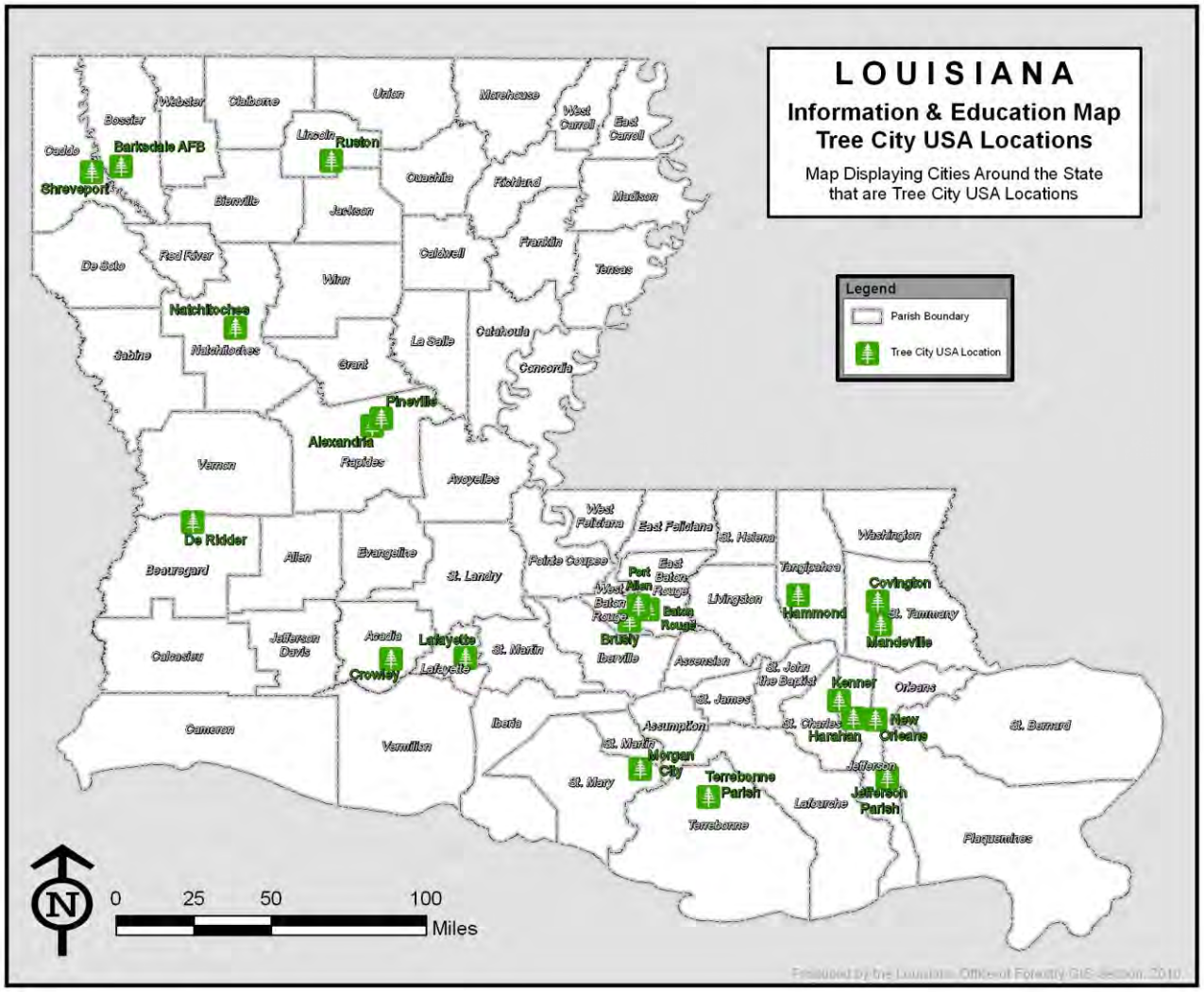
The Four Standards for Tree City USA Recognition

To qualify as a Tree City USA community, a town or city must meet four standards established by The Arbor Day Foundation and the National Association of State Foresters.

These standards were established to ensure that every qualifying community would have a viable tree management plan and program.

It is important to note that they were also designed so that no community would be excluded because of size.

