CONSERVATION ACTION PLAN

FOR THE

LOWER OUACHITA TERRACES CONSERVATION AREA

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Submitted by:

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TABLE OF CONTENTS

LOWER OUACHITA TERRACES CONSERVATION ACTION PLAN
EXECUTIVE SUMMARY

Project Vision

The long-term conservation vision for the Lower Ouachita Terraces conservation area is to conserve and restore functional terrestrial systems. The systems should support stable populations of CWCS Species of Special Concern and their associated ecological communities. This vision includes working in partnership with local communities and public entities to incorporate compatible economic and cultural interests within the Lower Ouachita Terraces into the long-term conservation of its biodiversity.

Project Area

The land on the terraces and Quaternary floodplains surrounding the confluence of the Ouachita and Saline rivers in Union, Calhoun, Cleveland, Bradley, Ashley and Drew counties, is often referred to as the Lower Ouachita Terraces Conservation Area. This landscape-scale site includes parts of two functioning, hydrologically intact, large river systems and parts of their mostly forested watersheds. The terrestrial communities include wetland forests, terrace forests and upland matrix pine-oak woodlands and pine-grass savannas that provide key habitats for a suite of wildlife. Some 30 globally-imperiled and state-tracked animal species occur within this site. This represents a significant proportion of the species on the Species of Concern list developed as part of the State Comprehensive Wildlife Conservation Plan (CWCP). Significant terrestrial habitats of concern include perhaps the best representation of Dry Pine-Hardwood Flatwoods in the world and of upland pine-grass ecosystems, required by red-cockaded woodpecker (*Picoides borealis*, G3LE) and important to several other high priority bird species.

Project Plan

This Conservation Action Plan was developed by a Core Project Team made up of members of governmental and non-governmental conservation organizations as well as private industrial timberland managers. Seven ecological systems were chosen as Focal Conservation Targets. The planning team determined these systems, when functional, represent a significant portion of the biodiversity of the project area. Over fifty CWCS Terrestrial Species of Concern are associated with these systems and represent Nested Conservation Targets. Top threats identified by the team include: conversion to pine plantation, incompatible silvicultural practices, fire suppression, invasive species, roads, bedding and dams. Strategies developed to abate threats and conserve targets include:

- Acquire large-acre conservation easement with major landowner in system, e.g. 60,000 acre Moro-Big Pine Project;
- Implement Conservation Forestry Plan at demonstration site;
- Implement Conservation Forestry on private lands in project area;
- Utilize currently existing private lands programs to encourage and fund conservation of focal targets on priority sites on private lands;
- Conduct Index of Hydrologic Alteration (IHA) study;
- Develop early warning and response system to address aggressive non-native invasive species;
- Identify and map high priority tracts (protection plan) within one year;
- Track availability of and protect identified tracts;
- Identify and remediate impacts of highest priority roads;
- Prevent impacts on focal targets from future road projects (I69);
- Increase capacity of state/federal/private land managers;
- Develop and implement a comprehensive fire management plan for the project area;
- Secure $14,000,000 from partners (AGFC, ANHC, AFC, TNC et. al.) for matching funds for grants; and
- Secure $7,000,000 through Forest Legacy and other public funding sources.

INTRODUCTION

Conservation Action Planning

The Nature Conservancy's process for helping conservation practitioners develop strategies, take action, measure success, and adapt and learn over time is called Conservation Action Planning (The Nature Conservancy 2005).

The planning team used conservation action planning to develop area-specific conservation strategies and prepare for taking action and measuring success. This plan follows the 5-S Framework:

- **Systems**. The *Core Project Team* identified the natural communities that will be the *Focal Conservation Targets* for the area. This was done using habitat lists developed during Arkansas Game & Fish Commission's Comprehensive Wildlife Conservation Strategy (CWCS) planning.

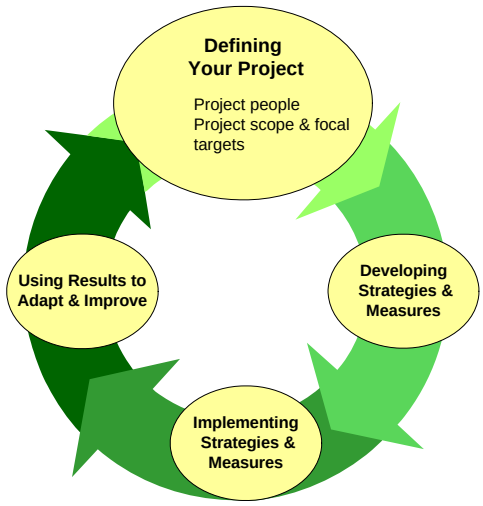
- **Stresses**. The team determined how focal conservation targets are compromised, such as by habitat conversion or fragmentation.

- **Sources**. The team then identified and ranked the causes, or sources, of stress for each element. The analysis of stresses and sources together made up the threat assessment.

- **Strategies**. An important step in the process was finding practical cooperative ways to mitigate or eliminate the identified threats and enhance biodiversity.

- **Success**. The plan outlines methods for assessing effectiveness in reducing threats and improving biodiversity-- by monitoring progress toward established biological and programmatic objectives.

The Conservation Action Plan for the Lower Ouachita Terraces Conservation Area was developed by a Core Planning Team made up of members of governmental and non-governmental conservation organizations as well as private industrial timberland managers. The project area (scope) was based on at-risk habitats adopted by the Comprehensive Wildlife Conservation Strategy (CWCS) Planning Team. The project area boundary was refined by the planning team to better encompass the CWCS Habitats (Systems) that occur there. The planning team utilized The Nature Conservancy's Conservation Action Planning tool referred to as the C.A.P. Workbook. This report was developed from information entered into the C.A.P. workbook by the core planning team.



Project Vision

The long-term conservation vision for the Lower Ouachita Terraces conservation area is to conserve and restore functional terrestrial systems. The systems should support stable populations of CWCS Species of Special Concern and their associated ecological communities. This vision includes working in partnership with local communities and public entities to incorporate compatible economic and cultural interests within the Lower Ouachita Terraces into the long-term conservation of its biodiversity.

Overview and General Description of The Upper West Gulf Coastal Plain Ecoregion

The Lower Ouachita Conservation Area is located entirely within the Upper West Gulf Coastal Plain (UWGCP) ecoregion. The area of the UWGCP is approximately 26,500,000 acres or 41,400 square miles and encompasses parts of four states; Arkansas, Oklahoma, Texas, and Louisiana. The UWGCP extends south approximately from Little Rock, Arkansas to Shreveport, Louisiana, southwest to Houston and Northwest to outside the Dallas/Fort Worth area. Physiographically it is bordered by the Lower West Gulf Coast Plain to the south, the Gulf Coast Prairies and Marshes to the southeast, the Crosstimbers and Southern Tallgrass Prairie to the West, the Ouachita Mountains to the north, and the Mississippi River Alluvial Plain to the East. The delineation between the Lower West Gulf Coastal Plain and the UWGCP is the northern limit of the longleaf pine terrestrial community.

Physiographic and Geologic Features of the UWGCP

The Upper West Gulf Coastal Plain is composed largely of clays, sands, marl, gravels, bedded gravels and clays, and marine sediments associated with the Cretaceous period, approximately 50 million years ago (Shepherd, 1984). Recent geologic formations include Quaternary age Pleistocene deposits and Holocene alluvial deposits (McInnis, 1995). Further south in the gulf coastal plain, Cretaceous deposits are overlain with Tertiary Pliocene and Claiborne Eocene deposits (Bernard & LeBlanc, 1965).

This late Cretaceous marine geology in the Upper West Gulf Coastal Plain is represented by the Trinity Group, Goodland Limestone, Kiamichi, Woodbine, Tokio, Brownstown, Ozan, Annona, Saratoga Chalk, and Nacatoch sand formations. Marginally marine depositional groups from the Tertiary period include the Midway and the Jackson group. Non-marine sands, silty sands, clays, gravels, and quartzite and lignite deposits from the tertiary period are represented in the Wilson and Claiborne, groups. (Bernard & LeBlanc, 1965).

Marine, marginally marine, and non-marine deposits are found throughout the ecoregion in Arkansas, Louisiana, Oklahoma, and Texas (McFarland, 1998). Sands underlie large parts of the UWGCP, and alkaline Lafe soils are present as well (Shepherd, 1984). There are some igneous intrusions in the ecoregion as evidenced by the bauxite and nepheline syenite formations in south central Arkansas (McFarland, 1998).

The UWGCP is bordered by the Mississippi River Alluvial Plain to the east, the Ouachita Mountains to the North, the Crosstimbers and Southern Prairies to the West, and the Lower West Gulf Coastal Plain to the south. The division between the lower and upper west gulf coastal plains is the northern extent of the Southern Longleaf Pine community.

Topography ranges generally from flat to rolling hills, with occasional ravines and erosional bluffs. Elevation ranges from 850 to less than 10 feet above sea level. A series of depositional plains make up the ecoregion; the Willis plain is the highest, to 200 feet, then the Bentley from 200 –100, the Montgomery from 125 to 70, and the Beaumont from 100 to 10 feet above sea level. Most of the UWGCP lies between 150-300 feet above sea level (Bernard & LeBlanc,1965).

The UWGCP has microtopographic natural hillocks or "pimple mounds," approximately 3 feet high and 50 feet in diameter, and are most evident in Wrightsville soils. They are found on Tertiary and Quaternary deposits in Louisiana, Arkansas, Texas, Missouri, and Kansas, but have not been reported east of the Mississippi River. The pimple mounds support islands of upland vegetation on otherwise wetland forests or savannas. No single theory significantly explains the origin of these mounds (Bernard & LeBlanc, 1965).

All Quaternary gulf coastal plains are depositional. Each progressively older Pleistocene coastal plain passes under the deposits forming the next younger plain; each successively younger plain slopes seaward at progressively smaller rates, varying in different areas along the coast because of different initial depositional slopes and differential coastal warping (Bernard & LeBlanc, 1965).

UWGCP Settlement, Use History and Current Human Interaction/Demographics

It is believed that nomadic hunter-gatherers first occupied the Upper West Gulf Coastal Plain at the end of the last glacial advance, approximately 14,000 to 10,000 years ago. Approximately 2,500 years ago Native Americans began to transition from a gathering to an agricultural lifestyle (Peter, et. al., 1990). European visitors to the Upper West Gulf Coastal Plain in the early 1800s reported Native Americans were engaged in limited farming, as well as hunting and gathering. It is believed that the Caddo tribe augmented the natural fire process in the ecoregion to clear areas, enhance crops, and flush game. Though there was a European presence in the area since the 17th century, the 1820s are considered the real beginning of settlement in the ecoregion (Shepherd, 1984).

Most Native Americans were relocated from the Upper West Gulf Coastal Plain by the 1840s. Relocation coincided with increasing western settlement aided by Federal land grant programs (McInnis, 1995). Agriculture became one of the primary land uses in the UWGCP with the rise of several large plantations in the 30 years before the civil war, with cotton and corn the dominant crops (Peter, et. al., 1990). The civil war curbed large-scale agricultural development. After the civil war property was sold off in smaller tracts so that by 1900 numerous smaller farms and tenants occupied the area. Cattle grazing also became important in the ecoregion after the civil war (McInnis, 1995).

Cotton farming grew as more lands were cleared from timber harvesting, to the point were cotton farming was attempted in nearly every terrestrial system in the ecoregion. Many of the smaller farms that were abandoned during the Great Depression in the 1920s and 1930s were purchased by the Federal

Government and became elements of Kisatchie, Davy Crockett, and Sabine National Forests (Turner, 2001).

Timber production has been the other primary land use in the ecoregion. Railroad construction through the UWGCP in the early 1800 facilitated traffic and development into the ecoregion, expanding timber and agriculture markets. Lumber mills followed rail lines into the ecoregion. The timber industry reached its peak in the UWGCP in the 1880s, and by the 1920s most of the ecoregion had been logged and cut over at least once. By 1925 almost all virgin pine had been cut over. After a decrease in large-scale timber harvesting, the timber industry moved to managed plantation harvesting. Timber harvesting for both sawmill and pulpwood continues to be a major land use in the Upper West Gulf Coastal Plain.

Mineral extraction in the UWGCP began in the late 1800s and included coal, lignite, clays, sand, gravel and metals. Many of these resources continue to be extracted from the ecoregion. Oil and gas extraction began in the 1920s following the decrease of timber production (McInnis, 1995). The Nepheline Syenite formations in the northern part of the ecoregion were mined extensively beginning in the 1930s for bauxite for the aluminum industry. In addition to creating a huge demand for aluminum, World War II was also responsible for the number of munitions plants, depots and military bases in the ecoregion (Shepherd, 1984). As munitions plants and depots were constructed in remote areas with plenty of surrounding land, they provide excellent conservation opportunities owing to their scale and use patterns.

Natural resource-based industries in the Upper West Gulf Coastal Plain have expanded this century to include recreation and tourism, though much of the local economy is still based on forestry, agriculture, and traditional resource extraction. Suburban sprawl and development of natural lands continues to increase (Shepherd, 1984; U.S. Dept. Census, 1998).

Generally land use in the UWGCP has resulted in disturbance of various types and levels throughout the ecoregion. Many areas of biodiversity have experienced some kind of past disturbance including clearing for timber, agriculture, grazing, or mineral extraction. However, some of these areas have been or are in the process of being returned to a level of pre-settlement state. Following the first round of timber extraction, many cleared areas were converted to pasture or cotton fields. Cleared areas that have failed to grow cotton may have been abandoned to return to a wooded state, and areas that were clearcut for the first time in the 1920s or 1930s are now showing older-growth forest; similarly, areas that have proven unsuccessful at hosting commercial forest are being restored to their natural state. Unfortunately suppression of the natural fire regime has resulted in stressed or ecologically incomplete landscapes (Foti and Zollner, pers. comm, 2001).

UWGCP Climatology

The climate of the UWGCP is considered transitional, between subtropical humid areas of the south and gulf, and the continental climates of the Great Plains and Midwest. Generally south or southwesterly winds contribute to hot, humid summers and mild winters. Spring and fall are usually mild. In the winter, temperatures range from an average of 50º – 63º F in the afternoons and 39º – 50º F in the early mornings; there are approximately 30 – 40 days of freezing temperatures in the winter. In warmer months the temperature varies less, with afternoon temperatures averaging between 85º – 95º F and morning temperatures averaging 68º – 75º F (NOAA, 2001a).

Precipitation occurs throughout the year, though most rainfall occurs in the spring and fall. Thunderstorms and extreme weather can occur throughout the year, though they are more prevalent in the spring and fall in the northern part of the ecoregion, and in the spring and summer in the southern part of the ecoregion. The UWGCP receives approximately 46 – 50 inches of precipitation a year with approximately 100 days receiving measurable rainfall (NOAA, 2001b).

Extreme weather includes convective thunderstorms, which may have historically been the source of lightning-ignited, low-intensity fires. Tornadoes, straight-line winds, and hailstorms also occur and have historically affected natural communities as periodic disturbances. More common in the southern section of the ecoregion, hurricanes and tropical storms from the Gulf of Mexico also affect climatology and natural communities.

