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1.0 EXECUTIVE SUMMARY

The Wolf River Watershed incorporates approximately 367 square miles in southeast Mississippi and spans across five counties including: Lamar, Pearl River, Stone, Harrison, and Hancock. The watershed begins near the Town of Lumberton in southeast Lamar County and empties into the Bay of St. Louis north of the City of Pass Christian near the Harrison and Hancock County lines. The Wolf River Watershed is formally identified as two separate sub-basins within the Coastal Streams Basin. These two sub-basins include the Upper Wolf River (11-Digit Hydrologic Unit Code (HUC) 03170009080) and the Lower Wolf River – Cane Creek (11-Digit HUC 03170009090).

The Wolf River Watershed Implementation Plan (WIP) is funded through a Section 319 Water Quality Grant from the Mississippi Department of Environmental Quality (MDEQ). The purpose of the Section 319 project is to protect water quality in the Wolf River Watershed by developing a WIP and conducting other activities that would engage stakeholders. The primary focus of this plan is on public and stakeholder education with a goal of increasing awareness of watershed issues, in general and increasing awareness of the Wolf River Watershed, specifically. Although the plan does include both technical and educational strategies, the Section 319 Grant only includes funding for implementation of selected educational strategies. However, the technical strategies discussed in this plan include strategies and activities already being carried out by the Wolf River Conservation Society (WRCS), its board members, and other interested and involved stakeholders.

The WRCS is a local, grassroots organization dedicated to preservation, conservation, management, and protection of the Wolf River and its watershed from its headwaters in Lamar County to its termination at the Bay of St. Louis, Mississippi. This WIP was prepared as a proactive measure to prevent future pollution of the watershed and to maintain and improve the current water quality within the watershed. The majority of activities and strategies proposed herein will be conducted throughout the entire watershed with an emphasis on a comprehensive approach to public outreach and education designed to reach both general and targeted audiences. The implementation of the plan will be carried out by the Watershed Implementation Team (WIT) as led and directed by the WRCS. The WRCS assumes primary responsibility for the contractual obligations with the MDEQ and will direct implementation, evaluation, review, and revision activities. The primary contact for the WRCS is:

Wolf River Conservation Society
Mr. Robert F. Fairbanks
(228) 865-5515
Post Office Box 4079
Gulfport, Mississippi 39502

The following tables summarize the primary components of the proposed technical and educational strategies incorporated into the WIP

Table 1.1 Summary of Watershed Technical Strategies

Goal/Benefit Desired	Management Action	Where	When
Increase the level of spatial data and technical knowledge of human activities in the watershed in support of planning, education, and outreach activities.	Collection and consolidation of readily available mapping data from a variety of sources including FEMA, USGS, MARIS, MDEQ, and others. Development of watershed maps and a GIS database to contain collected and created GIS data.	Entire Watershed	2009
Collection of water quality data to allow for more accurate quantification and qualification of water quality conditions in the watershed.	Sampling and monitoring of water quality as appropriate at selected sites throughout the watershed.	Entire Watershed	On-going
Improvements to public access assets, promotion of recreational opportunities, and preservation of critical lands within the watershed.	WRCS will continue to analyze the watershed to determine specific properties to target through acquisition of conservation easements designed to protect and preserve land within the watershed.	Entire Watershed	On-going