1. *A Tree Board or Department*
2. *A Tree Care Ordinance*
3. *A Community Forestry Program With an Annual Budget of at Least $2 Per Capita*
4. *An Arbor Day Observance and Proclamation* (1)



Map 25

References:

1 Arbor Day Foundation. 2010. http://www.arborday.org/programs/treeCityUSA/standards.cfm#www.arborday.org/programs/TreeCityStandards.cfm

2 Arbor Day Foundation. 2010. http://www.arborday.org/programs/treeCityUSA/treecities.cfm?chosenstate=Louisiana

3 Louisiana Office of Forestry. 2010. http://www.ldaf.state.la.us/portal/Offices/Forestry/InformationEducationUrbanForestry/TreeCityUSA/tabid/423/Default.aspx

Assessment Public Survey Summary

Figure 31: The following results are from the public response survey posted on the Surveymonkey.com website and made available through the Louisiana Office of Forestry website.

1. Sustainable Development Sustaining Louisiana's natural resources, while balancing economic development with quality of life, poses huge challenges to resource managers and economic developers. Critical resource decisions revolve around sustainability of forest products industries, water quality and quantity, urban development, landscape planning, and the desired conditions of Louisiana's forests and wildlife.

Low Importance	Less Than Moderate Importance	Moderate Importance	More Than Moderate Importance	High Importance	Rating Average	Response Count
1.0% (1)	0.0% (0)	8.2% (8)	23.7% (23)	67.0% (65)	4.56	97

2. Resource Utilization Fully utilizing Louisiana's abundant forest resource will require the development of new and diverse markets for forest products, in addition to expanding existing markets for wood fiber, wildlife and outdoor recreation, ecosystem services, carbon sequestration, and all other natural resource products.

Low Importance	Less Than Moderate Importance	Moderate Importance	More Than Moderate Importance	High Importance	Rating Average	Response Count
1.0% (1)	2.1% (2)	12.4% (12)	22.7% (22)	61.9% (60)	4.42	97

Assessment Public Survey Summary

3. Land Ownership Policies Sixty-two percent of Louisiana's forestland is in non-industrial private ownership. Maintaining a productive and sustainable future for Louisiana's forests and other natural resources may very well be dependent on the development of a natural resource policy structured to promote and maintain private ownership.

Low Importance	Less Than Moderate Importance	Moderate Importance	More Than Moderate Importance	High Importance	Rating Average	Response Count
0.0% (0)	**2.1% (2)**	**18.6% (18)**	**16.5% (16)**	**62.9% (61)**	**4.40**	**97**

4. Invasive Species The spread of non-native invasive species greatly impacts the productivity of the forest resource and creates significant challenges for the natural resource manager and landowner. Invasive species, tree damaging insects and pathogens pose a serious threat to the overall health of Louisiana's forest resource.

Low Importance	Less Than Moderately Importance	Moderate Importance	More Than Moderate Importance	High Importance	Rating Average	Response Count
0.0% (0)	1.0% (1)	10.3% (10)	25.8% (25)	**62.9% (61)**	4.51	97

Assessment Public Survey Summary

5. Renewable Energy With an abundance of readily available biomass material, there is great potential for the development of energy from renewable natural resources in Louisiana. Effective utilization of the biomass resource and continued advancement in biofuel technology will help Louisiana address present and future energy challenges.

Low Importance	Less Than Moderate Importance	Moderate Importance	More Than Moderate Importance	High Importance	Rating Average	Response Count
2.1% (2)	5.2% (5)	15.5% (15)	24.7% (24)	**52.6% (51)**	4.21	97

6. Education Providing effective natural resource education is vital to raising the level of environmental awareness in both youth and adults. Learning the importance of the forest and related natural resources at a young age can lead to the pursuit of a career in natural resources. Also, a better understanding of the wise use and stewardship of natural resources leads to policy makers and other individuals making sound, informed decisions in regard to natural resource public policy issues affecting the economic and ecological values of Louisiana's forest resources.

Low Importance	Less Than Moderate Importance	Moderate Importance	More Than Moderate Importance	High Importance	Rating Average	Response Count
0.0% (0)	3.1% (3)	11.3% (11)	25.8% (25)	**59.8% (58)**	4.42	97

Assessment Public Survey Summary

7. Urban Development/Urban Sprawl/Canopy Loss Urban development in the areas surrounding major cities/communities is an issue that has not been significantly addressed by the public and private sectors. Forested areas are becoming fragmented and are being converted to urban development projects without consideration to energy conservation, air and water quality and land use change. Education and communication are the necessary components needed to address these issues to the public and private sectors.

Low Importance	Less Than Moderate Importance	Moderate Importance	More Than Moderate Importance	High Importance	Rating Average	Response Count
1.0% (1)	5.2% (5)	20.6% (20)	21.6% (21)	**51.5% (50)**	4.18	97

8. Fire Management and Suppression The occurrence of wildfire directly affects air quality, forest health and the value of the resource. Urban sprawl (Wildland Urban Interface) places more lives and property at risk from wildfire while complicating the management of wildfires and prescribed fires. The health and vigor of Louisiana's forest are dependent on fire management and suppression.