Systems in the UWGCP

*Aquatic Systems***.** Though all aquatic systems in the UWGCP do not drain into the Mississippi River basin, all are zoogeographically classified in the Mississippi province (Moyle and Cech, 1998), and as such, contain the richest assemblage of fish and mussel species in the Nearctic region. Further, the lower Mississippi River basin is considered a glacial age species refuge, allowing for historic reoccupation and evolution throughout the range. Aquatic systems represented in the UWGCP include lacustrine systems as natural lakes, riverine systems as high order/ big rivers, and low-order/small streams, and seeps, and palustrine systems as sloughs and swamps. The majority of aquatic systems in the UWGCP are fluvial, and natural lakes are uncommon. Aquatic systems are not addressed in this plan.

*Terrestrial Systems***.** Terrestrial systems in the UWGCP include both mesic bottomland and upland dry-mesic and hydric areas. Bottomlands are dominated by hardwood communities, primarily oak species, and more deeply flooded areas frequently have cypress and cypress-tupelo swamp vegetation. Upland areas have shortleaf and loblolly pines, mixed pine-hardwood communities, glades, and woodlands. Prairies occur on blackland sites, depending on fire history and soil depth. Barrens and woodlands occur on saline soil flats. Ancient volcanic intrusions form bauxite deposits that are home to globally-rare and endemic nepheline syenite communities.

General Description of the Lower Ouachita Terraces Conservation Area

The land on the terraces and Quaternary floodplains surrounding the confluence of the Ouachita and Saline rivers in Union, Calhoun, Cleveland, Bradley, Ashley, Drew, Grant, Hot Spring and Saline counties, is often referred to as the Lower Ouachita Terraces Conservation Area. This 1.4 million acre, landscape-scale site includes parts of two functioning, hydrologically intact, large river systems and parts of their mostly forested watersheds (Figure 1). The terrestrial communities include wetland forests, terrace forests and upland matrix pine-oak woodlands and pine-grass savannas that provide key habitats for a whole suite of wildlife (Figure 2). Much of the forested portion of the Lower Ouachita site is used in the production of forest products, and as a result, faces threats associated with the broad-scale conversion of natural forests to monoculture pine plantations that provide limited benefit to wildlife.

Some 30 globally-imperiled and state-tracked animal species occur within this site. This represents a significant proportion of the species on the Species of Concern list developed as part of the State Comprehensive Wildlife Conservation Plan (CWCP). Significant terrestrial habitats of concern include perhaps the best representation of loblolly pine flatwoods in the world and of upland pine-grass ecosystems, required by red-cockaded woodpecker (*Picoides borealis*, G3LE) and important to several other high-priority bird species. Local geology and soil conditions within the site also provide for small patch diversity, including saline soil barrens (e.g. Warren Prairie, Kingsland Prairie), that support globally-significant birds such as wintering Henslow's sparrow (*Ammodramus henslowii*, G4) and breeding Bachman's sparrow (*Aimophila aestivalis*, G3).

Figure 1. Lower Ouachita Terraces Conservation Area Boundary

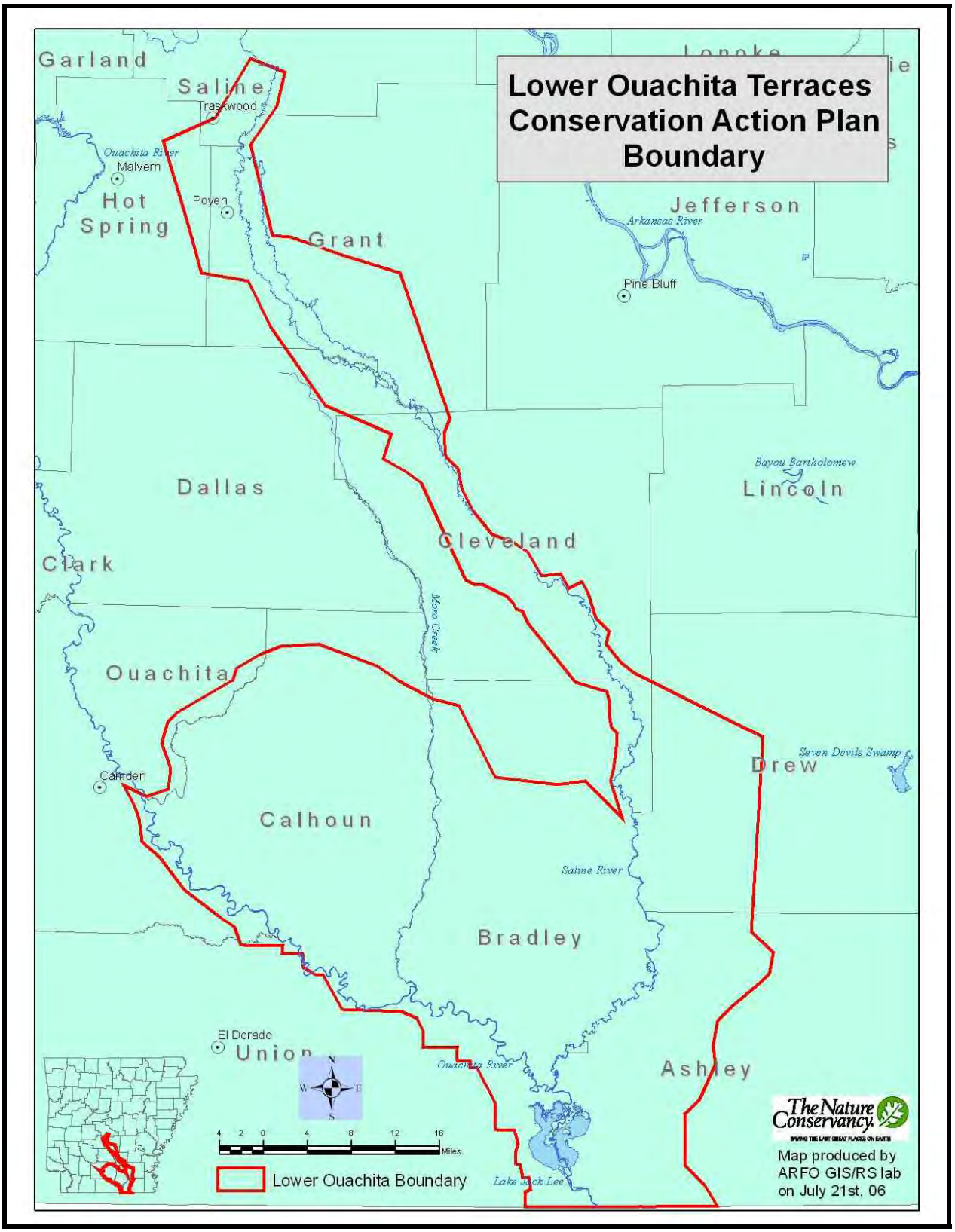
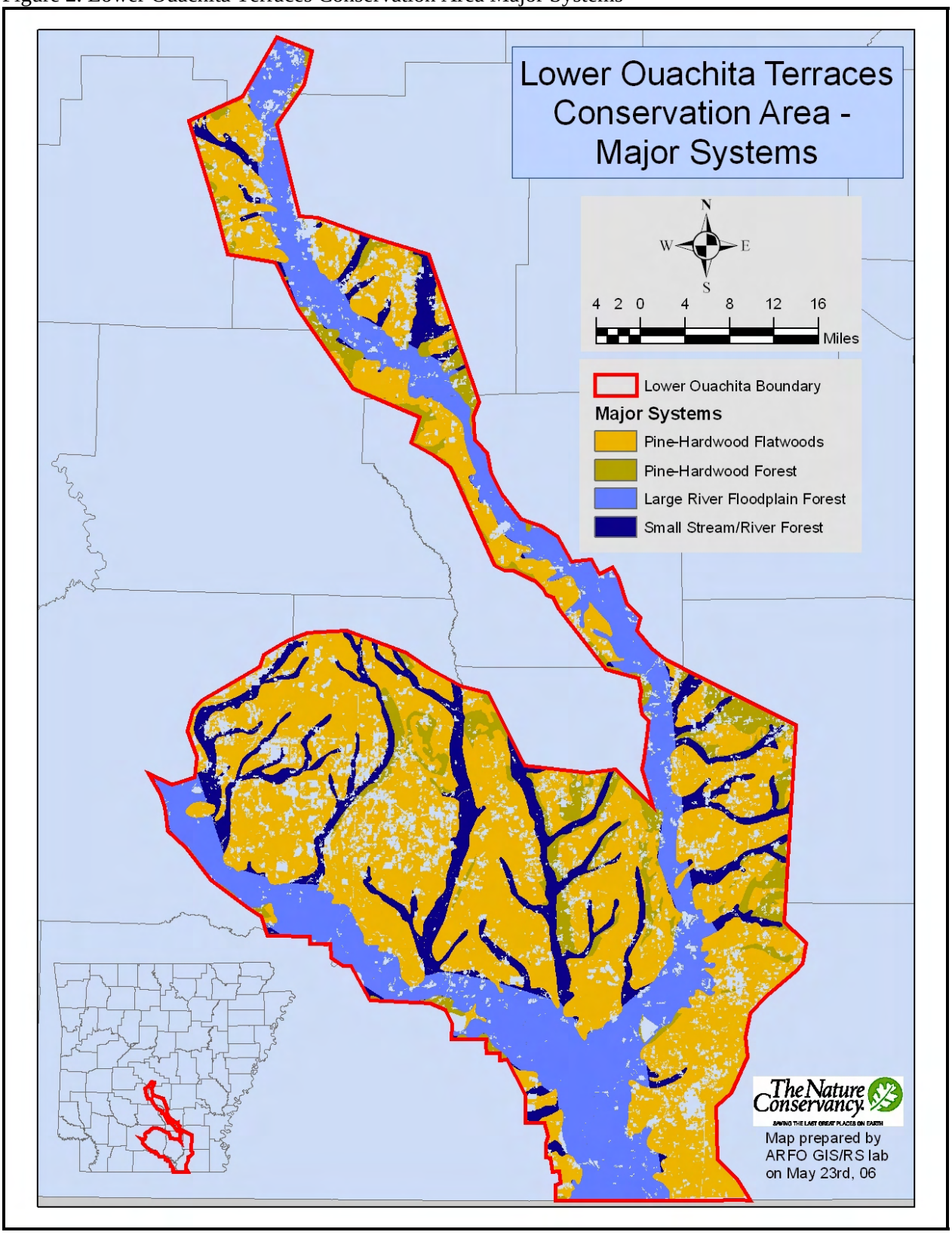

Lower Ouachita Terraces Conservation Action Plan Boundary
Garland
Saline
Traskwood
Ouachita River
Malvern
Hot Spring
Poyen
Grant
Jefferson
Arkansas River
Pine Bluff
Dallas
Bayou Bartholomew
Lincoln
Cleveland
Clark
Ouachita
Drew
Seven Devils Swamp
Camden
Calhoun
Saline River
Bradley
El Dorado
Union
Ouachita River
Ashley
Lake Jack Lee
N
W
E
S
4 2 0 4 8 12 16
Miles
Lower Ouachita Boundary
The Nature Conservancy
Map produced by ARFO GIS/RS lab on July 21st, 06

Figure 2. Lower Ouachita Terraces Conservation Area Major Systems*



*based on geomorphology, not current vegetative cover

FOCAL CONSERVATION TARGETS

In Conservation Action Planning, *Focal Conservation Targets* (also called *Systems*) are the eight or fewer conservation targets used as the basis for conservation project planning and measures of success. Focal conservation targets are selected to represent the numerous other species, natural communities, or ecological systems that (1) occur together with the focal conservation target on the landscape; or (2) are linked by ecological processes, underlying environmental features (e.g., soils, geology, topography), or environmental gradients (e.g., elevation, precipitation, temperature). They are the basis for setting goals, carrying out conservation actions, and measuring conservation effectiveness. In theory – and hopefully in practice – conservation of the focal targets will ensure the conservation of all native biodiversity within the functional landscapes (The Nature Conservancy 2005). In this document, Focal Conservation Target, Focal Target and Target are used interchangeably.

Nested Conservation Targets are the individual species, natural communities and species assemblages that are associated with, and represented by, the focal conservation target. These may be species or communities that are of local concern due to declines in populations or habitat loss, those that provide important functions to the system, or any others that have an important link to the viability of the system. Conservation planners refer to these species, communities or species groups or assemblages as "nested targets" because they are contained within or otherwise subsumed by one or more of the focal conservation targets.

Seven ecological systems were chosen as Focal Conservation Targets for the Lower Ouachita Terraces Conservation Action Plan: West Gulf Coastal Plain Pine-Hardwood Forest, West Gulf Coastal Plain Dry Pine-Hardwood Flatwoods, West Gulf Coastal Plain Mesic Hardwood Forest, West Gulf Coastal Plain Wet Hardwood Flatwoods, West Gulf Coastal Plain Seepage Swamp and Baygall, West Gulf Coastal Plain Large River Floodplain Forest and West Gulf Coastal Plain Small Stream/River Forest. The planning team determined these systems, when functional, represent a significant portion of the biodiversity of the project area. Over fifty CWCS Terrestrial Species of Concern are associated with these systems (Appendix A). These species, as well as associated ecological communities, represent the Nested Targets within each system. Each focal conservation target is listed below with a brief description and a list of associated CWCS Terrestrial Species of Concern. Descriptions (adapted from NatureServe 2005) and species were taken directly from the AGFC CWCS Database.

Description of Focal Conservation Targets

West Gulf Coastal Plain Pine-Hardwood Forest**.** This ecological system consists of forests and woodlands dominated by *Pinus taeda* and/or *Pinus echinata* in combination with a host of dry to dry-mesic site hardwood species. This type was the historical matrix (dominant vegetation type). This habitat was historically present on nearly all uplands in the region except on the most edaphically limited sites (droughty sands, calcareous clays, and shallow soil barrens/rock outcrops). Such sites are underlain by loamy to fine-textured soils of variable depths. These are upland sites on ridge tops and adjacent side slopes, with moderate fertility and moisture retention. Fire is an important natural process in this system (T. Foti pers. comm.).This system has undergone major transformations since European settlement of the region and has been largely converted to cultivated pine plantations.

Terrestrial Species of Concern associated with this habitat type and the weight or importance of the habitat to each species include:

Common Name	Scientific Name	Habitat Weight
Yellow-billed Cuckoo	(Coccyzus americanus)	Marginal
Bachman's Sparrow	(Aimophila aestivalis)	Marginal

West Gulf Coastal Plain Pine-Hardwood Forest continued

Wood Thrush	(Hylocichla mustelina)	Suitable
Texas Frosted Elfin	(Callophrys irus hadros)	Suitable
Strecker's Chorus Frog	(Pseudacris streckeri)	Marginal
Louisiana Slimy Salamander	(Plethodon kisatchie)	Suitable
Texas Coral Snake	(Micrurus tenere tenere)	Suitable
Kentucky Warbler	(Oporornis formosus)	Suitable
American Black Bear	(Ursus americanus americanus)	Suitable
Mississippi Kite	(Ictinia mississippiensis)	Suitable
EasternTowhee	(Pipilo erythrophthalmus)	Marginal
Worm-eating Warbler	(Helmitheros vermivorus)	Marginal
Brown-headed Nuthatch	(Sitta pusilla)	Suitable
Long-tailed Weasel	(Mustela frenata)	Data Gap
Prairie Warbler	(Dendroica discolor)	Optimal
Giant Stag Beetle	(Lucanus elephus)	Suitable
Rafinesque's Big-Eared Bat	(Corynorhinus rafinesquii)	Marginal
Red-cockaded Woodpecker	(Picoides borealis)	Obligate
Seminole Bat	(Lasiurus seminolus)	Optimal
Northern Bobwhite	(Colinus virginianus)	Marginal

West Gulf Coastal Plain Dry Pine-Hardwood Flatwoods**.** This system represents predominately dry flatwoods usually found on Pleistocene high terraces, typically outside the floodplain. Soils are fine-textured and hardpans may be present in the subsurface. The limited permeability of these soils contributes to shallowly perched water tables during portions of the year when precipitation is greatest and evapotranspiration is lowest. Soil moisture fluctuates widely throughout the growing season, from saturated to very dry, a condition sometimes referred to elsewhere as hydroxeric. Saturation occurs not from overbank flooding but typically whenever precipitation events occur. Drier sites support *Pinus taeda* and *Quercus stellata*; more mesic sites have *Pinus taeda* with *Quercus phellos* and species such as *Symplocos tinctoria* and *Viburnum dentatum*. Fire is an important natural process in this system (T. Foti pers. comm.).