Table 1.2 Summary of Watershed Educational Activities

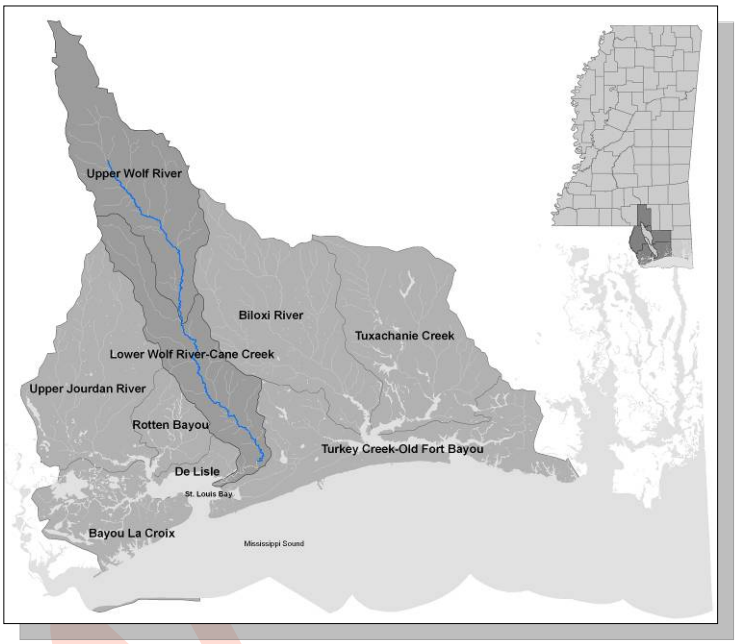
Goal/Benefit Desired	Management Action	Where	When
Provide water quality information and education to a variety of stakeholder groups to increase awareness of the watershed.	The WRCS and WIT will deliver presentations to stakeholder groups such as civic clubs, professional associations, and other organized meetings.	Entire Watershed	2009-2010
Utilization of the local media to increase the level of awareness of the watershed and associated water quality issues.	The WRCS and WIT will develop a series of public service announcements for distribution to local media outlets.	Entire Watershed	2010
Outreach to stakeholders to reach a broad audience with a series of messages related to water quality, recreational opportunities,	The WRCS will implement four specific activities including: • Development of factsheets and brochures	Entire Watershed	2009-2010

etc.	• Execution of a mass mail-out to property owners • Development of a table-top display • Development of a website		
To create opportunities for hands-on, real world experiences in the watershed designed to create a sense of place and ownership.	The WRCS and WIT will implement two specific activities including: • Planning and execution of a watershed fair • Planning and execution of at least two stream clean-up events	Entire Watershed	2010
Creation of watershed awareness through the strategic placement of signs throughout the watershed.	The WRCS will explore opportunities and options for placement of signs in the watershed including general watershed signs and signs identifying public access opportunities.	Entire Watershed	2010
Create and capitalize on opportunities to partner with a local high school to increase watershed awareness among high school students.	The WRCS will organize and assist in hosting events at the school related to the Adopt-A-Stream program and other educational activities targeted through the school's environmental science class.	West Harrison High School	2010

2.0 INTRODUCTION

2.1 INTRODUCTION

Figure 1 – *WOLF RIVER WATERSHED*



The Wolf River Watershed, located in southeast Mississippi, is unique to the region and the state both in the size of the watershed and the ecological resources contained within the watershed. The Wolf River Watershed is actually comprised of two distinct watersheds commonly referred to as the Lower Wolf River Watershed and the Upper Wolf River Watershed. For the purposes of this planning effort and implementation efforts to follow, the two sub-watersheds will be referred to in the collective as the Wolf River Watershed. Designated uses of the watershed are primarily recreational, and the Wolf River is one of few river systems in the State of Mississippi that is not overly burdened by severe water quality issues. Because the Wolf River drains directly to the Gulf of Mexico via the Bay of St. Louis, maintaining good water quality is critical not only for the river system itself but also for the Bay and the Gulf.

Because of the unique characteristics of the Wolf River Watershed, it has been determined that the development and implementation of a WIP will provide specific strategies and a focused approach to maintain the high water quality standards that the Wolf River now exhibits. The development of the WIP involves the formation of a WIT. This WIT plays a critical role in the planning process by ensuring that the primary plan elements are selected based on a broad consensus. The WIT is also the body that will work with the WRCS to ensure plan elements are implemented according to the WIP and in a timely manner.

The pages to follow in this document are the result of an intensive planning effort undertaken by a large and diverse group of local, state, and federal stakeholders. The plan references numerous organizations, agencies, and other stakeholders that played a critical role in the development of the plan and the strategies contained within the plan. Many of these agencies and organizations are referred to in the plan document by acronym. While efforts have been made to reduce the frequency of acronym usage, a

table has been provided as **Appendix A** that provides a guide to acronyms and their meanings.