Low Importance	Less Than Moderate Importance	Moderate Importance	More Than Moderate Importance	High Importance	Rating Average	Response Count
1.0% (1)	3.1% (3)	14.6% (14)	17.7% (17)	**63.5% (61)**	4.40	96

Assessment Public Survey Summary

9. Other Issues In addition to the issues presented in this survey, there may be other issues you believe are important to the forests and natural resources of Louisiana. Please review the additional issues listed below and identify any other issues you think should be addressed in the Louisiana Statewide Assessment of Forest Resources

Land Stewardship

	1	2	3	4	5	6	7	8	Response Count
Rank in order of importance 1-8, 8 is the most important.	5.4% (5)	2.2% (2)	9.8% (9)	9.8% (9)	13.0% (12)	18.5% (17)	12.0% (11)	**29.3% (27)**	92

Prescribed Burning

	1	2	3	4	5	6	7	8	Response Count
Rank in order of importance 1-8, 8 is the most important.	1.1% (1)	10.8% (10)	6.5% (6)	19.4% (18)	14.0% (13)	14.0% (13)	14.0% (13)	**20.4% (19)**	93

Rural Forest Health

	1	2	3	4	5	6	7	8	Response Count
Rank in order of importance 1-8, 8 is the most important.	4.5% (4)	6.8% (6)	4.5% (4)	8.0% (7)	12.5% (11)	21.6% (19)	14.8% (13)	**27.3% (24)**	88

Assessment Public Survey Summary

Coastal Forest Loss									
	1	2	3	4	5	6	7	8	Response Count
Rank in order of importance 1-8, 8 is the most important.	3.3% (3)	9.8% (9)	8.7% (8)	7.6% (7)	10.9% (10)	14.1% (13)	13.0% (12)	**32.6% (30)**	92

Climate Change									
	1	2	3	4	5	6	7	8	Response Count
Rank in order of importance 1-8, 8 is the most important.	**24.4% (22)**	12.2% (11)	12.2% (11)	3.3% (3)	15.6% (14)	8.9% (8)	5.6% (5)	17.8% (16)	90

Biodiversity									
	1	2	3	4	5	6	7	8	Response Count
Rank in order of importance 1-8, 8 is the most important.	3.4% (3)	9.0% (8)	9.0% (8)	19.1% (17)	14.6% (13)	**20.2% (18)**	16.9% (15)	7.9% (7)	89

Assessment Public Survey Summary

Ecosystem Restoration/Rehabilitation									
	1	2	3	4	5	6	7	8	Response Count
Rank in order of importance 1-8, 8 is the most important.	4.4% (4)	3.3% (3)	5.5% (5)	12.1% (11)	14.3% (13)	15.4% (14)	16.5% (15)	**28.6% (26)**	91

A link to the Assessment Public Survey was available on the Louisiana Office of Forestry GIS Branch Web Portal. This link was also forwarded to cooperators of the Louisiana Office of Forestry to stimulate response. The results will be weighed and incorporated into the Office's approach to confronting the State's forestry related issues, as outlined throughout this document. The results will also be applied in directing the Office's pursuit of funding sources.