Embedded swales tend to support hardwood flatwoods or swamps, often heavily oak-dominated with species tolerant of some inundation such as *Quercus phellos* and *Quercus laurifolia* with sparse coverage of wetland herbs such as *Carex glaucescens*. Some swales support unusual pockets of *Fraxinus caroliniana* and *Crataegus spp*.

In addition to the CWCS Terrrestial Species of Concern listed below, an important nested target that occurs within this system is the CWCS habitat, West Gulf Coastal Plain Saline Glade**.** This habitat is present only on soils with high saline content, which are generally not conducive to woody plant growth. Thus, the vegetation forms a mosaic primarily consisting of open herbaceous or shrubby plant communities. The federally-endangered plant, *Geocarpon minimum*, occurs in saline glades at Kingsland Prairie Preserve. Saline glades are listed as optimal hatitat for Henslow's Sparrow, a CWCS Species of Concern.

West Gulf Coastal Plain Dry Pine-Hardwood Flatwoods continued

Terrestrial Species of Concern associated with this habitat type and the weight or importance of the habitat to each species include:

Common Name	Scientific Name	Habitat Weight
Prairie Warbler	(Dendroica discolor)	Marginal
American Woodcock	(Scolopax minor)	Suitable
Brown-headed Nuthatch	(Sitta pusilla)	Suitable
Bachman's Sparrow	(Aimophila aestivalis)	Suitable
Seminole Bat	(Lasiurus seminolus)	Optimal
Yellow-billed Cuckoo	(Coccyzus americanus)	Marginal
Wood Thrush	(Hylocichla mustelina)	Marginal
Mississippi Kite	(Ictinia mississippiensis)	Suitable
Red-cockaded Woodpecker	(Picoides borealis)	Obligate
EasternTowhee	(Pipilo erythrophthalmus)	Marginal
Long-tailed Weasel	(Mustela frenata)	Data Gap
Northern Bobwhite	(Colinus virginianus)	Marginal

West Gulf Coastal Plain Mesic Hardwood Forest**.** This ecological system is found in limited upland areas, especially side slopes and narrow ridgetops.These areas were somewhat protected topographically from historically fire-prone, pine-dominated uplands. Soils can be quite variable ranging from coarse to loamy in surface texture. Most are acidic in surface reactions and less commonly circumneutral. These sites have moderate to high fertility and moisture retention. Sites are often found along slopes above perennial streams in the region. Vegetation indicators are mesic hardwoods such as *Fagus grandifolia*, *Quercus alba*, and *Ilex opaca*, although scattered, large-diameter pines, often *Pinus taeda*, are also often present. Spring-blooming herbaceous species are typical in the understory of most examples.

Terrestrial Species of Concern associated with this habitat type and the weight or importance of the habitat to each species include:

Common Name	Scientific Name	Habitat Weight
Hooded Warbler	(Wilsonia citrina)	Optimal
EasternTowhee	(Pipilo erythrophthalmus)	Marginal
Worm-eating Warbler	(Helmitheros vermivorus)	Marginal
Mississippi Kite	(Ictinia mississippiensis)	Marginal
Giant Stag Beetle	(Lucanus elephus)	Suitable
Yellow-billed Cuckoo	(Coccyzus americanus)	Optimal
Wood Thrush	(Hylocichla mustelina)	Optimal
Chuck-will's-widow	(Caprimulgus carolinensis)	Suitable
Louisiana Slimy Salamander	(Plethodon kisatchie)	Optimal
Southeastern Bat	(Myotis austroriparius)	Suitable
Cerulean Warbler	(Dendroica cerulea)	Marginal
Long-tailed Weasel	(Mustela frenata)	Data Gap
Chimney Swift	(Chaetura pelagica)	Suitable
Kentucky Warbler	(Oporornis formosus)	Optimal
American Woodcock	(Scolopax minor)	Suitable
Swainson's Warbler	(Limnothlypis swainsonii)	Marginal

West Gulf Coastal Plain Wet Hardwood Flatwoods**.** These habitats are usually found on Pleistocene high terraces outside the floodplains. Soils are fine-textured and hardpans may be present in the subsurface. The limited permeability of these soils contributes to perched water tables during fairly substantial portions of the year (when precipitation is greatest and evapotranspiration is lowest). Saturation occurs not from overbank flooding but typically whenever precipitation events occur. The local landscape is often a series of ridges and swales There is vegetation variability related to soil texture and moisture and disturbance history. Most examples support hardwood forests or swamps, which are often heavily oak-dominated. Important species are tolerant of inundation. They include *Quercus phellos* and *Quercus laurifolia* with sparse coverage of wetland herbs such as *Carex glaucescens*. Some swales support unusual pockets of *Fraxinus caroliniana* and *Crataegus spp*.

Terrestrial Species of Concern associated with this habitat type and the weight or importance of the habitat to each species include:

Common Name	Scientific Name	Habitat Weight
Red-headed Woodpecker	(Melanerpes erythrocephalus)	Suitable
Long-tailed Weasel	(Mustela frenata)	Data Gap
Rafinesque's Big-Eared Bat	(Corynorhinus rafinesquii)	Suitable
Northern Pintail	(Anas acuta)	Suitable
EasternTowhee	(Pipilo erythrophthalmus)	Marginal
American Black Duck	(Anas rubripes)	Suitable
Hooded Warbler	(Wilsonia citrina)	Marginal
Wood Thrush	(Hylocichla mustelina)	Marginal
Southeastern Bat	(Myotis austroriparius)	Marginal
Swainson's Warbler	(Limnothlypis swainsonii)	Marginal
Mole Salamander	(Ambystoma talpoideum)	Suitable
Kentucky Warbler	(Oporornis formosus)	Marginal
American Woodcock	(Scolopax minor)	Suitable
Mississippi Kite	(Ictinia mississippiensis)	Suitable
Western Chicken Turtle	(Deirochelys reticularia miaria)	Suitable
Prothonotary Warbler	(Protonotaria citrea)	Marginal
Yellow-billed Cuckoo	(Coccyzus americanus)	Suitable
Bald Eagle	(Haliaeetus leucocephalus)	Suitable

West Gulf Coastal Plain Seepage Swamp and Baygall**.** This habitat consists of forested wetlands (often densely wooded) in acidic seepage influenced wetland habitats. These wetlands may occur in poorly developed upland drainages, toe-slopes, and small headwaters stream bottoms. These environments are prone to long duration standing water, and tend to occur on highly acidic, nutrient-poor soils. The vegetation is characterized by *Magnolia virginiana*, *Nyssa sylvatica*, *Nyssa biflora*, and *Acer rubrum*, although there is some variation according to latitude. Understory vegetation throughout the region consistently supports an abundance of ferns, such as *Osmunda cinnamomea*, *Osmunda regalis var. spectabilis*, and *Woodwardia areolata*. In most cases, these wetlands are embedded in uplands with deep sandy soils. When these communities are associated with streams, they tend to be low gradient, with narrow, often braided channels and diffuse drainage patterns. Due to excessive wetness, these habitats are normally protected from fire except those which occur during dry years.

This system occurs on saturated soils associated with springs and seepage flow at the headwaters and margins of topographically flat creek bottoms of low velocity in the West Gulf Coastal Plain. The creek

West Gulf Coastal Plain Seepage Swamp and Baygall continued

channels themselves tend to be highly meandering, often with multiple channels and extremely shallow banks. Examples are invariably embedded within deep sandy slopes and uplands, and may also occur in association with flatwoods drainages

Terrestrial Species of Concern associated with this habitat type and the weight or importance of the habitat to each species include:

Common Name	Scientific Name	Habitat Weight
Rafinesque's Big-Eared Bat	(Corynorhinus rafinesquii)	Optimal
Mississippi Kite	(Ictinia mississippiensis)	Marginal
crayfish	(Fallicambarus petilicarpus)	Data Gap
King's Hairstreak	(Satyrium kingi)	Suitable
Prothonotary Warbler	(Protonotaria citrea)	Marginal
crayfish	(Fallicambarus gilpini)	Suitable
crayfish	(Faxonella blairi)	Data Gap
crayfish	(Procambarus regalis)	Suitable
Dwarf Salamander	(Eurycea quadridigitata)	Optimal
Yellow-billed Cuckoo	(Coccyzus americanus)	Suitable
Spotted Dusky Salamander	(Desmognathus conanti)	Obligate
Western Chicken Turtle	(Deirochelys reticularia miaria)	Optimal

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West Gulf Coastal Plain Large River Floodplain Forest. This system represents broad bottomlands along larger rivers such as the Saline and Ouachita. Several distinct plant communities are recognized within this system that may be related to the array of different geomorphic features present within the floodplain. Some of the major geomorphic features associated with different community types include natural levees, point bars, meander scrolls, oxbows and sloughs. Vegetation generally includes forests dominated by bottomland hardwood species and other trees tolerant of flooding.

Terrestrial Species of Concern associated with this habitat type and the weight or importance of the habitat to each species include:

Common Name	Scientific Name	Habitat Weight
Snowy Egret	(Egretta thula)	Suitable
Yellow-billed Cuckoo	(Coccyzus americanus)	Optimal
Kentucky Warbler	(Oporornis formosus)	Optimal
Northern Pintail	(Anas acuta)	Suitable
Prothonotary Warbler	(Protonotaria citrea)	Suitable
Swallow-tailed Kite	(Elanoides forficatus forficatus)	Suitable
Gulf Crayfish Snake	(Regina rigida sinicola)	Suitable
Mississippi Kite	(Ictinia mississippiensis)	Suitable
Little Blue Heron	(Egretta caerulea)	Suitable
Yellow-crowned Night-heron	(Nyctanassa violacea)	Suitable
American Woodcock	(Scolopax minor)	Suitable
EasternTowhee	(Pipilo erythrophthalmus)	Marginal
Black-crowned Night-heron	(Nycticorax nycticorax)	Suitable
Rusty Blackbird	(Euphagus carolinus)	Suitable
American Black Duck	(Anas rubripes)	Suitable

West Gulf Coastal Plain Large River Floodplain Forest continued

Bald Eagle	(Haliaeetus leucocephalus)	Suitable
Wood Stork	(Mycteria americana)	Marginal
Swainson's Warbler	(Limnothlypis swainsonii)	Marginal
Cerulean Warbler	(Dendroica cerulea)	Suitable
Wood Thrush	(Hylocichla mustelina)	Optimal
Chimney Swift	(Chaetura pelagica)	Suitable
Red-headed Woodpecker	(Melanerpes erythrocephalus)	Suitable
Hooded Warbler	(Wilsonia citrina)	Optimal
Bird-voiced Treefrog	(Hyla avivoca)	Optimal
Long-tailed Weasel	(Mustela frenata)	Data Gap
Dwarf Salamander	(Eurycea quadridigitata)	Optimal
Rafinesque's Big-Eared Bat	(Corynorhinus rafinesquii)	Optimal
Western Chicken Turtle	(Deirochelys reticularia miaria)	Suitable
Southeastern Bat	(Myotis austroriparius)	Optimal
American Black Bear	(Ursus americanus americanus)	Optimal

West Gulf Coastal Plain Small Stream/River Forest**.** This is a forested habitat associated with small rivers and creeks. In contrast to West Gulf Coastal Plain Large River Floodplain Forest, examples of this habitat have fewer major geomorphic floodplain features. Those features that are present tend to be smaller and more closely intermixed with one another, resulting in less obvious vegetational zonation. Bottomland hardwood tree species are typically important and diagnostic, although mesic hardwood species are also present in areas with less inundation, such as upper terraces and possibly second bottoms. As a whole, flooding occurs annually, but the water table usually is well below the soil surface throughout most of the growing season. Areas impacted by beaver impoundments are also included in this system.

Terrestrial Species of Concern associated with this habitat type and the weight or importance of the habitat to each species include:

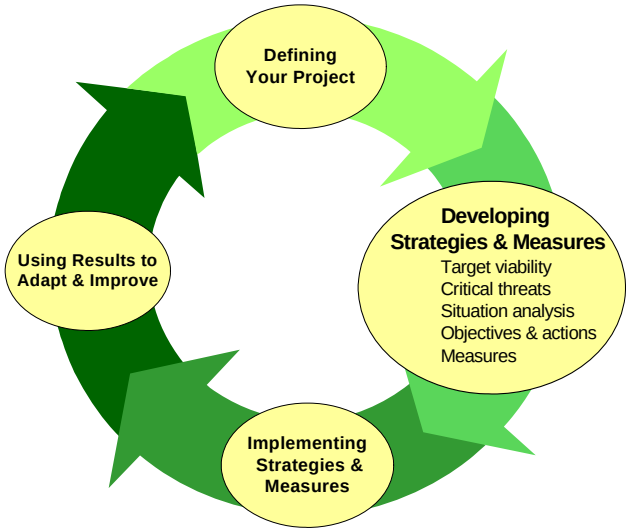
Common Name	Scientific Name	Habitat Weight
Yellow-crowned Night-heron	(Nyctanassa violacea)	Marginal
Mole Salamander	(Ambystoma talpoideum)	Optimal
Dwarf Salamander	(Eurycea quadridigitata)	Optimal
Spotted Dusky Salamander	(Desmognathus conanti)	Optimal
Graham's Crayfish Snake	(Regina grahamii)	Suitable
Mississippi Kite	(Ictinia mississippiensis)	Suitable
Gulf Crayfish Snake	(Regina rigida sinicola)	Suitable
Yellow-billed Cuckoo	(Coccyzus americanus)	Optimal
Rafinesque's Big-Eared Bat	(Corynorhinus rafinesquii)	Suitable
American Woodcock	(Scolopax minor)	Suitable
Southeastern Bat	(Myotis austroriparius)	Marginal
Long-tailed Weasel	(Mustela frenata)	Data Gap
EasternTowhee	(Pipilo erythrophthalmus)	Marginal
Chimney Swift	(Chaetura pelagica)	Suitable
Red-headed Woodpecker	(Melanerpes erythrocephalus)	Marginal
Bald Eagle	(Haliaeetus leucocephalus)	Suitable
Wood Thrush	(Hylocichla mustelina)	Suitable

West Gulf Coastal Plain Small Stream/River Forest continued

Western Chicken Turtle	(Deirochelys reticularia miaria)	Suitable
Swainson's Warbler	(Limnothlypis swainsonii)	Suitable
Yehl Skipper	(Poanes yehl)	Suitable
Kentucky Warbler	(Oporornis formosus)	Suitable
Bird-voiced Treefrog	(Hyla avivoca)	Optimal
King's Hairstreak	(Satyrium kingi)	Suitable
Hooded Warbler	(Wilsonia citrina)	Suitable

ASSESSING CHALLENGES: Threats and Biodiversity Health

Identifying focal conservation targets was the preliminary step in planning for conservation action. The next step was to examine the effect of any threats on the viability of focal targets and the biodiversity health of the Lower Ouachita Terraces conservation area as a whole. Threats are conditions or activities that negatively affect focal targets, either directly or indirectly. Viability is the likelihood that a focal target will persist long-term. Biodiversity health is the aggregation of the viability of all focal targets, the likelihood that the conservation area will remain an ecologically functional landscape over time (The Nature Conservancy 2000). Threats and biodiversity health are usually examined within a ten-year time frame, using current conditions and projected trends.