The Wolf River WIP includes multiple components, many of which will be conducted concurrently. These components include planning, public education, development of strategies for water quality protection, and development of a plan for continuous monitoring of the progress of the implementation of the plan. Each component of the plan will play an integral role in the success of the established goals and objectives of the plan. This plan is the sum of all its parts and should be viewed, analyzed, and implemented in a comprehensive manner in order for the implementation process to be fully successful.

2.2 VISION STATEMENT

The vision of the Wolf River WIT is to establish a watershed management framework designed to protect water quality, to enhance and protect the natural resources that exist within the watershed, and to allow the entire watershed, as a natural system, to fully realize its potential for the designated water uses through the application of education measures, sound scientific principles, and natural resource management practices.

2.3 MISSION STATEMENT

The mission of the WRCS and the WIT through this planning effort is to develop a WIP emphasizing practices designed to assist in the realization of the WRCS's mission to "preserve, conserve, manage, and protect the Wolf River and its watershed from its headwaters in Lamar County to its termination at the Bay of St. Louis, Mississippi." This WIP is being prepared as a proactive measure to prevent future pollution of the watershed and to maintain and improve the current water quality within the watershed. Potential water quality impairment issues include erosion, sediment, siltation, litter, organic debris, excess nutrients, suspended solids, and pathogens. Through the development and implementation of this plan, the WIT will promote technical and educational best management practices (BMPs) to address issues of concern and priority areas. The goals of the plan will be achieved through a combination of assessment, education, public involvement, targeted management actions, and land conservation easements.

2.4 WATERSHED IMPLEMENTATION TEAM

The following entities are represented on the Wolf River WIT:

Mississippi Power
Wolf River Conservation Society
Wolf River Canoe & Kayak
DuPont

Mississippi Department of Environmental Quality
Mississippi Department of Wildlife & Fisheries
Mississippi Soil & Water Conservation Commission
Mississippi Museum of Natural Science
Lamar County Planning Department

Executive Committee (Wolf River Conservation Society)

Robert Bass	Ed Blakeslee	Jane Dennis	Frank DiGeorge
Bob Fairbank	Joe Feil	John Hairston	Tracy Heggins
Tina Knoll	Tom Milner	Walter Morton	Bob Occhi
Lenny Sawyer	Dan Sloan	Judy Steckler	Bob Tannen
Ben Vance			

Technical & Education Committees

Bobby Ariatti	Laura Beiser	Mark Gilbert	Micheal Hershman
Joyce Hicks	Art Kennard	Chris Lagarde	Lance Middleton
Coen Perrott	Cynthia Simmons	Daniel Stuart	Patrick Vowell
John Walrod	Melanie Walrod	Andrew Whitehurst	

3.0 WATERSHED DESCRIPTION

3.1 OVERVIEW

The Wolf River Watershed is a sub-basin of the Coastal Streams Basin and is centrally located within the Coastal Streams Basin. The Wolf River Watershed begins with Wolf Creek at its headwaters near the Town of Lumberton in Lamar County and extends southward through five counties including Lamar, Pearl River, Stone, Hancock and Harrison to its mouth at Bayou Portage and the Bay of St. Louis. The Wolf River Watershed also includes the eastern portions of the City of Poplarville. The Wolf River Watershed encompasses approximately 367 square miles equating to approximately 235,052 acres. The Wolf River itself includes approximately 66 stream miles and flows through land that is predominantly rural in nature.