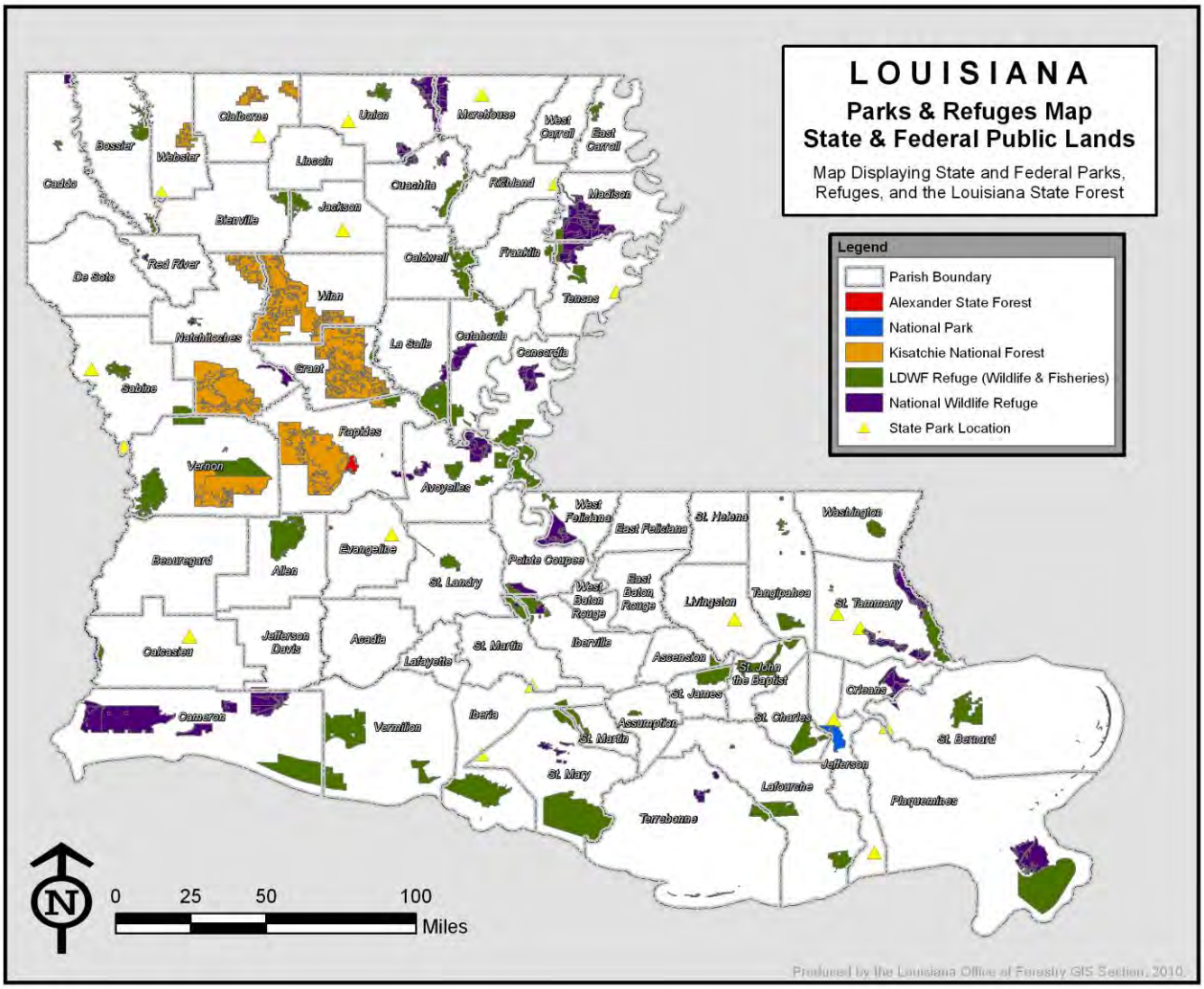
Reference:

Surveymonkey.com compiled the statistics for our survey.

http://www.surveymonkey.com/s.aspx?sm=3dLFwoEBDOr7DUA07UXGqQ_3d_3d

Additional Maps

Map 26



References:

1 Kisatchie National Forest. 2010. Kisatchie National Forest Boundary

2 Louisiana Department of Transportation and Development. 2007. Louisiana Department of Transportation and Development State Parks. Baton Rouge, Louisiana: Louisiana GIS Digital Map - May 2007 - Compilation DVD, LOSCO & LSU.

3 Louisiana Department of Wildlife and Fisheries. 2006. LDWF Wildlife Refuge Boundaries. Baton Rouge, Louisiana: Louisiana GIS Digital Map - May 2007 - Compilation DVD, LOSCO & LSU.