Viability and Biodiversity Health Assessment

To assess biodiversity health, the viability of each focal target was evaluated, ranked, and the ranks aggregated to provide a biodiversity health rank for the conservation area. The assessment of viability was based on three criteria: size, condition, and landscape context. Size is a measure of the area or abundance of a focal target's occurrence. Condition is an integrated measure of the composition, structure, and biotic interactions that characterize its occurrence. Landscape context is an integrated measure of the dominant environmental regimes and processes that establish and maintain the focal target, and habitat connectivity across the landscape. Tables 1a and 1b are examples of a viability matrix developed for the Dry Pine-Hardwood Flatwoods focal conservation target. See Appendix B for viability matrix tables for the remaining focal targets. After the viability criteria were evaluated for each focal target, the planning team determined what the desired future viability conditions are. The desired future viability was used in developing objectives and, ultimately, forming conservation strategies.

There are three core components of the Assessment of Target Viability that apply to all focal conservation targets in a conservation project of any scale – whether these focal targets are individual populations or species, assemblages of species, ecological communities, or ecological systems. These elements and their function are as follows:

1. Key ecological attributes – structure, composition, interactions and abiotic and biotic processes that enable the target to persist through their influence on the target's size, condition and landscape context.

2. Indicators – measurable entities that are used to assess the status and trend of key ecological attributes.

3. Indicator ratings – the ranges of variation in an Indicator that define and distinguish Very Good, Good, Fair, and Poor rating categories to provide a consistent and objective basis for assessing the status of each Indicator.

Table 1a: Focal Target Viability Matrix: Dry Pine-Hardwood Flatwoods

Conservation Target	Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good
Dry Pine-Hardwood Flatwoods	Landscape Context	Fire regime - (timing, frequency, intensity, extent)	Fire Regime Condition Class (FRCC Definition 2003)	FRCC3	**Conservation Ownership: FRCC2; Non-Cons: FRCC3**	*Conservation Ownership: FRCC1; Non-conservation ownership: >50% FRCC2*	*Conservation Ownership: FRCC1; Non-conservation ownership: >25% FRCC1;>50% FRCC2*
Dry Pine-Hardwood Flatwoods	Landscape Context	Hydrologic regime - (timing, duration, frequency, extent)	Bedding	>25%	**Cons. Own. = none; Non-cons. own.: 10 - 25%**	*Cons. Own. = none; Non-cons. own. < 10%*	No bedding
Dry Pine-Hardwood Flatwoods	Condition	Community architecture	Canopy closure-Landfire Model (Moore 2005)	90% of stands >=15years old >80% closed canopy	**Conser. Ownership: 90% of stands >=15 years old <80% closed canopy; Other: 50% of stands >=15 years old <80% closed canopy**	*Conser. Ownership: 90% of stands >=15 years old <80% closed canopy; Other: 75% of stands >= 15 years old <80% closed canopy*	*All Ownership: 90% of stands >=15 years old 50-80% closed canopy*
Dry Pine-Hardwood Flatwoods	Size	Presence of key communities or seral stages	Percent of landscape, stand age, crown closure-Landfire Model (Moore 2005)	**A: >35% <15 years old; B: 15-25% 15-45 years old, closed canopy; C: 30-40% 15-45 years old, open; D: <10% >45 years old, open; E: 5% >45 years old, closed.**	A: 15-25% <15 years old; B: 10-15% 15-45 years old, closed; C: 35-45% 15-45 years old, open; D: 20-30% >45 years old, open; E: 5% >45 years old, closed.	*A: 10-15% <15 years old; B: 5-10% 15-45 years old, closed canopy; C: 30-35% 15-45 years old, open; D: 30-35% >45 years old, open; E: 5% >45 years old, closed.*	A: 10-15% <15 years old; B: 5-10% 15-45 Years old, closed canopy; C: 10-20% 15-45 years old, open (<80% closure); D: 40-60% >45 years old, open; E: 5% >45 years old, closed.

The table above is an example of part of the viability matrix developed for each focal conservation target. The table and explanation is continued on the following page. The focal target is listed in the first column. The second column contains the key attribute assessment context category (landscape, condition or size). The third column contains the key attributes chosen by the planning team. A key ecological attribute is a critical component of a target's life history, physical processes, community interaction, habitat or interaction with other species. Key ecological attributes are the essential currency for identifying and measuring the composition, structure and function of conservation targets at any biological or geographic scale. The fourth column contains the indicators for each key attribute. Indicators are monitored to track the status of a conservation target, and ultimately to measure the success of conservation strategies. Indicators are identified for each key attribute based on ecological model development, expert consultation and/or reviews of scientific literature. The next columns contain the ranking criteria for each indicator within a range from poor to very good. The criteria were developed from expert estimation of team members, reference communities or from models such as LANDFIRE (www.landfire.gov) and Fire Regime Condition Class (Fire Regime Condition Class Definition 2003).

Table 1b: Focal Target Viability Matrix: Dry Pine-Hardwood Flatwoods continued

Conservation Target	Category	Key Attribute	Indicator	Current Indicator Status	Current Rating	Desired Rating	Date of Current Rating	Date for Desired Rating
Dry Pine-Hardwood Flatwoods	Landscape Context	Fire regime - (timing, frequency, intensity, extent)	Fire Regime Condition Class (FRCC)	Conservation Ownership: FRCC2; Other: FRCC3	Fair	Good	Jan-06	Jan-16
Dry Pine-Hardwood Flatwoods	Landscape Context	Hydrologic regime - (timing, duration, frequency, extent)	Bedding	Bedding of flatwoods is increasing in use as a forestry practice.	Fair	Good	May-06	Jun-16
Dry Pine-Hardwood Flatwoods	Condition	Community architecture	Canopy closure	Conser. Ownerhship:Fair; Other: Poor	Fair	Good	Jan-06	Jan-16
Dry Pine-Hardwood Flatwoods	Size	Presence of key communities or seral stages	Percent of landscape, stand age, crown closure	A: ~45% <15 years old; B: ~15% 15-45 years old, closed canopy; C: ~25% 15-45 years old, open; D: 10% >45 years old, open; E: ~5% >45 years old, closed.	Poor	Good	Jan-06	Jan-26

The status indicator ratings are defined as:

Very Good: The indicator is functioning within an ecologically desirable status, requiring little human intervention for maintenance within the natural range of variation (i.e., is as close to "natural" as possible and has little chance of being degraded by some random event).

Good: The indicator is functioning within its range of acceptable variation, although it may require some human intervention for maintenance.

Fair: The indicator lies outside of its range of acceptable variation and requires human intervention for maintenance. If unchecked, the target will be vulnerable to serious degradation.

Poor: Allowing the indicator to remain in this condition for an extended period will make restoration or prevention of extirpation of the target practically impossible (e.g., it will be too complicated, costly, and/or uncertain to reverse the alteration).

"Conserving conservation targets" is defined as maintaining each target's key ecological attributes within their acceptable ranges of variation. The viability assessment framework therefore emphasizes the importance of identifying the ranges of variation that define the categories of Very Good, Good, Fair, and Poor for indicators of the key ecological attributes.

Viability Summary for the Lower Ouachita Terraces Conservation Area

Overall biodiversity health of the Lower Ouachita Terraces Conservation Area is considered "fair," which suggests the indicators lie outside of their range of acceptable variation and require human intervention for maintenance. If unchecked, the conservation area will be vulnerable to serious degradation. Viability rankings for individual focal targets ranged from poor to fair (Table 2). Examples of each focal target in good condition exist within the conservation area but they are relatively small in size and number and are located on the very small percentage of land that is currently in conservation ownership, e.g. Preserves, Natural Areas, Refuges, WMAs. While a few remnants in good condition occur within the remainder of the conservation area, most of the systems have degraded due to altered processes or have been converted to pine plantations.

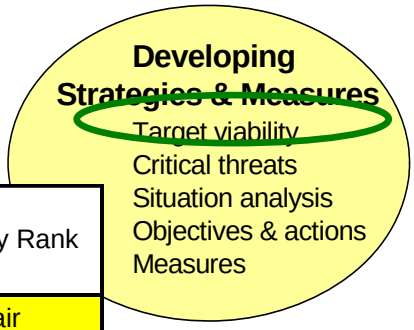


Table 2: Overall viability summary for Lower Ouachita Terraces

Conservation Targets	Landscape Context	Condition	Size	Viability Rank
	Grade	Grade	Grade	
Wet Hardwood Flatwoods	Fair	-	Fair	Fair
Pine-Hardwood Forest	Poor	Poor	Poor	Poor
Small Stream/River Forest	-	Fair	Fair	Fair
Large River Floodplain Forest	Fair	Fair	Fair	Fair
Mesic Hardwood Forest	-	Poor	Poor	Poor
Dry Pine-Hardwood Flatwoods	Fair	Fair	Poor	Fair
Seepage Swamp and Baygall	Poor	-	Poor	Poor
Site Biodiversity Health Rank				**Fair**

Assessing Threats: Stresses and Sources of Stress

A threat assessment is the identification, evaluation, and ranking of threats that affect focal targets. *Threats* are composed of stresses and sources. *Stresses* are disturbances that are likely to destroy, degrade or impair the focal conservation targets and that result directly or indirectly from human activity. *Sources* of stress are the proximate causes of the stresses to the focal conservation targets. The planning team identified and ranked stresses and sources for each focal target. Stress and source ranks helped elucidate the factors influencing each target and subsequently, the necessary conservation strategies for the conservation area. Detailed stress and source matrices can be found in the Lower Ouachita Terraces C.A.P. Workbook (submitted to AGFC in digital format on a cd with this plan).

Threats in the Lower Ouachita Terraces Conservation Area

Each focal target's stress and source ranks were analyzed together to provide an overall threat rank for each focal target and the conservation area as a whole. One important part of the threat assessment is the determination of critical threats. Critical threats are highly ranked threats that jeopardize multiple focal targets or threats that affect at least one focal target and are ranked "very high." Critical threats necessitate development of immediate conservation strategies. Several critical threats acting at a conservation area usually indicate that the area is highly or very highly threatened.

In the Lower Ouachita Terraces Conservation Area, one critical threat, conversion to pine plantation, was ranked very high and four critical threats were ranked as high for the conservation area: non-compatible forestry practices, altered fire regime, invasive species and roads (Table 3). The overall threat rank for the Lower Ouachita Terraces Conservation Area is Very High.

Table 3: Threats Summary for the Lower Ouachita Terraces Conservation Area

Threats Across Systems Project-specific threats		Wet Hardwood Flatwoods	Pine-Hardwood Forest	Small Stream/ River Forest	Large River Floodplain Forest	Mesic Hardwood Forest	Dry Pine-Hardwood Flatwoods	Seepage Swamp and Baygall	**Overall Threat Rank**
1	Pine Plantation Mgmt (Habitat Conversion)	High	Very High	Medium	High	Very High	Very High	Very High	**Very High**
2	Other Silviculture (incompatible practices)	High	Very High	Medium	Medium	High	Medium	Medium	**High**
3	Fire Suppression	Low	Very High	Medium	Low	High	High	Medium	**High**
4	Invasive Species	Medium	Medium	Medium	Medium	High	Medium	Medium	**High**
5	Roads	Medium	Medium	Medium	High	Medium	Medium	Low	**High**
6	Bedding, Filling, Ditching	Low	-	Medium	Medium	High	Medium	Medium	**Medium**
7	Locks & Dams	-	-	-	Medium	-	-	-	**Low**
Threat Status for Targets and Site		**High**	**Very High**	**Medium**	**High**	**Very High**	**High**	**High**	**Very High**

Threat #1: Pine Plantation Management (Habitat Conversion) Overall Rank: Very High (Critical)

Conversion of native vegetation to intensively managed pine plantations has led to the loss of extensive forests and woodlands in the conservation area. The majority of the area is owned by private industrial timber companies (Figure 3) and conversion has taken place across all natural systems. This conversion causes fragmentation of forests and woodlands. Once converted, restoration can be difficult, costly, and very slow. Recent conversion of open oak woodland communities to dense single species pine plantations affects the area in several ways. The conversion destroys habitat for species dependent on open woodlands and prairies. Conversion also geographically isolates woodland and prairie remnants. In addition to converting forest types and lowering the biological diversity, the dense pine plantations act as a potential barrier towards seed and pollinator dispersal between plant communities and the movement of prairie and ecotonal-dependent fauna.

Threat #2: Other Silviculture (incompatible practices) Overall Rank: High

Various incompatible silvicultural practices are negatively affecting long-term viability of the targets. Certain common practices such as selecting for certain species (loblolly pine over shortleaf pine) in the residual stands and removal of all older or larger diameter trees particularly affect species composition/ dominance and presence of key communities or seral stages, both key ecological attributes of focal targets in the conservation area. Broadcast application of certain herbicides affect species composition and diversity.