The Wolf River became part of the State of Mississippi's Scenic Streams Stewardship Program on March 17, 2000 and was the first river in Mississippi designated through the Scenic Streams Stewardship Program. The Mississippi Scenic Streams Stewardship Program was established as a voluntary program designed to encourage conservation and stewardship by riparian (stream-side) landowners. According to the Mississippi Code of 1972, Section 51-4-5, "The Legislature finds that certain selected streams and stream segments of this state posses unique or outstanding scenic, recreational, geological, botanical, fish, wildlife, historic, or cultural values. It is the policy of the Legislature to provide for the protection of these streams and to conserve the state's natural heritage for the benefit and enjoyment of present and future generations, while preserving the private property rights of riparian landowners. There is a necessity for a rational balance between the use of these streams and the conservation of the natural beauty along these streams. The Legislature finds that this balance will be best achieved through a nonregulatory voluntary stewardship program emphasizing local education, participation, and support. The primary goal of the program is to maximize voluntary private conservation efforts and to build and maintain a sense of stewardship among stream users and riparian landowners. To accomplish this goal, the program must provide a nonregulatory framework to obtain cooperative, voluntary management agreements with landowners to maintain scenic values while ensuring the rights of riparian landowners to continue customary uses along the stream."

The goals of the WIP and the Scenic Streams Program closely align, and the benefits of the Wolf River being a part of the Scenic Streams Stewardship Program will complement the WIT's efforts to implement this plan to its fullest potential.

The Wolf River is the largest and longest river in the Wolf River Watershed. However, the Watershed does include several other named streams and also includes several named waterbodies. **Table 3.1** provides a listing and location of all named streams in the watershed and **Table 3.2** provides a listing and location of the named waterbodies located in the watershed.

Table 3.1 Named Streams in the Wolf River Watershed

Stream/River Name	Length (in miles)	County				
		Hancock	Harrison	Lamar	Pearl River	Stone
Bayou Acadian	4.51		X			
Alligator Creek	9.04				X	
Bayou Bacon	1.08	X				
Bay Branch	1.77		X			
Beaverdam Creek	5.82				X	
Bee Tree Brake	2.55				X	
Bell Creek	7.38	X	X			
Big Brake	2.39				X	
Big Creek	6.77		X			
Boggy Branch	4.80			X	X	
Cowpen Creek	6.07				X	
Crane Creek	19.57	X			X	
Cypress Creek	6.68				X	X
Davis Creek	4.85				X	
De Lisle Bayou	0.16		X			
Fryes Creek	3.35				X	
Grandpa Brake	2.73				X	
Green Brake	2.82				X	
Hickory Creek	5.55				X	
Juniper Creek	5.79				X	X
Mill Creek	15.04		X		X	X
Murder Creek	13.56				X	
Pen Branch	7.27				X	
Polar Branch	4.64		X			
Poplar Springs Branch	4.64				X	
Redfish Creek	5.63				X	
Sandy Creek	8.05		X			
Savannah Branch	2.64				X	
Sheldon Creek	3.89				X	
Silver Run	5.31				X	X
Spring Branch	2.17				X	
Turkey Creek	3.51				X	
Waterhole Brake	1.81				X	
White Cypress Creek	0.68	X				
Wolf Creek	15.02			X	X	

Wolf River	70.06	X	X		X	X

An analysis of stream miles in each county reveals Pearl River County approximately 677 stream miles within the watershed. Harrison County has approximately 339 stream miles within the watershed, followed by Hancock County with approximately 94 stream miles, Stone County with approximately 88 stream miles, and Lamar County with approximately 31 stream miles.

Table 3.2 Named Waterbodies in the Wolf River Watershed

Name	Area (in acres)	County
Big Swamp	285.65	Pearl River
Bonner Lake	19.27	Pearl River
Browns Lake	15.23	Stone
Carrol Lake	15.23	Stone
Crystal Lake	35.09	Stone
Hillsdale Lake	36.82	Pearl River
Holiday Lake	60.05	Pearl River
Horsehead Lake	3.95	Stone
Morning Glory Lake	43.24	Hancock
Orvisburg Lake	7.91	Pearl River
Rogers Lake	44.23	Stone
Silver Run Lakes	66.47	Stone