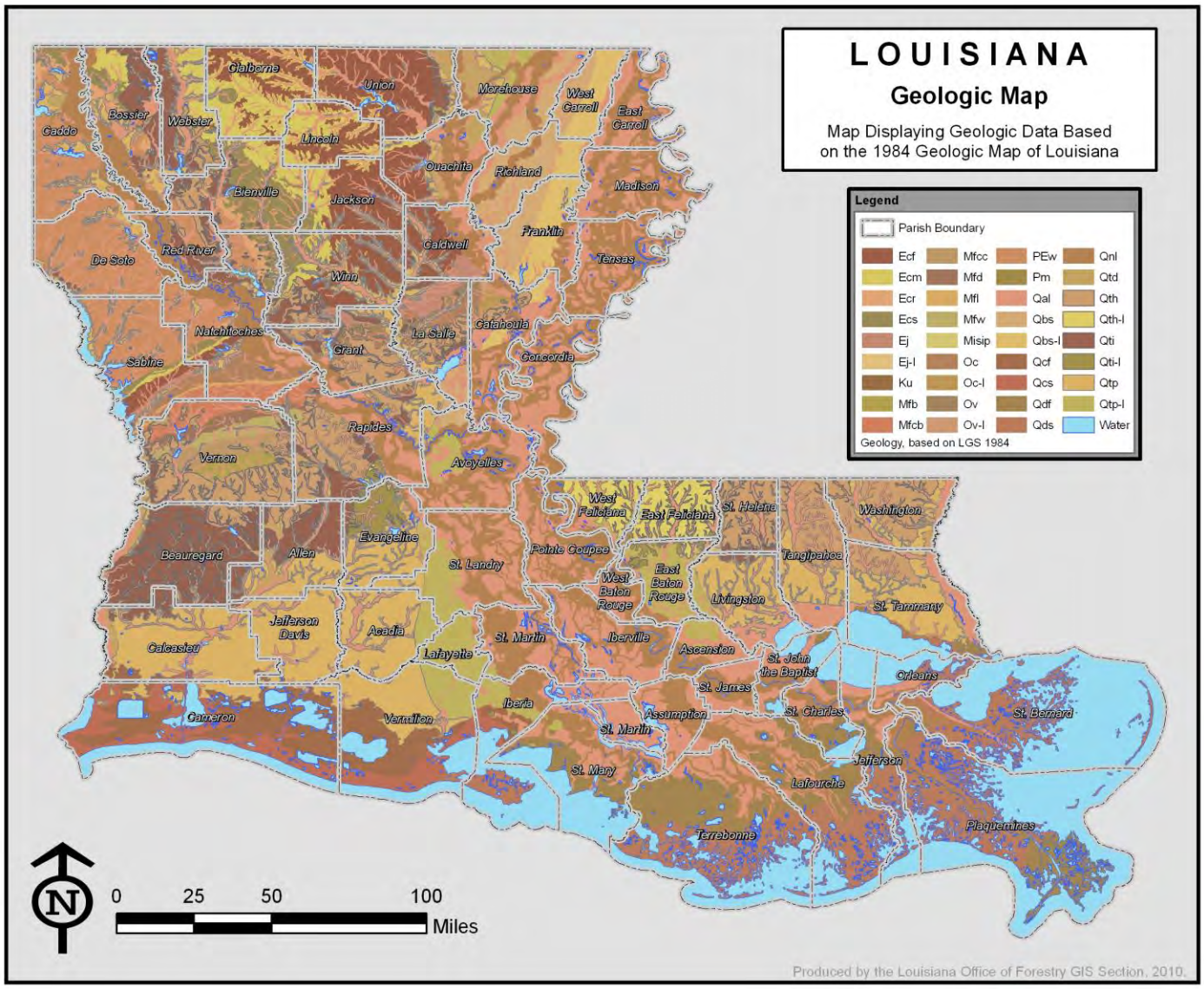
4 Louisiana Office of Forestry. 2010. Alexander State Forest Boundary. Baton Rouge, Louisiana

5 National Park Service. 2006. National Park System Boundary Dataset. Baton Rouge, Louisiana: Louisiana GIS Digital Map - May 2007 - Compilation DVD, LOSCO & LSU.

6 US Fish and Wildlife Service, Region 4. 2001. National Wildlife Refuge Boundaries. Baton Rouge, Louisiana: Louisiana GIS Digital Map - May 2007 - Compilation DVD, LOSCO & LSU.

Additional Map

Map 27



Reference:

1 United States Geological Survey - National Wetlands Research Center. 1998. Digital representation of the *Geologic Map of Louisiana: 1984*. Baton Rouge, Louisiana: Louisiana GIS Digital Map - May 2007 - Compilation DVD, LOSCO & LSU.