Threat #3: Fire Suppression Overall Rank: High

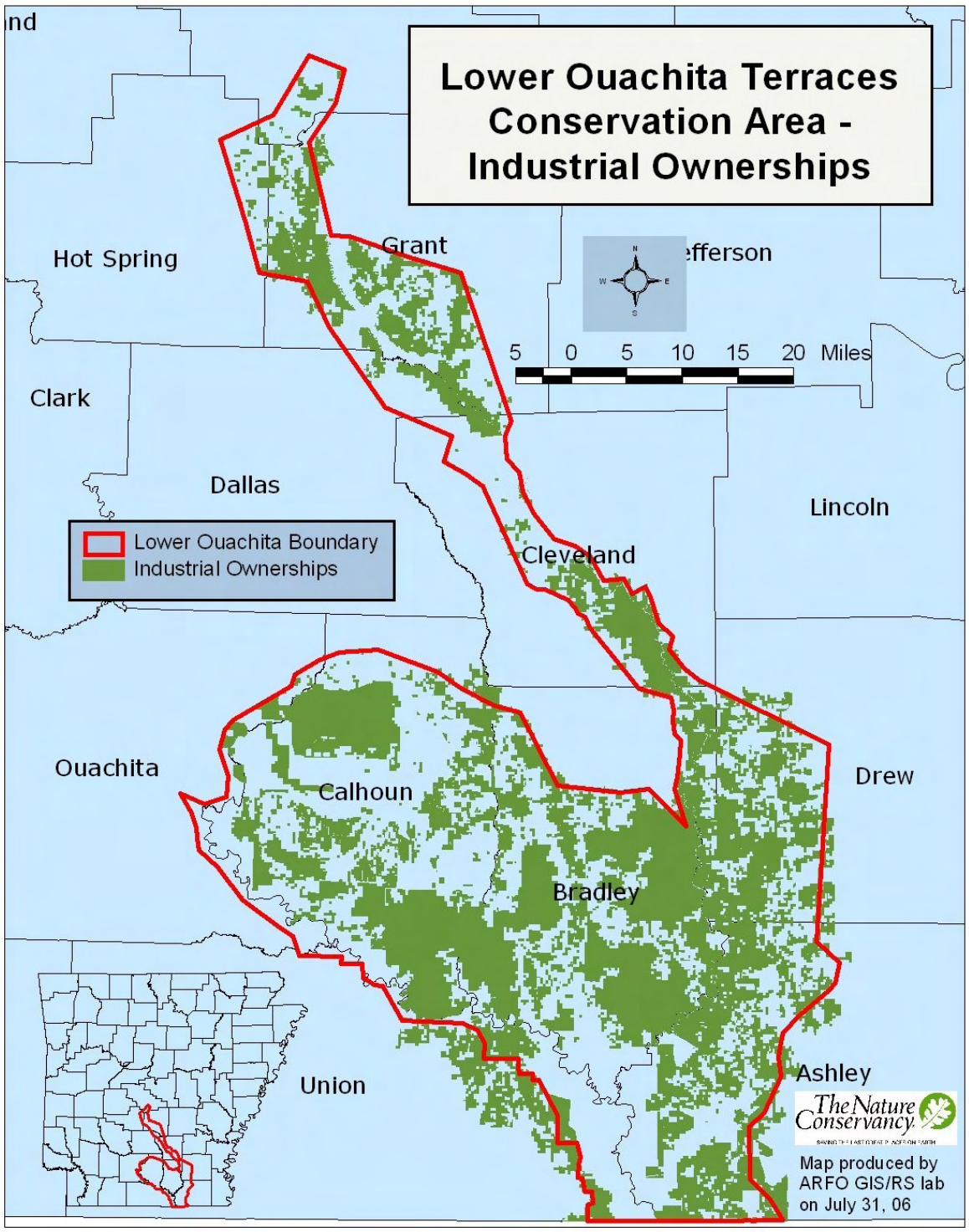
An altered fire regime is a major threat to most terrestrial systems. Most of the focal conservation target remnants have become degraded or diminished due to fire exclusion. Fire maintains the distribution, composition, and diversity of prairie, woodland, and forest communities and the ecotones between plant community types. The prevalence of fire on the Gulf Coastal Plain has been well documented (Albert 1982, Pyne 1982, Foti and Glenn 1990). Fire exclusion leads to densification and homogenization of forest communities and a subsequent loss of fire-dependent woodlands and savannas. The closed-canopy structure and dense litter layer has likely reduced the diversity and biomass of herbaceous plants in the understory, an important food and cover component for many wildlife species.

Fire timing also shifts species composition within communities. For woody vegetation, pine is most susceptible to fall fires, while hardwoods are most susceptible to late spring and summer fires in general. For prairie species, spring burns appear to stimulate grasses, while fall fires stimulate forb species (Pyne 1982).

Examination of aerial photos and GLO records of Kingsland Prairie Conservation Site (located within Lower Ouachita Conservation Area) indicate that native grasslands there have declined in extent and open woodlands have virtually disappeared. Like many herbaceous -dominated ecosystems the Gulf Coastal Plain has undergone fire suppression in the past century (Pyne 1982). As a result prairie openings have declined in size from encroaching woody vegetation. Prairie plant species diversity is noticeably lower under the shade of surrounding woody plants (The Nature Conservancy 2001a).

Fire suppression has also facilitated woody succession in other plant communities at the site. Woodlands without fire management have become dense with minimal herbaceous understory. Forests along stream courses have become impenetrable thickets of young woody vegetation and vines. Ecotones have been lost. Increased woody plant density in all communities has led to a decline in species diversity. Habitat changes from open to closed canopy alters species composition and adversely impacts herbaceous layer plants and dependent animals.

Figure 3: Lower Ouachita Terraces Conservation Area – Industrial Timber Company Ownership



Threat #4: Invasive Species Overall Rank: High

Invasive/exotic plant species are a major threat to the long-term viability of native plant communities. Many tend to invade disturbed areas, particularly man-caused disturbance. These species may become problematic in glade and barren restoration areas, as well as in woodlands and forests as they become more open under a prescribed fire regime. Invasive species can displace native species, reduce diversity, degrade habitat for at-risk wildlife species. Most invasive species in the project area are non-native plants. Feral swine is an example of a non-native invasive species that has proven to be problematic in the conservation area.

Threat #5: Roads Overall Rank: High

Roads alter hydrology, cause fragmentation and promote the spread of exotic species. The result is the loss of ecotones, rare species habitat, changes in species composition to non-conservative plants, increases in non-native plants, a melding of diverse plant community types, and an increase in the weediness of the ecosystem.

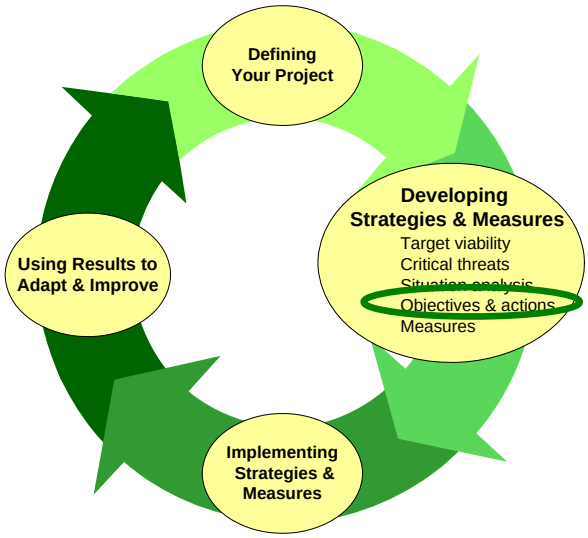
Threat #6: Altered Hydrologic Regime (bedding, ditching, filling)Overall Rank: Medium

Bedding, ditching and filling has altered surface water flow in several locations in the natural areas and throughout the Conservation Area. The overall impact is not well understood but localized impacts on the plant communities can be severe. As alterations in surface water flow divert, pond, or dry out localized areas of the ecosystem, plant communities shift in response.

Threat #7: Locks and Dams Overall Rank: Medium

Locks and Dams primarily affect the Large River Floodplain Forests and the lower reaches of Small Stream/ River Forests through alteration of flooding regimes and normal water table fluctuations. The lengths and seasonality of inundation of floodplain forests have been altered by locks and dams. The water table fluctuations either vary more widely or less widely, depending on proximity to these structures. This has led to increased tree mortality and species composition change.

CONSERVATION STRATEGIES: Objectives and Strategic Actions



Objectives

Objectives are specific and measurable statements of what planners hope to achieve. They represent assumptions as to what needs to be accomplished and as such, become the measuring stick against which progress of the project is gauged. Objectives can be set for and linked to the abatement of threats, restoration of degraded key ecological attributes, and/or the outcomes of specific conservation actions. A good objective meets the criteria of being: impact oriented, measurable, time limited, specific, practical, and credible.

Objectives established for the Lower Ouachita Terraces Conservation Area include:

1. Establish large-scale (>20,000 acres) conservation forestry demonstration site on private lands in the flatwoods in 3 years.

An important goal of any large acquisition within the conservation area would be to use it as part of a *conservation forestry* strategy. Conservation Forestry is defined as a set of forest management practices that sustains ecological systems, protects social values, and is economically viable.

This project would enable conservation partners to demonstrate conservation benefits and costs on their designated high value conservation forests with different conservation forestry models. Over time, this Compatible Forestry Demonstration Project will provide defensible timber yield data for lands of high conversion value managed under fairly restrictive and natural guidelines. The project would provide hard data to public owners for management of sustainable, healthy forests with multiple values. Implementation of the vision of ecologically sustainable forestry will document and illustrate to private and public partners the potential to generate reasonable levels of return on investments while maintaining and enhancing the conservation values of their property. These partners include industrial and non-industrial timberland owners, and federal and state land management agencies. All these partners will participate in the project at various levels to parley the results across multiple operating units, divisions and regions. The applicability of this concept is well supported by project partners and area industrial foresters.

2. Improve condition of focal targets on priority sites on private lands one step in 10 years.

The current viability ranks of the focal conservation targets range from poor to fair. A poor viability rank suggests that if the target is allowed to remain in that condition for an extended period, restoration may become impossible. A fair rank suggests that without human intervention for maintenance, the target will be vulnerable to serious degradation. It is assumed that due to on-going restoration activities, lands under public (conservation) ownership are less at risk to degradation. Because the majority of the project area is privately-owned, not protected from degradation and thus most at risk, steps must be taken to conserve the priority sites that occur there.

3. Improve or maintain hydrologic regime in project area on Ouachita and Saline Rivers in 5 years.

This objective refers primarily to Large River Floodplain Forests and the lower reaches of the Small Stream/ River Forests that occur within the flood plains of the Ouachita and Saline Rivers. Human activities that alter the seasonality and/or length of natural inundation and water table fluctuations invariably lead to decreased viability of those targeted systems. Species composition change in bottomland hardwood forests due to altered hydrology is well documented.

4. Prevent establishment of aggressive non-native invasive species.

Prevention, early detection, tracking and control are all important aspects of any invasive species program. The global invasive species initiative will provide useful resources for refining strategies and developing work plans associated with this objective.

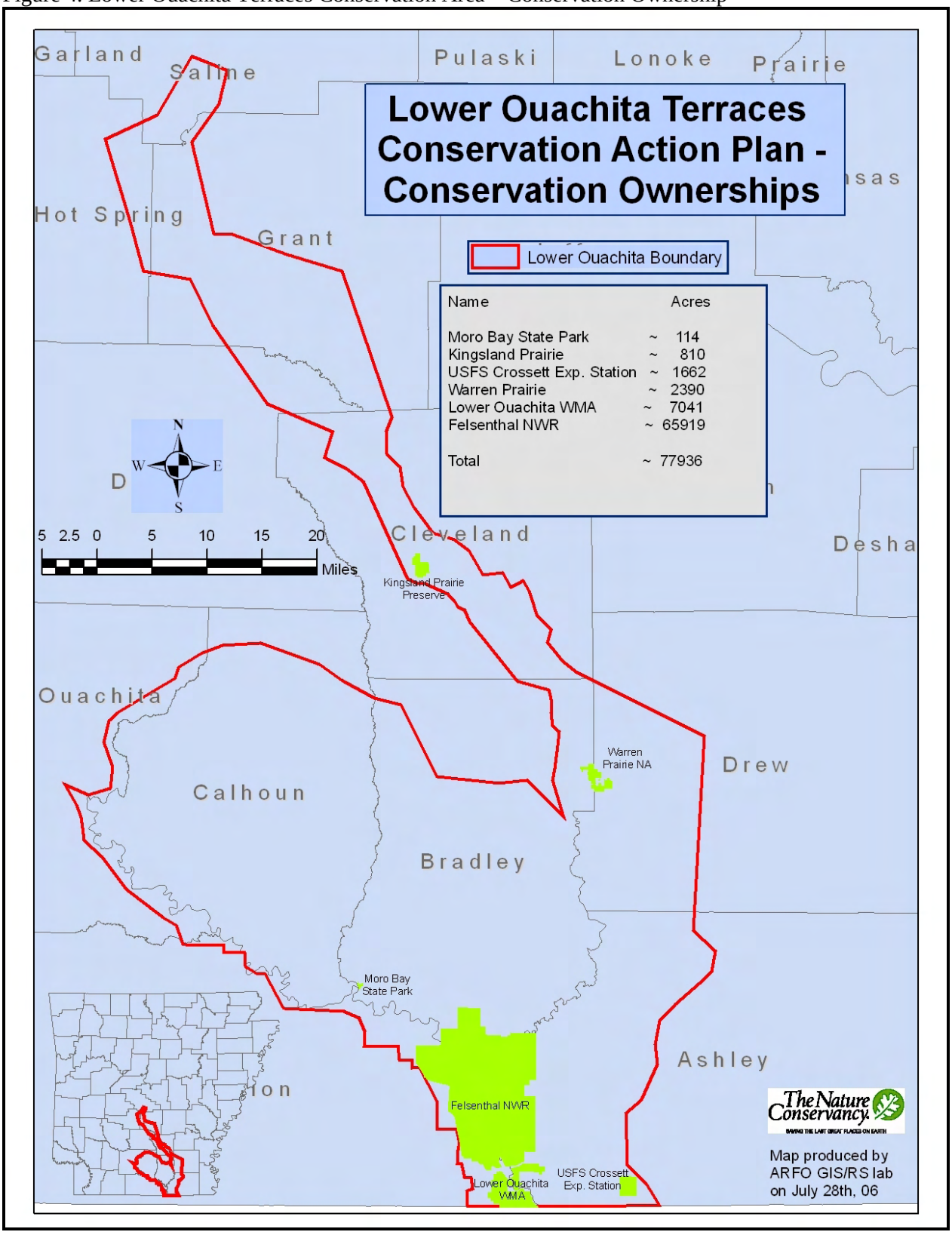
5. Protection through fee title, conservation easement or other long-term agreements on 50-75% of high priority conservation tracts within ten years.

Legal, long-term protection of high priority sites is imperative to the success of sustained viability of the individual focal targets and the conservation area as a whole. Insurance that expended revenues and manpower will not be for short-term benefit is crucial. Additionally, southern pine systems are some of the least protected, most at-risk, systems in Arkansas and the entire southeastern U.S. Currently, only 78,000, or 5.5% of the area, is protected by conservation ownership or easement. (Figure 4).

6. Reduce impacts of roads on hydrology of focal targets at 10 sites within 5 years.

The Dry Pine-Hardwood Flatwoods and Wet Hardwood Flatwoods are particularly sensitive to small hydrologic alterations. Roads, fire lines, rutting, and other seemingly minor changes in topography have large impacts on the systems. The hydrology for each plant community consists of a series of hydrologic inputs (precipitation, sheetflow, streamflow, overbank flow, and groundwater flow) and outputs (evaporation, transpiration, streamflow, and sheetflow). The daily balance of these hydrologic inputs and outputs result in the individual water levels or degrees of soil saturation for each community. Taken over the course of an entire year, these water levels are a hydropattern. Each community at the site has its own distinct hydropattern. The plant species within each community are adapted to a specific hydropattern. As hydrologic inputs and outputs change, so does the corresponding hydropattern, and associated species (Mitch and Gosselink 1993).

Figure 4. Lower Ouachita Terraces Conservation Area – Conservation Ownership



7. **Restore fire regime on 90% on conservation lands and 5% of other lands in project area within 10 years.**
   The overall threat rank for Altered Fire Regime (mainly due to long-term suppression) is high.

   The prevalence of fire on the Gulf Coastal Plain has been well documented (Albert 1982, Pyne 1982, Foti and Glenn 1990). An examination of Arkansas Forestry Commission records indicate a prevalence of lightning ignited fires occurring from mid-July through October (Foti and Glenn 1990). Historically, fires occurred both naturally and anthropogenically in the region. Anthropogenic fires could have occurred in any season but early records of aboriginal burning reference September through December (Young and Hoffman 1995, Lottinville 1980).

   To restore and maintain ecological health of targeted systems, fire must be restored in the form of ecologically-planned prescribed burns. Fire restoration on lands under conservation ownership is currently underway and should be straightforward with few limiting factors other than funding, capacity and conditions. Fire restoration on other ownerships, especially private industrial ownership, will take longer to implement. While most timber companies historically used prescribed fire as a management tool, liability issues and management philosophies have all but eliminated it except for rare circumstances.