3.2 DEMOGRAPHICS AND PRIMARY LAND USES

The Wolf River Watershed reaches into five counties in south Mississippi including: Lamar, Pearl River, Stone, Hancock, and Harrison. General land uses within the watershed are primarily rural in nature, with the City of Poplarville being the only city within the watershed boundaries. The total estimated population of the watershed is 17,882 according to the 2000 U.S. Census. The portion of the Watershed's population residing inside the City of Poplarville is 1,017 people. Based on this breakdown of the Watershed's population, only about 5% of the total population in the watershed lives within a municipality with the other 95% living in rural or unincorporated portions of the watershed counties. An analysis of data from the U.S. Census Bureau's Population Estimates Program from the base year of 2000 through July 2008 indicates that Hancock and Harrison Counties' populations have decreased while populations in Lamar, Pearl River and Stone Counties have increased. **Table 3.3** provides an overview of the population changes in the five watershed counties since 2000.

Table 3.3 Population Change in Watershed Counties, 2000-2008

	Hancock County, Mississippi	Harrison County, Mississippi	Lamar County, Mississippi	Pearl River County, Mississippi	Stone County, Mississippi
Total Population					
1-Jul-08	40,140	178,460	49,121	57,466	16,025
1-Jul-07	39,741	176,366	47,648	57,007	15,549
1-Jul-06	38,853	172,955	45,916	56,237	15,390
1-Jul-05	46,088	195,756	44,150	51,773	14,695
1-Jul-04	45,445	194,544	42,865	51,264	14,297
1-Jul-03	44,835	190,933	41,609	50,475	14,139
1-Jul-02	44,435	191,295	40,928	50,050	14,016
1-Jul-01	43,848	190,232	39,952	49,350	14,067
1-Jul-00	43,274	189,872	39,335	48,765	13,688
April 1, 2000 (Estimates Base)	42,969	189,606	39,068	48,619	13,622
April 1, 2000 (Census 2000)	42,967	189,601	39,070	48,621	13,622
Percent Change 2000 - 2009	**-6.60%**	**-5.90%**	**25.73%**	**18.19%**	**17.64%**

Source: US Census Bureau, Population Estimates Program

As indicated in **Table 3.3**, the populations of Hancock and Harrison Counties decreased at 6.6% and 5.9% primarily dues to the impacts of Hurricane Katrina as evidenced by the population change from July, 2005 – July 2006. In similar fashion, the populations of Lamar, Pearl River, and Stone Counties have increased, with the largest increase of 25.73% seen in Lamar County. In terms of management of the watershed, increased population in Lamar, Pearl River, and Stone Counties have the potential to equate to increased development pressures in the upper reaches of the watershed as these counties develop in an effort to accommodate increases in population. It is also assumed that as hurricane recovery efforts continue, populations in Hancock and Harrison Counties will eventually return to and exceed pre-hurricane numbers.

Other management concerns associated with demographic trends in the watershed relate to growing populations and residential development in rural areas located in the upper reaches and headwaters of the watershed. At the current time, none of the watershed counties have centralized wastewater systems. While some counties may have scattered decentralized systems, the majority of new rural residential development will rely on single-lot septic systems for sanitary sewer disposal. An increase in the number of septic systems in the watershed has the potential to create nutrient related water quality concerns. These concerns can be best addressed through public education targeting these residential populations and through the promotion of more technologically-advanced decentralized wastewater systems throughout the watershed.

The predominant land use throughout the watershed is rural, undeveloped land classified as bottomland hardwood forests, pine forests, farmlands, marshes, and other habitats typical of coastal environments. The primary improved land uses in the watershed include residential and light commercial activities. Most commercial activity in the watershed is found in the eastern portion of the City of Poplarville within the boundaries of the watershed.