Additional Maps

Map 28

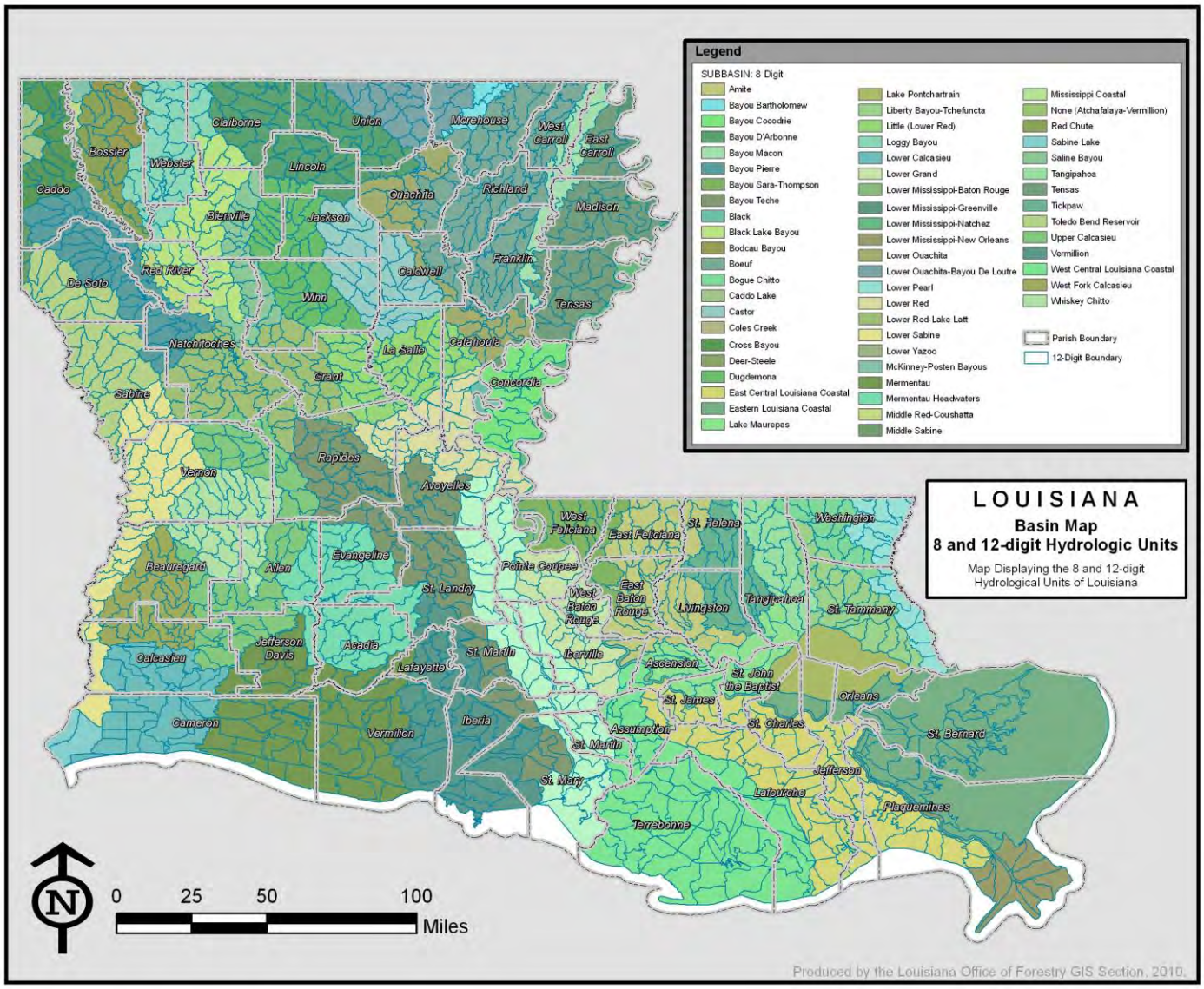
Reference:

1 United States Geological Survey- National Wetlands Research Center. 1998. Louisiana State General Soil Map Data.

(see Figure 31 for a complete list of soils used in this map)