8. **Secure $20,000,000 over next 10 years to fund project.**
   Most long-term conservation projects are expensive. This project is no exception. In fact, potential timber revenue (or loss thereof) maintains the high cost of most conservation efforts in the UWGCP. In addition, the current rate of change (for the worse) is so rapid and the viability ranks for the targets are so low, the next ten year period is critical. It should be understood that the amount referred to in this objective is in addition to current funding obligated to restoration and maintenance projects in the conservation area.

Strategic Actions

Strategic actions are sets of interventions that conservation partners will undertake to achieve stated objectives. The challenge is to identify high leverage actions that will achieve the most impact for the available resources.

The process of developing effective conservation strategies involves six main steps:
1. Review the project goal;
2. Define objectives for abating the critical threats and/or for restoring the viability of focal conservation targets (i.e., threat objectives and viability objectives);
3. Deeply probe the contextual situation of the critical threats;
4. Brainstorm potential strategic actions that might accomplish each objective, or multiple objectives;
5. Select priority strategic actions based on benefits, feasibility and costs.
6. Determine key action steps.

Strategic Actions for Lower Ouachita Terraces Conservation Area

Objective**:** Establish large-scale (>20,000 acres) conservation forestry demonstration site on private lands in the flatwoods in 3 years.

- ***Strategic action: Acquire large-acre conservation easement with major landowner in system, e.g. 60,000 acre Moro-Big Pine Project.***
- ***Strategic action: Implement conservation forestry plan at demonstration site***

Objective**:** Improve condition of focal targets on priority sites on private lands one step in 10 years.

- ***Strategic action: Implement Conservation Forestry on private lands in project area***
- ***Strategic action: Utilize currently existing private lands programs to encourage and fund conservation of focal targets on priority sites on private lands***

Objective**:** Improve or maintain hydrologic regime in project area on Ouachita and Saline Rivers in 5 years.

- ***Strategic action: Conduct Index of Hydrologic Alteration (IHA) study***

Objective**:** Prevent establishment of aggressive non-native invasive species.

- ***Strategic action: Develop early warning and response system to address aggressive non-native invasive species***

Objective**:** Protection through fee title, conservation easement or other long-term agreements on 50-75% of high priority conservation tracts within ten years.

- ***Strategic action: Identify and map high priority tracts (protection plan) within one year***
- ***Strategic action: Track availability of and protect identified tracts***

Objective**:** Reduce impacts of roads on hydrology of focal targets at 10 sites within 5 years.

- ***Strategic action: Identify and remediate impacts of highest priority roads***
- ***Strategic action: Prevent impacts on focal targets from future road projects (I69)***

Objective**:** Restore fire regime on 90% on conservation lands and 5% of other lands in project area within 10 years.

- ***Strategic action: Increase capacity of state/federal/private land managers***
- ***Strategic action: Develop and implement a comprehensive fire management plan for the project area***

Objective: Secure $20,000,000 over next 10 years to fund project.

- ***Strategic action: Secure $7,000,000 through Forest Legacy and other public funding sources.***
- ***Strategic action: Secure $14,000,000 from partners (AGFC, ANHC, AFC, TNC et. al.) for matching funds for grants***

Potential strategic actions may be ranked on nine criteria related to Benefits (contribution, threat abatement, viability enhancement, duration, leverage), Feasibility (lead individual/institution, ease of implementation, ability to motivate), and Cost. Based on input into those three categories, TNCs Conservation Action Plan workbook assigns an overall rank to each strategic action (Table 4).

Table 4: Strategic Action Ranking Detail for Lower Ouachita Terraces Conservation Area

#	Strategic Actions	**Overall Rank**	Benefits	Feasibility	Cost
1	Implement conservation forestry plan at demonstration site	**Very High**	Very High	High	Medium
2	Secure $14,000,000 from partners (AGFC, ANHC, AFC, TNC et. al.) for matching funds for grants	**Very High**	Very High	Medium	Medium
3	Secure $7,000,000 through Forest Legacy and other public funding sources.	**Very High**	Very High	Medium	Medium
4	Acquire large-acre conservation easement with major landowner in system (60,000 acre Moro-Big Pine)	**High**	Very High	Medium	Very High
5	Develop and implement a comprehensive fire management plan for the project area	**High**	Very High	High	Very High
6	Develop early warning and response system to address aggressive non-native invasive species	**High**	High	Medium	Medium
7	Increase capacity of state/federal/private land managers	**High**	High	High	Medium
8	Prevent impacts on focal targets from future road projects (I69)	**High**	Very High	Low	Medium
9	Track availability of and protect identified tracts	**High**	Very High	Medium	High
10	Conduct Index of Hydrologic Alteration (IHA) study	**Medium**	Medium	Medium	Medium
11	Identify and map high priority tracts (protection plan) within one year	**Medium**	Medium	High	Medium
12	Identify and remediate impacts of highest priority roads	**Medium**	Very High	Low	High
13	Implement Conservation Forestry on private lands in project area	**Medium**	Medium	Medium	Medium
14	Utilize currently existing private lands programs to encourage and fund conservation of focal targets on priority sites on private lands	**Medium**	Medium	Medium	Medium

MEASURING SUCCESS

An adaptive management approach should be used to continuously evaluate the effects of conservation actions on focal targets. A variety of monitoring techniques can be used to measure attributes of biodiversity health and threat abatement. Some monitoring protocols may measure *key ecological attributes* of focal targets. In most cases, *indicators* of these key attributes will be measured. These measurements will most often be as quantitative as possible. However, some qualitative measures such as photo points can be quite useful in assessing changes. Some measures will track the abatement of key threats, such as fire exclusion and forest conversion.

A monitoring plan should have monitoring indicators for all stated objectives in the conservation action plan. Some of these objective-driven indicators will measure threat abatement and some will track changes in the status of key ecological attributes. There is also a need to track indicators for key ecological attributes listed in the viability table that are not tied to specific objectives - this gives managers the ability to report on the overall status of the biodiversity they are striving to conserve. Some of these key ecological attributes will be linked to known threats – others will be presumably unthreatened. There may also be a need to track indicators for identified threats that aren't currently linked to objectives and actions but where managers want to monitor changes in the status of the threat to determine if they should be taking action to abate it.

Indicators measuring progress for objectives and strategic actions in the plan should be a top priority. Assuming objectives are addressing the highest priority threats and key ecological attributes most in need of attention - this will direct monitoring efforts to the most important indicators.

Each monitoring record is uniquely identified by its indicator. Each monitoring indicator may support multiple targets, categories (e.g., viability or threat) and even key ecological attributes within five categories of monitoring:

1. Landscape Context within Assessments of Target Viability
2. Condition within Assessments of Target Viability
3. Size within Assessments of Target Viability
4. Threat-based monitoring
5. Other monitoring (e.g., tracking improved conservation capacity)

A key attribute may need only one indicator. However, many key attributes may be difficult to pin down so easily; they may themselves be multi-faceted phenomena (e.g., the composition of a plant community), or there may be no single best way to monitor it (e.g., transect surveys of floodplain vegetation versus analysis of aerial photographs; census surveys of fishes via electro-fishing versus seining methods). In these cases, managers will have to consider using several indicators together to get the best picture of what is going on.

Indicators are monitored to track the status of a conservation target, and ultimately to measure the success of conservation strategies.

Monitoring Plan for the Lower Ouachita Terraces Conservation Area

Indicator: >=20 acres each embedded within conserved larger system with >= Fair Condition

Key Attribute References by Target (w/ current indicator status):
Mesic Hardwood Forest
-Size: Presence of key communities or seral stages (data gap)

Methods: EOR protocol
Priority: Medium
Status: Ongoing
Frequency and Timing: Every 3 years
Who monitors: ANHC & TNC
Detailed monitoring plan completed?: EOR Protocol compete (plan for project area?)

Indicator: >=5 acres each embedded within larger system with >=fair current rating

Key Attribute References by Target (w/ current indicator status):
Seepage Swamp and Baygall
-Size: Size / extent of characteristic communities / ecosystems (data gap)

Methods: EOR protocol
Priority: Medium
Status: Ongoing
Frequency and Timing: Every 3 years
Who monitors: ANHC & TNC
Detailed monitoring plan completed?: EOR protocol complete but no monitoring plan

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Indicator: Bedding (silvicultural site preparation practice)

Key Attribute References by Target (w/ current indicator status):
Dry Pine-Hardwood Flatwoods
-Landscape Context: Hydrologic regime - (timing, duration, frequency, extent) (Bedding of flatwoods is increasing in use as a forestry practice.)

Threat References by Target (w/ current indicator status):
Wet Hardwood Flatwoods
-Threat: Altered Hydrologic Regime
-Threat: Pine Plantation Mgmt

Dry Pine-Hardwood Flatwoods
-Threat: Altered Hydrologic Regime
-Threat: Pine Plantation Mgmt

Objectives:
-Establish large-scale (>20,000 acres)conservation forestry demonstration site on private lands in the flatwoods in 3 years
-Improve condition of focal targets on priority sites on private lands one step in 10 years

Methods: Conservation Ownership: management history data; Other: management history data (baseline) & annual survey of bedding contractors.
Priority: High
Status: Planned
Frequency and Timing: Annually after bedding season
Detailed monitoring plan completed?: No
Comment: Protocol needs to be developed

Indicator: Canopy closure

Key Attribute References by Target (w/ current indicator status):
Mesic Hardwood Forest
-Condition: Community architecture (data gap)

Dry Pine-Hardwood Flatwoods
-Condition: Community architecture (Conser. Ownerhship:Fair; Other: Poor)

Methods: FRCC protocol
Priority: High
Status: Ongoing
Frequency and Timing: Baseline then every 5 years
Who monitors: TNC (while training partners)
Funding Source: SWG, LANDFIRE, PSG, LIP, NRCS
Detailed monitoring plan completed?: Yes, FRCC Protocol

Indicator: Element Occurrence Record condition

Key Attribute References by Target (w/ current indicator status):
Wet Hardwood Flatwoods
-Landscape Context: Hydrologic regime - (timing, duration, frequency, extent) (One known occurrence w/ unaltered hydrology - Warren)

Seepage Swamp and Baygall
-Landscape Context: Hydrologic regime - (timing, duration, frequency, extent) (data gap)

Objectives: -Reduce impacts of roads on hydrology of focal targets at 10 sites within 5 years
Methods: EOR monitoring protocol
Priority: Medium
Status: Ongoing
Frequency and Timing: Every 3 years
Who monitors: ANHC & TNC (while training partners)
Funding Source: SWG
Detailed monitoring plan completed?: EOR protocol completed

Indicator: Fire Regime Condition Class (FRCC)

Key Attribute References by Target (w/ current indicator status):

Pine-Hardwood Forest

-Landscape Context: Fire regime - (timing, frequency, intensity, extent) (Managed tracts - FRCC3 approaching 2; All other FRCC3)

Dry Pine-Hardwood Flatwoods

-Landscape Context: Fire regime - (timing, frequency, intensity, extent) (Conservation Ownership: FRCC2; Other: FRCC3)

Threat References by Target (w/ current indicator status):

Wet Hardwood Flatwoods

-Threat: Altered Fire Regime

Pine-Hardwood Forest

-Threat: Altered Fire Regime

Small Stream/River Forest

-Threat: Altered Fire Regime

Large River Floodplain Forest

-Threat: Altered Fire Regime

Mesic Hardwood Forest

-Threat: Altered Fire Regime

Dry Pine-Hardwood Flatwoods

-Threat: Altered Fire Regime

Seepage Swamp and Baygall

-Threat: Altered Fire Regime

Objectives:

-Improve condition of focal targets on priority sites on private lands one step in 10 years

-Restore fire regime on 90% on conservation lands and 5% of other lands in project area within 10 years

Methods: Implement FRCC (workbook)
Priority: High
Status: Ongoing
Frequency and Timing: Every 5 Years
Who monitors: TNC (while training other partners)
Funding Source: SWG
Detailed monitoring plan completed?: Use FRCC methodology
Comment: See LANDFIRE.GOV

Indicator: Indicator of Hydrologic Alteration (IHA)

Key Attribute References by Target (w/ current indicator status):

Large River Floodplain Forest

-Landscape Context: Hydrologic regime - (timing, duration, frequency, extent) (data gap)

Threat References by Target (w/ current indicator status):

Large River Floodplain Forest

-Threat: Altered Hydrologic Regime

-Threat: Natural System Modifications (dams)

Objectives: -Improve or maintain hydrologic regime in project area on Ouachita and Saline Rivers in 5 years.
Methods: IHA implementation
Priority: Medium
Status: Planned
Frequency and Timing: Every three years
Location: Ouachita and Saline Rivers in project area
Who monitors: TNC
Funding Source: SWG et. al.
Detailed monitoring plan completed?: Protocol completed but no plan for project area

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Indicator: Overstory composition

Key Attribute References by Target (w/ current indicator status):

Pine-Hardwood Forest
-Condition: Species composition / dominance (data gap)

Small Stream/River Forest
-Condition: Species composition / dominance (data gap)

Large River Floodplain Forest
-Condition: Species composition / dominance (data gap)

Threat References by Target (w/ current indicator status):

Wet Hardwood Flatwoods
-Threat: Pine Plantation Mgmt
-Threat: Other Silviculture

Pine-Hardwood Forest
-Threat: Pine Plantation Mgmt
-Threat: Other Silviculture

Small Stream/River Forest
-Threat: Pine Plantation Mgmt
-Threat: Other Silviculture

Large River Floodplain Forest
-Threat: Pine Plantation Mgmt
-Threat: Other Silviculture

Mesic Hardwood Forest
-Threat: Pine Plantation Mgmt
-Threat: Other Silviculture

Dry Pine-Hardwood Flatwoods
-Threat: Pine Plantation Mgmt
-Threat: Other Silviculture

Seepage Swamp and Baygall
-Threat: Pine Plantation Mgmt
-Threat: Other Silviculture

Objectives: -Improve condition of focal targets on priority sites on private lands one step in 10 years
Methods: Remote sensing change detection for larger focal targets; site visits and aerial photography for smaller focal targets.
Priority: Medium
Status: Planned
Frequency and Timing: Baseline and then every 5 years
Who monitors: TNC (while training partners)
Funding Source: SWG, PSG, LIP, PFFW, Farm Bill
Detailed monitoring plan completed?: No

Comment: Refer to results from Bayou (Piney) Ranger Dist.

Indicator: Percent of landscape, stand age, crown closure

Key Attribute References by Target (w/ current indicator status):

Dry Pine-Hardwood Flatwoods

-Size: Presence of key communities or seral stages (A: ~45% <15 years old; B: ~15% 15-45 years old, closed canopy; C: ~25% 15-45 years old, open; D: 10% >45 years old, open; E: ~5% >45 years old, closed.)