3.3 PHYSICAL GEOLOGY

The Wolf River Watershed is located in the Pine Belt and Coastal Zone regions of the Southern Coastal Plain and Eastern Gulf Coast Flatwoods land resource areas with the majority of the watershed located in the Pine Belt Region. The watershed stretches across three primary geological formations including the Citronelle Formation, the Pascagoula/Hattiesburg Formation, and the Coastal Deposits Formation. The Wolf River Watershed includes approximately twenty-five soil associations and a variety of specific soil types typical of soils located throughout the Pine Belt and Coastal Zone Regions. A map depicting primary soil associations throughout the watershed is included in **Appendix B** and **Table 3.4** provides specific information on the predominant soil types located within the soil associations.

Table 3.4 Primary Soil Types

Soil Type	% of Land Area	Hydric	Erosive
Altmore Silt Loam	2%	Yes	Slight
Dorovan-Croation	2%	Yes	Slight
Harleston Fine Sandy Loam	2%	No	Slight
Malbis Fine Sandy Loam	2%	No	Slight to Moderate
Malbis-Saucier	2%	No	Moderate
Malbis-Susquehanna-Saucier	10%	No	Moderate
McLaurin Fine Sandy Loam	8%	No	Moderate
McLaurin-Lucy	2%	No	Slight
McLaurin-Smithdale	14%	No	Moderate
Poarch Fine Sandy Loam	9%	No	Slight
Ponzer and Smithton	2%	Yes	Slight
Ruston Fine Sandy Loam	11%	No	Slight to Moderate
Saucier Fine Sandy Loam	2%	No	Slight
Saucier-Susquehanna	2%	No	Slight
Smithdale Fine Sandy Loam	2%	No	Moderate
Smithdale Sandy Loam	3%	No	Slight
Smithton	7%	Yes	Slight
Smithton Fine Sandy Loam	3%	Yes	Slight

Percentages do not include surface water areas and soils of less than 2% of the total land area

Soil classifications represented in **Table 3.4** make up approximately 85% of the geographic area of the watershed not including surface water areas. In terms of their erosive index, these soils range from slight to moderate with approximately 16% of the soil surface area of the top 85% of soils in the watershed classified as hydric.

3.4 WETLANDS

Wetlands are defined by 33CFR328 as “areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under

normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." Ecologically, wetlands provide a number of valuable functions including habitat and foraging opportunities for many species of animals. From a water quality perspective, wetlands provide attenuation of floodwaters, processing of nutrients, and infiltration of stormwater, all of which improve the water quality of the respective watershed.

In the northern portions of this watershed, wetlands exist primarily in conjunction with streams and are often located in the floodplains of the stream channels. The dominant wetland type is composed of bottomland hardwood forested areas along streams and in floodplains. Smaller areas of emergent and shrub type wetlands are present in areas where shallow water pools for extended periods, such as oxbows, sloughs, and beaver ponds. In general, the wetland areas within the watershed are dominated by canopy species of sweet gum, sweet bay, cypress, tupelo gum, and magnolia. Loblolly and slash pines are found in wet flats within the watershed.

The Wolf River terminates at the Bay of Saint Louis. A large, 2,426 acre Gulf Ecological Management Site (GEMS) exists near the mouth of the Wolf River. This preserve area is managed by the Mississippi Department of Marine Resources (MDMR) Coastal Preserves Program and contains both tidal freshwater and brackish water marsh areas. These southernmost wetland areas are dominated by marsh plants such as sawgrass, arrow arum, spike rush, and pickerelweed. The marsh areas with higher salinity also contain needle rush, duck potato, and big cordgrass.

Two types of wetland management activities that currently exist in the watershed include the GEMS preserve area and "Streamside Management Zones" (SMZs), which are timber harvesting practices encouraged throughout the watershed. Timber production constitutes one of the major land uses in the watershed, and practices such as clear-cutting have the potential to result in significant disturbance of soils thus impacting water quality. SMZs are designed to protect water quality of streams and wetlands by limiting clearing of areas along streams and providing a buffer for managing runoff from adjacent disturbed areas. While it would be expected that an increase in urbanization would lead to impacts on the quantity and quality of wetlands within the watershed; data does not exist to make a determination of impacts.