Additional Maps

Map 29

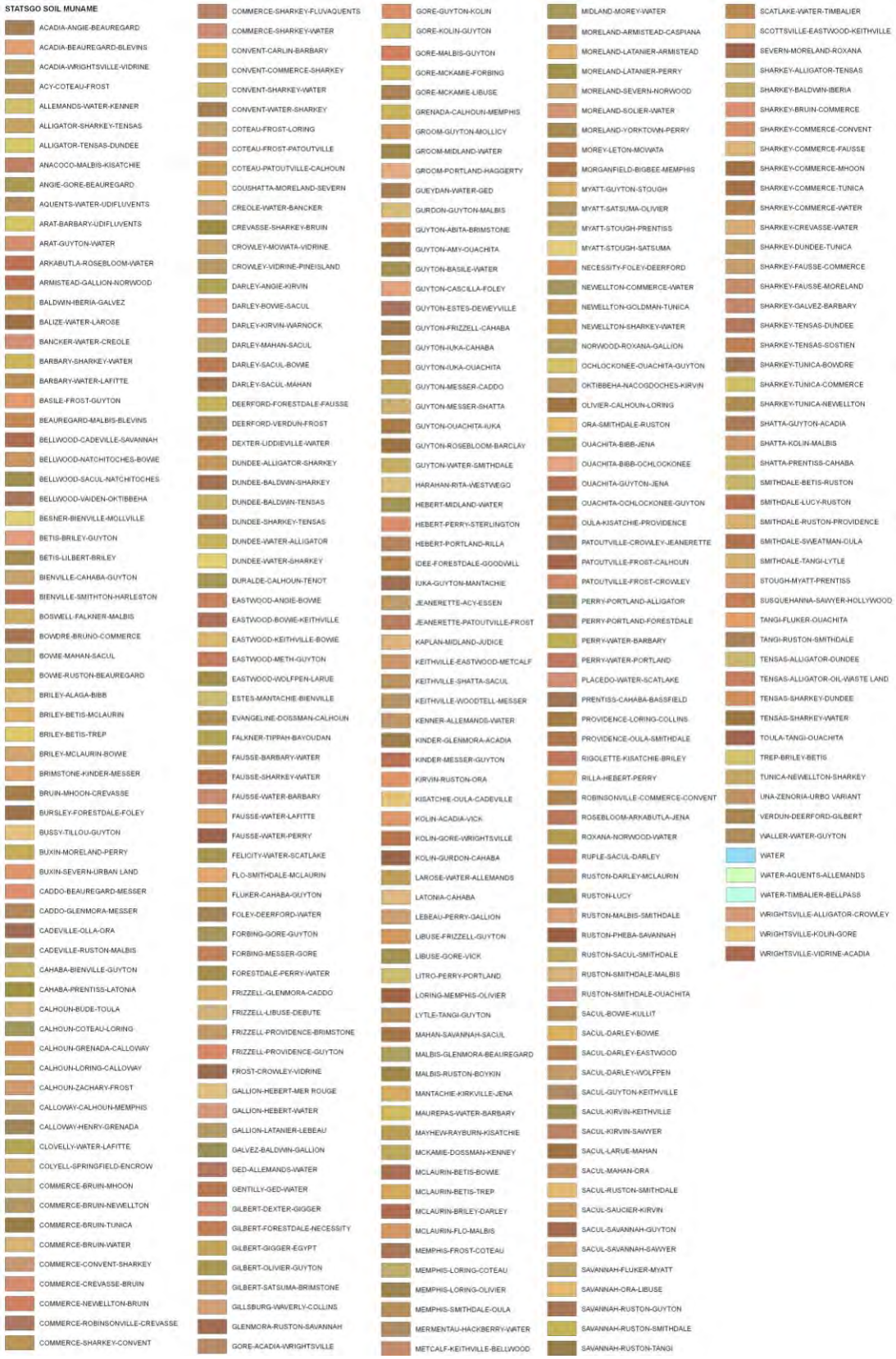


References:

1 United States Department of Agriculture - NRCS. Acquired 2010. 8-Digit Hydrological Unit.

2 United States Department of Agriculture - NRCS. Acquired 2010. 12-Digit Hydrological Unit.

Figure 31: STATSGO Soils used in Map 28



Land Classifications

Open Water - All areas of open water, generally with less than 25% cover of vegetation or soil.

Perennial Ice/Snow - All areas characterized by a perennial cover of ice and/or snow, generally greater than 25% of total cover.

Developed, Open Space - Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes

Developed, Low Intensity - Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49 percent of total cover. These areas most commonly include single-family housing units.

Developed, Medium Intensity - Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-79 percent of the total cover. These areas most commonly include single-family housing units.

Developed, High Intensity - Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to100 percent of the total cover.

Barren Land (Rock/Sand/Clay) - Barren areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.

Unconsolidated Shore* - Unconsolidated material such as silt, sand, or gravel that is subject to inundation and redistribution due to the action of water. Characterized by substrates lacking vegetation except for pioneering plants that become established during brief periods when growing conditions are favorable. Erosion and deposition by waves and currents produce a number of landforms representing this class.

Deciduous Forest - Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75 percent of the tree species shed foliage simultaneously in response to seasonal change.

Evergreen Forest - Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75 percent of the tree species maintain their leaves all year. Canopy is never without green foliage.

Mixed Forest - Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75 percent of total tree cover.

Dwarf Scrub - Alaska only areas dominated by shrubs less than 20 centimeters tall with shrub canopy typically greater than 20% of total vegetation. This type is often co-associated with grasses, sedges, herbs, and non-vascular vegetation.

Shrub/Scrub - Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.

Grassland/Herbaceous - Areas dominated by grammanoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.

Sedge/Herbaceous - Alaska only areas dominated by sedges and forbs, generally greater than 80% of total vegetation. This type can occur with significant other grasses or other grass like plants, and includes sedge tundra, and sedge tussock tundra.

Lichens - Alaska only areas dominated by fruticose or foliose lichens generally greater than 80% of total vegetation.

Moss - Alaska only areas dominated by mosses, generally greater than 80% of total vegetation.

Pasture/Hay - Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation.

Cultivated Crops - Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being actively tilled.

Woody Wetlands - Areas where forest or shrubland vegetation accounts for greater than 20 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

Palustrine Forested Wetland* -Includes all tidal and non-tidal wetlands dominated by woody vegetation greater than or equal to 5 meters in height and all such wetlands that occur in tidal areas in which salinity due to ocean-derived salts is below 0.5 percent. Total vegetation coverage is greater than 20 percent.