Methods: FRCC protocol
Priority: High
Status: Ongoing
Frequency and Timing: Baseline then every 5 years
Who monitors: TNC (while training partners)
Detailed monitoring plan completed?: FRCC protocol complete

Indicator: Percent of landscape, stand age, crown closure (LANDFIRE Model)

Key Attribute References by Target (w/ current indicator status):

Pine-Hardwood Forest

-Size: Presence of key communities or seral stages (Large amount in pine plantation in A and B)

Small Stream/River Forest

-Size: Presence of key communities or seral stages (data gap)

Large River Floodplain Forest

-Size: Presence of key communities or seral stages (data gap)

Threat References by Target (w/ current indicator status):

Wet Hardwood Flatwoods
-Threat: Pine Plantation Mgmt
-Threat: Other Silviculture

Pine-Hardwood Forest
-Threat: Pine Plantation Mgmt
-Threat: Other Silviculture

Small Stream/River Forest
-Threat: Pine Plantation Mgmt
-Threat: Other Silviculture

Large River Floodplain Forest
-Threat: Pine Plantation Mgmt
-Threat: Other Silviculture

Mesic Hardwood Forest
-Threat: Pine Plantation Mgmt
-Threat: Other Silviculture

Dry Pine-Hardwood Flatwoods
-Threat: Pine Plantation Mgmt
-Threat: Other Silviculture

Seepage Swamp and Baygall
-Threat: Pine Plantation Mgmt
-Threat: Other Silviculture

Objectives: -Improve condition of focal targets on priority sites on private lands one step in 10 years
Methods: FRCC (workbook)
Priority: High
Status: Ongoing
Frequency and Timing: Baseline then every 5 years
Who monitors: TNC (while training partners)
Detailed monitoring plan completed?: Use FRCC protocol
Comment: see LANDFIRE.GOV

Indicator: Presence in larger system (embedded) in conservation ownership

Key Attribute References by Target (w/ current indicator status):
Wet Hardwood Flatwoods
-Size: Presence of key communities or seral stages (One known protected occurrence - Warren Prairie Natural Area.)

Objectives: -Protection through fee title, conservation easement or other long-term agreements on 50-75% of high priority conservation tracts within ten years
Methods: EOR monitoring
Priority: Medium
Status: Ongoing
Frequency and Timing: Every 3 years
Who monitors: ANHC & TNC (while training partners)
Funding Source: SWG et. al.
Detailed monitoring plan completed?: EOR protocol complete

Detailed monitoring implementation plans will be needed for each indicator. As this Conservation Action Plan is revised and refined, and as work plans are developed (next section), monitoring needs may change.

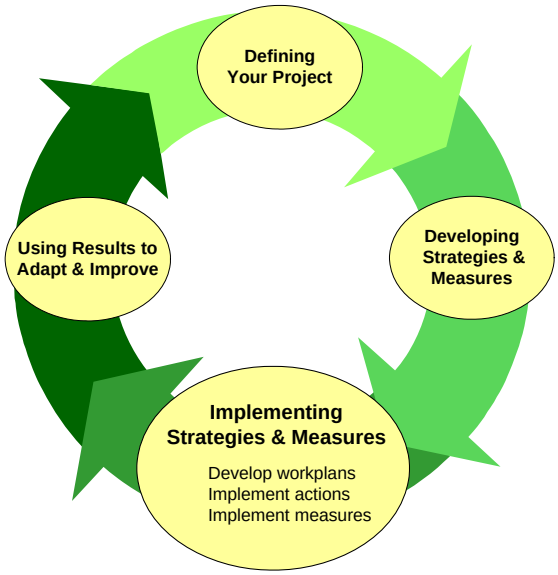
Additionally, program coordinators may choose to conduct monitoring of nested targets (animals and plants) in areas under conservation ownership and other high-proiority sites. Ongoing monitoring at these sites should be reviewed and summarized. Good communication and data-sharing between partners will be important to avoid duplication of effort and unnecessary expenditures.

IMPLEMENTING CONSERVATION STRATEGIES AND MEASURES

Work Plan Development

A Project Implementation Team, or Project Team, made up of conservation partners and stakeholders should be assembled. The team's function will be to take the strategic actions and measures and develop specific plans for doing this work as the project goes forward. Specific questions that this step answers include:

"What do we specifically need to do?"
"Who will be responsible for each task?"
"What resources do we need?"



1. Identify action steps and monitoring tasks**:** Each strategic action can be broken down into a series of tasks or action steps that the project team and partners will undertake. Likewise, monitoring the indicators will require a series of monitoring tasks. It is important to identify which individual(s) will be responsible for these steps or tasks, when they will do them, where they will do them and what resources they will need. Expected outputs include:

- □ Lists of major action steps and monitoring tasks, especially those needing to take place in the near future.
- □ Assignments for specific individual(s) and a rough implementation timeline.
- □ A rough project budget.

2. Assess project resources and address critical needs: Elements of the project's capacity include project leadership and staff availability, funding, community support, an enabling legal framework, and other resources such as partner capacity and buy in from leaders. As the work plan is developed, it is important to consider how the current capacity in the project area matches up with the resources required to achieve this plan. If there is a rough balance, then the Project Team is okay. However, if there is greater needs than the current capacity, investment in developing new resources and/or plan scale-back may be needed. Expected outputs include:

- □ A brief summary of project capacity (the project resources scorecard in the CAP Excel workbook is one tool to help with this summary).
- □ If needed, objectives and strategic actions for enhancing project resources.

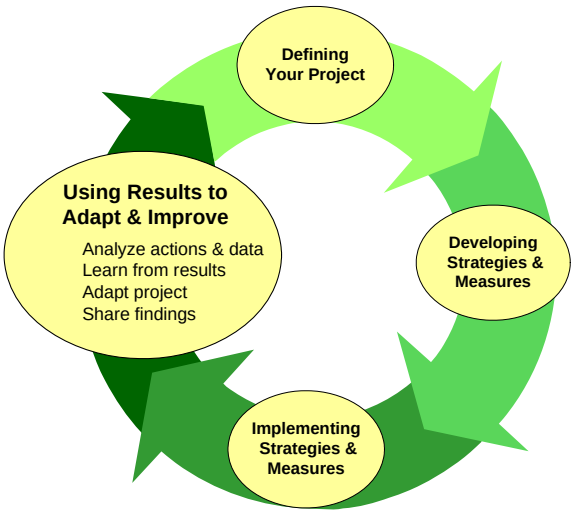
Implement

After the action and monitoring plans are developed, they won't do any good sitting on the shelf – the challenge here is to trust the hard preparation work done and implement the plans to the best of the team's ability. Implementation is the most important step in this entire process; however, given the diversity of project needs and situations, the only requirement is:

Put the plans into action **–** Do the work outlined in the plans. Expected outputs include:

- □ Action.
- □ Measures.

USING RESULTS TO ADAPT AND IMPROVE



Analyze, Learn, Adapt, & Share

Project partners should systematically take the time to evaluate the actions they have implemented, to update and refine their knowledge of the targets, and to review the results available from monitoring data. This reflection will provide insight on how actions are working, what may need to change, and what to emphasize next. Project partners should then document what has been learned and share it with other people so they can benefit from the successes and failures. Specific questions that this step answers include:

"What are our monitoring data telling us about our project?"

"What should we be doing differently?"
"How will we capture what we have learned?"
"How can we make sure other people benefit from what we have learned?"

1. Analyze actions and data from monitoring efforts: An annual review of the actions accomplished and results observed by the core project team and select advisors will provide continuity and facilitate learning. The challenge is to regularly use data to enrich understanding of the project and inform future work. Depending on what type of data is available and what needs are, analysis can range from formal statistical studies to simple qualitative assessments. Expected outputs include:

□ Appropriate and scheduled analyses of your data.

2. Use results to adapt action and monitoring plans: The challenge is to use what has been learned from the analyses to modify the project. Expected outputs include:

□ Updated viability and threat assessments, as warranted.
□ Modifications to the objectives, strategic actions, and work and monitoring plans, as warranted.

3. Update project documents: It is critical to formally record updates to the project documents on a regular (at least annual) basis to capture new knowledge and changes in plans. Not only will this aid the original team, but it will protect against a loss of institutional knowledge in the case of staff transitions. If the CAP Excel Workbook is used, a spreadsheet is designed to be flexible and easy to update with new information. Whatever the recording tool, expected outputs include:

□ Regular updates of project documents.
□ Summaries of what you have learned, focusing on both process and results.

4. Share results with key audiences – Many other practitioners can benefit from experience gained from this project. Share with them what has been learned. The key is to communicate results in an appropriate way to each audience. Also, the value of sharing experiences with partners and other practitioners outside the organization should not be underestimated. Expected outputs include:

□ Appropriate communication outputs for each key audience.
□ Project's completed CAP Excel Workbook (if available).

GLOSSARY

Acceptable Range of Variation – Key ecological attributes of focal targets naturally vary over time. The acceptable range defines the limits of this variation which constitute the minimum conditions for persistence of the target (note that persistence may still require human management interventions). This concept of an acceptable range of variation establishes the minimum criteria for identifying a conservation target as "conserved" or not. If the attribute drops below or rises above this acceptable range, it is a degraded attribute.

Adaptive Management – A process originally developed to manage natural resources in large scale ecosystems by deliberate experimentation and systematic monitoring of the results. More broadly, it is the incorporation of a formal learning process into conservation action. Specifically, it is the integration of design, management, and monitoring to systematically test assumptions in order to learn and adapt.

Action Steps – Specific tasks required to advance and make progress toward a strategic action.

CAP – Shorthand for Conservation Action Planning.

CAP Excel Workbook – An Excel-based software program developed by The Nature Conservancy to facilitate the CAP process, automate the roll-up of summary results, and serve as a consistent repository for CAP information. Can be downloaded at: CAP Workbook Download website - ConserveOnline

Conservation Action Planning (CAP) – The Nature Conservancy's process for helping conservation practitioners develop strategies, take action, measure success, and adapt and learn over time

Conservation Approach – A key part of the Nature Conservancy's *Conservation by Design Framework.* It is an integrated conservation process comprised of four fundamental components: 1) Setting priorities through ecoregional planning and global habitat assessments; 2) Developing strategies at multiple scales to address these priorities; 3) Taking direct conservation action; and 4) Measuring conservation success. The CAP process outlined in this document covers components 2-4.

Conservation Project – A set of actions undertaken by any group of managers, researchers, or local stakeholders in pursuit of a specified conservation vision and objectives. Can range in scale from managing a small site over a few weeks to an entire region over many years.

Contribution – One of the criteria used to rate the impact of a source of stress. The degree to which a source of stress, acting alone, is likely to be responsible for the full expression of a stress within the project area within 10 years. See also reversibility.

Core Project Team – A specific group of practitioners who are responsible for designing, implementing, and monitoring a project. This group can include managers, stakeholders, researchers, and other key implementers.

Critical Threats – Sources of stress that are most problematic. Most often, "very high" and "high" rated threats based on the Conservancy's rating criteria of the scope, severity, contribution, and reversibility of their impact on the focal targets

Current Status – An assessment of the current "health" of a target as expressed through the most recent measurement or rating of an indicator for a key ecological attribute. Compare to desired status.

Degraded Attribute – A key ecological attribute that is outside its acceptable range of variation.

Desired Status – A measurement or rating of an indicator for a key ecological attribute that describes the level of viability/integrity that the project intends to achieve. Compare to current status.

Direct Threats − Used as a synonym for sources of stress. Agents or factors that directly degrade targets. A project's highest ranked direct threats are its critical threats. For example, "logging" or "fishing."

Ecoregional Targets – Ecoregions are relatively large geographic areas of land and water delineated by climate, vegetation, geology and other ecological and environmental patterns. Ecoregional targets are the species, ecological communities, and ecological systems within a given ecoregion used to set conservation priorities. See also focal conservation targets.

Effectiveness Measures – Information used to answer the question: Are the conservation actions we are taking having their intended impact? Compare to status measures.

Focal Conservation Targets – A limited suite of species, communities, and ecological systems that are chosen to represent and encompass the full array of biodiversity found in a project area. They are the basis for setting goals, carrying out conservation actions, and measuring conservation effectiveness. In theory – and hopefully in practice – conservation of the focal targets will ensure the conservation of all native biodiversity within functional landscapes. Often referred to as Focal Targets.

Goal – Synonymous with vision. A general summary of the desired state or ultimate condition of the project area that a project is working to achieve. A good goal statement meets the criteria of being visionary, relatively general, brief, and measurable.

Indicators – Measurable entities related to a specific information need (for example, the status of a key ecological attribute, change in a threat, or progress towards an objective). A good indicator meets the criteria of being: measurable, precise, consistent, and sensitive.

Indirect Threats – Factors identified in an analysis of the project situation that are drivers of direct threats. Often an entry point for conservation actions. For example, "logging policies" or "demand for fish."

Integrity – The status or "health" of an ecological community or system. Integrity indicates the ability of a community or system target to withstand or recover from most natural or anthropogenic disturbances and thus to persist for many generations or over long time periods. See also viability for species.

Irreversibility – A synonym for reversibility (used in CAP Excel Workbook ratings). One of the criteria used to rate the impact of a source of stress. The degree to which the effects of a source of stress can be restored. Typically includes an assessment of both the technical difficulty and the economic and/or social cost of restoration. See also contribution.

KEA – Short for Key Ecological Attribute.

Key Ecological Attributes (also Key Attributes, or KEAs) – Aspects of a target's biology or ecology that, if missing or altered, would lead to the loss of that target over time. As such, KEAs define the target's viability or integrity. More technically, the most critical components of biological composition, structure, interactions and processes, environmental regimes, and landscape configuration that sustain a target's viability or ecological integrity over space and time. "Attribute" used as shorthand in this document.

Methods – Specific techniques used to collect data to measure an indicator. Methods vary in their accuracy and reliability, cost-effectiveness, feasibility, and appropriateness.

Monitoring Tasks – Specific activities required to measure each indicator.

Nested Targets – Species, ecological communities, or ecological system targets whose conservation needs are subsumed by one or more focal conservation targets. Often includes targets identified as ecoregional targets.

Objectives – Specific statements detailing the desired accomplishments or outcomes of a particular set of activities within a project. A typical project will have multiple objectives. Objectives are typically set for abatement of critical threats and for restoration of degraded key ecological attributes. They can also be set, however, for the outcomes of specific conservation actions, or the acquisition of project resources. If the project is well conceptualized and designed, realization of all the project's objectives should lead to the fulfillment of the project's vision. A good objective meets the criteria of being: impact oriented, measurable, time limited, specific, practical, and credible.

Opportunities – Factors identified in an analysis of the project situation that potentially have a positive effect on targets, either directly or indirectly. Often an entry point for conservation actions. For example, "demand for sustainably harvested timber."

Project Area – The place where the biodiversity of interest to the project is located. It can include one or more "conservation areas" or "areas of biodiversity significance" as identified through ecoregional assessments. Note that in some cases, project actions may take place outside of the defined project area.

Project Capacity – A project team's ability to accomplish its work. Elements include project leadership and staff availability, funding, community support, an enabling legal framework, and other resources.

Project Team – Shorthand for core project team. A specific group of practitioners who are responsible for designing, implementing, and monitoring a project. This group can include managers, stakeholders, researchers, and other key implementers.

Reversibility – One of the criteria used to rate the impact of a source of stress. The degree to which the effects of a source of stress can be restored. Typically includes an assessment of both the technical difficulty and the economic and/or social cost of restoration. Sometimes referred to as "irreversibility." See also contribution.

Scope (in the context of a threat assessment) – One of the measurements used to rate the impact of a stress. Most commonly defined spatially as the proportion of the overall area of a project site or target occurrence likely to be affected by a threat within 10 years. See also severity.

Severity – One of the criteria used to rate the impact of a stress. The level of damage to the conservation target that can reasonably be expected within 10 years under current circumstances (i.e., given the continuation of the existing situation). See also scope.

Sources of Stress – Proximate agents or factors that directly degrade targets. Synonymous with direct threats.