3.5 ENVIRONMENTAL MANAGEMENT AREAS

The only environmental management area located within the Wolf River Watershed is the Wolf River Coastal Preserve located near the mouth of the river at Bayou Portage and the Bay of St. Louis. The Wolf River Wildlife Management Area is located adjacent to the watershed boundaries at the extreme northwestern end of the watershed but exists primarily outside of the watershed boundaries.

The Wolf River Coastal Preserve is part of the MDMR's GEMS program. GEMS is part of a coordinated effort between the U.S. EPA, the Gulf of Mexico Program, and the MDMR to collect information about Mississippi's coastal wetland areas. Data collected is available on the internet. The GEMS sites in Mississippi are also Mississippi's designated coastal preserves. The Wolf River Coastal Preserve is primarily characterized as an estuarine and tidal freshwater marsh dominated by sawgrass, arrow arum, pickerelweed, and spike rush in the mid-section of the river segment located in the preserve. The lower extent of the river near DeLisle Bayou and Bayou Portage is dominated by needle rush with a mixture of duck potato and big cordgrass. This area provides feeding, resting, and wintering habitat for several migratory bird species including the Brown Pelican, White Pelican, Osprey, and Cormorants. Rare, threatened, and endangered species common to the Wolf River Coastal Preserve include:

- Mottled Duck
- Black Rail
- American Alligator
- Osprey
- Coastal Shiner
- Gulf Salt Marsh Snake
- Yellow Rail
- Diamondback Terrapin
- Southern Red Cedar

Lands within the Coastal Preserve are either privately, locally, state, or federally–owned, with much of the property owned by the State of Mississippi. The primary threat to the ecological integrity of the preserve is development of surrounding lands. It is the intention of the State of Mississippi to offset these threats through intergovernmental and private cooperation in the management of the unique ecosystem that exists within the Wolf River Coastal Preserve.[1]

3.6 PARKS AND RECREATIONAL AREAS

An analysis of available GIS data indicates the presence of nineteen facilities located throughout the Wolf River Watershed. These facilities are mixed in ownership and use with several listed as owned by the State or local governments and others listed as privately owned. The primary concern with limited parks and recreational areas is the limited public access to the Wolf River and the Wolf River Watershed. Limited access also tends to create a hindrance to education and outreach efforts by limiting the "hands-on" personal experience that adds intrinsic and cultural value to the watershed.

[1] Mississippi Department of Marine Resources GEMS Sites: www.dmr.state.ms.us/Coastal-Ecology/GEMS/Wolf-River.htm.

A listing of known parks and recreational areas is included in **Table 3.5**. A map of the location of known parks and recreational areas is included in **Appendix B**.

Table 3.5 Parks and Recreational Areas in the Wolf River Watershed[2]

Site Name	County	Ownership Status	Publicly Accessible	Type of Facility
Necaise Crossing Park	Hancock	County	N/A	Community Playfield
Salmon Boy Scout Camp	Hancock	Civic Organization	NO	Boy Scout Camp
Scenic Trails Campground	Hancock	Commercial	YES	Commercial Campground
Wolf River	Hancock	State	N/A	Unique Natural Park
Bayou Acadian	Harrison	State	N/A	Unique Natural Park
Five Star R. V. Park	Harrison	Commercial	YES	Single Purpose Facility
Lizana Elementary School	Harrison	School	N/A	Community Playfield
Lonesome Duck Stables	Harrison	Commercial	YES	Horse Rental
Magic River Resort	Harrison	Commercial	YES	Single Purpose Facility
Wolf River	Harrison	State	N/A	Unique Natural Park
Wolf River Canoes	Harrison	Commercial	YES	Single Purpose Facility
Baxterville Recreation Area	Lamar	County	N/A	Community Playfield
Wolf Creek	Lamar	State	N/A	Unique Natural Park
Bill Watson Memorial Park	Pearl River	County	N/A	Single Purpose Facility
Hillsdale Lake & Golf Course	Pearl River	Other Private	NO	Golf Course
Poplarville High School	Pearl River	School	N/A	Community Playfield
Wolf River	Pearl River	State	N/A	Unique Natural Park
Rogers Lake	Stone	Commercial	YES	Fishing Lake
Silver Run Lake	Stone	Other Private	NO	Private Fishing Lake