Palustrine Scrub/Shrub Wetland* - Includes all tidal and non-tidal wetlands dominated by woody vegetation less than 5 meters in height, and all such wetlands that occur in tidal areas in which salinity due to ocean-derived salts is below 0.5 percent. Total vegetation coverage is greater than 20 percent. The species present could be true shrubs, young trees and shrubs or trees that are small or stunted due to environmental conditions.

Estuarine Forested Wetland* - Includes all tidal wetlands dominated by woody vegetation greater than or equal to 5 meters in height, and all such wetlands that occur in tidal areas in which salinity due to ocean-derived salts is equal to or greater than 0.5 percent. Total vegetation coverage is greater than 20 percent.

Estuarine Scrub/Shrub Wetland* - Includes all tidal wetlands dominated by woody vegetation less than 5 meters in height, and all such wetlands that occur in tidal areas in which salinity due to ocean-derived salts is equal to or greater than 0.5 percent. Total vegetation coverage is greater than 20 percent.

Emergent Herbaceous Wetlands - Areas where perennial herbaceous vegetation accounts for greater than 80 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

Palustrine Emergent Wetland (Persistent)* - Includes all tidal and non-tidal wetlands dominated by persistent emergent vascular plants, emergent mosses or lichens, and all such wetlands that occur in tidal areas in which salinity due to ocean-derived salts is below 0.5 percent. Plants generally remain standing until the next growing season.

Estuarine Emergent Wetland* - Includes all tidal wetlands dominated by erect, rooted, herbaceous hydrophytes (excluding mosses and lichens) and all such wetlands that occur in tidal areas in which salinity due to ocean-derived salts is equal to or greater than 0.5 percent and that are present for most of the growing season in most years. Perennial plants usually dominate these wetlands.

Palustrine Aquatic Bed* - The Palustrine Aquatic Bed class includes tidal and nontidal wetlands and deepwater habitats in which salinity due to ocean-derived salts is below 0.5 percent and which are dominated by plants that grow and form a continuous cover principally on or at the surface of the water. These include algal mats, detached floating mats, and rooted vascular plant assemblages.

Estuarine Aquatic Bed* - Includes tidal wetlands and deepwater habitats in which salinity due to ocean-derived salts is equal to or greater than 0.5 percent and which are dominated by plants that grow and form a continuous cover principally on or at the surface of the water. These include algal mats, kelp beds, and rooted vascular plant assemblages.

* Coastal NLCD class only

Reference:

1 United States Geological Survey. 2008. Land Use - Land Cover Classification. http://www.mrlc.gov/nlcd_definitions.php

Forest Legacy Program Assessment of Need

Development of the nation's forested areas poses an increasing threat to maintaining the integrity of our country's valuable forest lands. Intact forest lands supply timber products, wildlife habitat, soil and watershed protection, aesthetics, and recreational opportunities. However, as these areas are fragmented and disappear, so do the benefits they provide. While local governments commonly guide development away from the most sensitive areas through traditional land use controls (like zoning and performance standards), sometimes these measures are not sufficient to fully protect the forested component of our natural resource base.

The Forest Legacy Program (FLP), a United States Department of Agriculture - Forest Service (USDA-FS) program in partnership with States, supports State efforts to protect environmentally sensitive forest lands. Designed to encourage the protection of privately owned forest lands, FLP is an entirely voluntary program. To maximize the public benefits it achieves, the program focuses on the acquisition of partial interests in privately owned forest lands. FLP helps the States develop and carry out their forest conservation plans. It encourages and supports acquisition of conservation easements, legally binding agreements transferring a negotiated set of property rights from one party to another, without removing the property from private ownership. Most FLP conservation easements restrict development, require sustainable forestry practices, and protect conservation values.

To participate in the Forest Legacy Program, each state must complete an Assessment of Need (AON) and submit it to the USDA-FS for approval. As the lead state agency, the Louisiana Department of Agriculture and Forestry contracted with The Nature Conservancy to prepare our AON, see link below. Presently, one Forest Legacy Area has been identified in Louisiana and is mapped within the AON.

Reference:

1 Louisiana Office of Forestry website. 2010. http://www.ldaf.state.la.us/portal/Offices/Forestry/ForestManagement/ForestLegacyProgram/tabid/234/Default.aspx

Attached to or distributed with this Assessment, the adjoining document is the Louisiana Forestry Legacy Program Assessment of Need from September 2007.

Patch worn by all current employees of the Office of Forestry.