Stakeholders – Individuals, groups, or institutions who have a vested interest in the natural resources of the project area and/or who potentially will be affected by project activities and have something to gain or lose if conditions change or stay the same.

Status Measures – Information used to answer the questions: "How is the biodiversity we care about doing?" and/or "How are threats to biodiversity changing?" for key ecological attributes and/or threats that are not currently the subject of conservation actions. Compare to effectiveness measures.

Strategic Actions – Interventions undertaken by project staff and/or partners designed to reach the project's objectives. A good action meets the criteria of being: linked (to threat abatement or target restoration), focused, strategic, feasible, and appropriate.

Strategies – Broad courses of action that include one or more objectives, the strategic actions required to accomplish each objective, and the specific action steps required to complete each strategic action.

Stresses – Disturbances that are likely to destroy, degrade, or impair targets that result directly or indirectly from human sources. Generally equivalent to degraded key ecological attributes.

Targets – Elements of biodiversity which can include species, ecological communities, and ecological systems. Strictly speaking, refers to all biodiversity elements at a project site, but sometimes is used as shorthand for focal conservation targets.

Threats – Agents or factors that directly or indirectly degrade targets. See also direct threat, indirect threat, and critical threat.

Viability – The status or "health" of a population of a specific plant or animal species. More generally, viability indicates the ability of a conservation target to withstand or recover from most natural or anthropogenic disturbances and thus to persist for many generations or over long time periods. See also integrity for ecological communities and ecological systems.

Vision – A general summary of the desired state or ultimate condition of the project area or scope that a project is working to achieve. A good vision statement meets the criteria of being visionary, relatively general, brief, and measurable. Synonymous with project goal.

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Weed Information Management System (WIMS) (http://tncweeds.ucdavis.edu/wims.html)
Invasive Species Initiative (http://tncweeds.ucdavis.edu/index.html)

Appendix A: Comprehensive list of CWCS Terrestrial Species of Concern associated with targeted systems.

Common_Name	*Scientific_Name*	S_Rank	G_Rank
American Black Bear	*Ursus americanus americanus*	S5	G5
American Black Duck	*Anas rubripes*	S3N	G5
American Woodcock	*Scolopax minor*	S2B,S4N	G5
Bachman's Sparrow	*Aimophila aestivalis*	S3B	G3
Bald Eagle	*Haliaeetus leucocephalus*	S2B,S4N	G4
Bird-voiced Treefrog	*Hyla avivoca*	S3	G5
Black-crowned Night-Heron	*Nycticorax nycticorax*	S2B,S3N	G5
Brown-headed Nuthatch	*Sitta pusilla*	S4	G5
Cerulean Warbler	*Dendroica cerulea*	S3S4B	G4
Chimney Swift	*Chaetura pelagica*	S4B,S5N	G5
Chuck-will's-widow	*Caprimulgus carolinensis*	S4B	G5
Dwarf Salamander	*Eurycea quadridigitata*	S3	G5
EasternTowhee	*Pipilo erythrophthalmus*	S3	G5
Giant Stag Beetle	*Lucanus elephus*	S2	G3G5
Graham's Crayfish Snake	*Regina grahamii*	S2	G5
Gulf Crayfish Snake	*Regina rigida sinicola*	S3	G5T5
Henslow's Sparrow	*Ammodramus henslowii*	S1B,S2N	G4
Hooded Warbler	*Wilsonia citrina*	S4B	G5
Kentucky Warbler	*Oporornis formosus*	S4B	G5
King's Hairstreak	*Satyrium kingi*	S1	G3G4
Little Blue Heron	*Egretta caerulea*	S2B	G5
Long-tailed Weasel	*Mustela frenata*	S2	G5
Louisiana Slimy Salamander	*Plethodon kisatchie*	S2	G3G4Q
Mississippi Kite	*Ictinia mississippiensis*	S4B,S4N	G5
Mole Salamander	*Ambystoma talpoideum*	S3	G5
Northern Bobwhite	*Colinus virginianus*	S5	G5
Northern Pintail	*Anas acuta*	S5N	G5
Prairie Warbler	*Dendroica discolor*	S4B	G5
Prothonotary Warbler	*Protonotaria citrea*	S4B	G5
Rafinesque's Big-Eared Bat	*Corynorhinus rafinesquii*	S2	G3G4
Red-cockaded Woodpecker	*Picoides borealis*	S2	G3
Red-headed Woodpecker	*Melanerpes erythrocephalus*	S4B,S4S5N	G5
Rusty Blackbird	*Euphagus carolinus*	S5N	G4
Seminole Bat	*Lasiurus seminolus*	S1?	G5
Snowy Egret	*Egretta thula*	S2B	G5
Southeastern Bat	*Myotis austroriparius*	S2?	G3G4
Southern Crawfish Frog	*Rana areolata areolata*	S1	G4T4
Spotted Dusky Salamander	*Desmognathus conanti*	S1	G5
Strecker's Chorus Frog	*Pseudacris streckeri*	S2	G5
Swainson's Warbler	*Limnothlypis swainsonii*	S3B	G4
Swallow-tailed Kite	*Elanoides forficatus forficatus*	SH	G5T?
Texas Coral Snake	*Micrurus tenere tenere*	S2	G5T5

Appendix A continued

Texas Frosted Elfin	*Callophrys irus hadros*	S1	G3T1T2
Western Chicken Turtle	*Deirochelys reticularia miaria*	S3	G5T5
Wood Stork	*Mycteria americana*	SZN	G4
Wood Thrush	*Hylocichla mustelina*	S4B	G5
Worm-eating Warbler	*Helmitheros vermivorus*	S4B	G5
Yehl Skipper	*Poanes yehl*	S1S3	G4
Yellow-billed Cuckoo	*Coccyzus americanus*	S4B	G5
Yellow-crowned Night-Heron	*Nyctanassa violacea*	S3B	G5

Appendix B: Viability Matrices for Focal Conservation Targets (Matrix for Dry Pine-Hardwood Flatwoods in Viability section of plan)

Conservation Target	Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good
Pine-Hardwood Forest	Landscape Context	Fire regime - (timing, frequency, intensity, extent)	Fire Regime Condition Class (FRCC)	**FRCC3**	Conservation Ownership - FRCC2; Non-Cons - FRCC3	*Conservation Ownership - FRCC1; Non-conservation ownership - FRCC2*	Fire Regime Restored
Pine-Hardwood Forest	Condition	Species composition / dominance	Overstory comp	**>=75% Loblolly pine plantations**	Conservation Lands=15% more than 90% pine; 15% less than 10% pine (hardwood dominated); 70% between 10-90% pine/hardwood. Non-Cons. Lands= >=75% Loblolly Pine Plantations	*Conservation Lands=15% more than 90% pine; 15% less than 10% pine (hardwood dominated); 70% between 10-90% pine/hardwood. Non-Cons. Lands=50% greater than 90% pine; 50% mixed (in all, pine can be shortleaf or loblolly)*	Conservation Lands=15% more than 90% shortleaf pine; 15% less than 10% pine (hardwood dominated); 70% between 10-90% shortleaf pine/hardwood. Non-Cons. Lands=50% greater than 90% shortleaf pine; 50% mixed
Pine-Hardwood Forest	Size	Presence of key communities or seral stages	Percent of landscape, stand age, crown closure (LANDFIRE Model)	**A: >35% <15 years old; B: 30-50% 15-45 years old, closed canopy; C: 5% 15-45 years old, open; D: <5% >45 years old, open; E: <5% >45 years old, closed.**	A: 25-30% <15 years old; B: 20-35% 15-45 years old, closed; C: 10-15% 15-45 years old, open; D: 5-10% >45 years old, open; E: 5-10% >45 years old, closed.	*A: 10-20% <15 years old; B: 10-20% 15-45 years old, closed canopy; C: 15-25% 15-45 years old, open; D: 20-40% >45 years old, open; E: 5-10% >45 years old, closed.*	A: 15-25% <15 years old; B: 5-10% 15-45 Years old, closed canopy; C: 25-30% 15-45 years old, open (<80% closure); D: 40-60% >45 years old, open; E: 5% >45 years old, closed.

Conservation Target	Category	Key Attribute	Indicator	Current Indicator Status	Current Rating	Desired Rating	Date of Current Rating	Date for Desired Rating
Pine-Hardwood Forest	Landscape Context	Fire regime - (timing, frequency, intensity, extent)	Fire Regime Condition Class (FRCC)	Managed tracts - FRCC3 approaching 2; All other FRCC3	Poor	Good	Jan-06	Jan-16
Pine-Hardwood Forest	Condition	Species composition / dominance	Overstory comp	Unknown	Poor	Good	Jan-06	Jan-16
Pine-Hardwood Forest	Size	Presence of key communities or seral stages	Percent of landscape, stand age, crown closure (LANDFIRE Model)	Large amount in pine plantation in A and B	Poor	Good	Jan-06	Jan-30

Appendix B: Viability Matrices for Focal Conservation Targets continued

Conservation Target	Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good
Mesic Hardwood Forest	Condition	Community architecture	Canopy closure	**100% Mixed size**	50% Mixed size; 50% Mature, open canopy forest	40% Mixed size; 30% Mature, closed canopy forest with gaps; 30% Mature, open canopy forest	*50% Mature, closed canopy forest with gaps; 25% Mature, open canopy forest; 25% Mixed size*
Mesic Hardwood Forest	Size	Presence of key communities or seral stages	>=20 acres each embedded within conserved larger system with >= Fair Condition	**None**	1-8	9-19	*>=20*

Conservation Target	Category	Key Attribute	Indicator	Current Indicator Status	Current Rating	Desired Rating	Date of Current Rating	Date for Desired Rating
Mesic Hardwood Forest	Condition	Community architecture	Canopy closure	Unknown	Poor	Very Good	May-06	Jun-16
Mesic Hardwood Forest	Size	Presence of key communities or seral stages	>=20 acres each embedded within conserved larger system with >= Fair Condition	Unknown	Poor	Very Good	May-06	Jun-16

Appendix B: Viability Matrices for Focal Conservation Targets continued

Conservation Target	Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good
Wet Hardwood Flatwoods	Landscape Context	Hydrologic regime - (timing, duration, frequency, extent)	Element Occurance Record condition	No sites with unaltered hydrology	**1-14 w/ unaltered hydrology**	15-20 w/ unaltered hydrology	*>=21 w/ unaltered hydrology*
Wet Hardwood Flatwoods	Size	Presence of key communities or seral stages	Presence in larger system (embedded) in conservation ownership	None	**1-14**	15-20	*>=21*

Conservation Target	Category	Key Attribute	Indicator	Current Indicator Status	Current Rating	Desired Rating	Date of Current Rating	Date for Desired Rating
Wet Hardwood Flatwoods	Landscape Context	Hydrologic regime - (timing, duration, frequency, extent)	Element Occurance Record condition	One known occurance w/ unaltered hydrology - Warren	Fair	Very Good	May-06	Jun-16
Wet Hardwood Flatwoods	Size	Presence of key communities or seral stages	Presence in larger system (embedded) in conservation ownership	One known protected occurance - Warren Prairie Natural Area.	Fair	Very Good	May-06	Jun-16

Appendix B: Viability Matrices for Focal Conservation Targets continued

Conservation Target	Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good
Seepage Swamp and Baygall	Landscape Context	Hydrologic regime - (timing, duration, frequency, extent)	Element Occurance Record condition	**None w/ unaltered hydrology**	1-5 w/ unaltered hydrology	6-9 w/ unatlered hydrology	*>=10 w/ unaltered hydrology*
Seepage Swamp and Baygall	Size	Size / extent of characteristic communities / ecosystems	>=5 acres each embedded within larger system with >=fair current rating	**none**	1-5	6-9	*>=10*

Conservation Target	Category	Key Attribute	Indicator	Current Indicator Status	Current Rating	Desired Rating	Date of Current Rating	Date for Desired Rating
Seepage Swamp and Baygall	Landscape Context	Hydrologic regime - (timing, duration, frequency, extent)	Element Occurance Record condition	Unknown	Poor	Very Good	May-06	Jun-16
Seepage Swamp and Baygall	Size	Size / extent of characteristic communities / ecosystems	>=5 acres each embedded within larger system with >=fair current rating	Unknown	Poor	Very Good	May-06	Jun-16

Appendix B: Viability Matrices for Focal Conservation Targets continued

Conservation Target	Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good
Large River Floodplain Forest	Landscape Context	Hydrologic regime - (timing, duration, frequency, extent)	Indicator of Hydrologic Alteration (IHA)	High alteration	**Medium alteration**	*Low ateration*	Not altered
Large River Floodplain Forest	Condition	Species composition / dominance	Overstory comp	>30% conversion (agri or silvi)	**20-30% conversion**	*6-19% conversion*	Less than 5% conversion
Large River Floodplain Forest	Size	Presence of key communities or seral stages	Percent of landscape, stand age, crown closure (LANDFIRE Model)	A: 40-50% <20 years old; B: 40-50% 20-79 years old, closed canopy; C: <=5% 80+ years old, closed	**A: 30-40% <20 years old; B: 30-40% 20-79 years old, closed; C: 20-30% 80+ years old, closed**	*A: 25-30% <20 years old; B: 25-30% 20-79 years old, closed canopy; C: 30-45% 80+ years old, open*	A: 15-25% <20 years old; B: 25-35% 20-79 years old, closed canopy; C: 45-55% >=80 years old, closed canopy

Conservation Target	Category	Key Attribute	Indicator	Current Indicator Status	Current Rating	Desired Rating	Date of Current Rating	Date for Desired Rating
Large River Floodplain Forest	Landscape Context	Hydrologic regime - (timing, duration, frequency, extent)	Indicator of Hydrologic Alteration (IHA)	Unknown	Fair	Good	May-06	Jun-16
Large River Floodplain Forest	Condition	Species composition / dominance	Overstory comp	Unknown	Fair	Good	Jun-06	Jun-16
Large River Floodplain Forest	Size	Presence of key communities or seral stages	Percent of landscape, stand age, crown closure (LANDFIRE Model)	Unknown	Fair	Good	May-06	May-16

Appendix B: Viability Matrices for Focal Conservation Targets continued

Conservation Target	Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good
Small Stream/River Forest	Condition	Species composition / dominance	Overstory comp	>50% conversion (agri or silvi)	**20-50% conversion**	*6-19% conversion*	Less than 5% conversion
Small Stream/River Forest	Size	Presence of key communities or seral stages	Percent of landscape, stand age, crown closure (LANDFIRE Model)	A: 40-50% <20 years old; B: 40-50% 20-79 years old, closed canopy; C: <=5% 80+ years old, closed	**A: 30-40% <20 years old; B: 30-40% 20-79 years old, closed; C: 20-30% 80+ years old, closed**	*A: 25-30% <20 years old; B: 25-30% 20-79 years old, closed canopy; C: 30-45% 80+ years old, open*	A: 15-25% <20 years old; B: 25-35% 20-79 years old, closed canopy; C: 45-55% >=80 years old, closed canopy

Conservation Target	Category	Key Attribute	Indicator	Current Indicator Status	Current Rating	Desired Rating	Date of Current Rating	Date for Desired Rating
Small Stream/River Forest	Condition	Species composition / dominance	Overstory comp	Unknown	Fair	Good	Jun-06	Jun-16
Small Stream/River Forest	Size	Presence of key communities or seral stages	Percent of landscape, stand age, crown closure (LANDFIRE Model)	Unknown	Fair	Good	May-06	May-16