[2] Mississippi Automated Resource Information Service: www.maris.state.ms.us

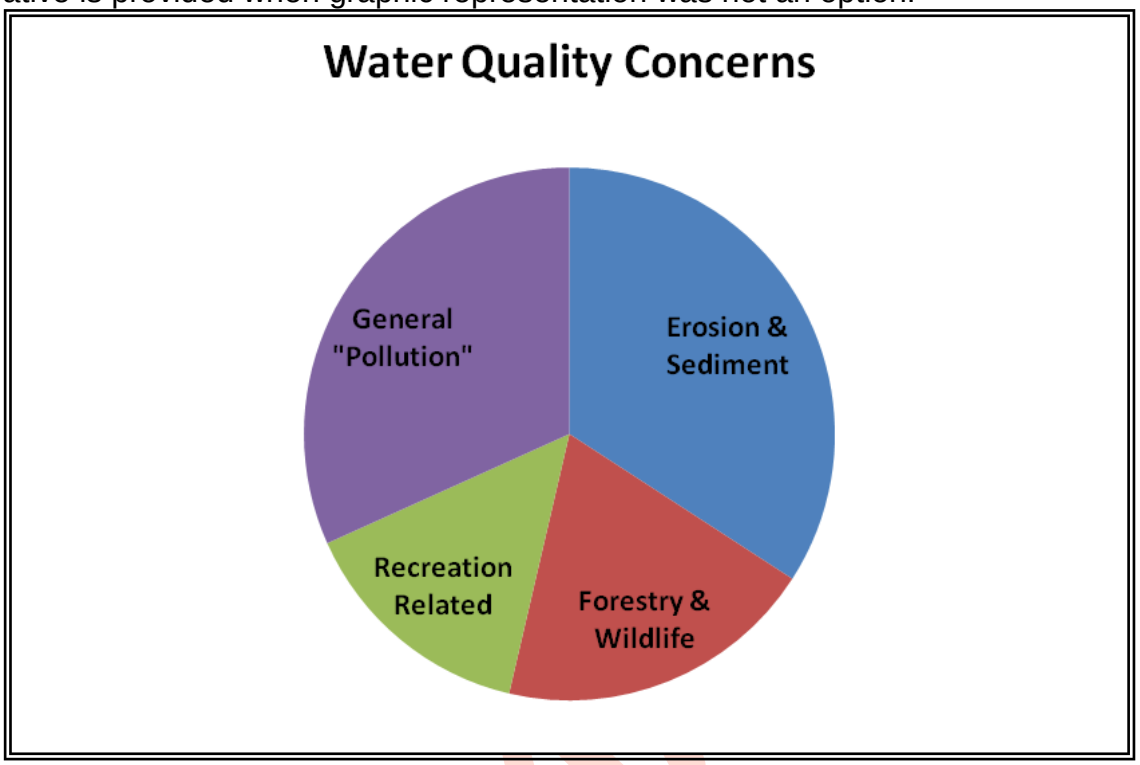
4.0 STAKEHOLDER INTERESTS

Stakeholder concerns and issues of interest were solicited via the development of a stakeholder survey and through discussions during numerous stakeholder and WIT meetings. The survey was designed to gauge and quantify issues of concern, identify geographic areas of concern, and reveal general attitudes of stakeholders towards the watershed. While some survey questions were easily quantifiable, others were more subjective in nature and allowed for a wide range of responses. Water quality concerns communicated by the stakeholders are primarily directed towards non-point source pollution issues. Specific non-point source pollution issues included erosion, siltation, and pathogens. In addition to general non-point pollution concerns, the survey revealed concerns associated with the use of all terrain vehicles (ATVs) and the presence of invasive and non-native plant species in the watershed.

The survey also revealed several geographic priority areas including (1) the stretch of river from Poplarville to Silver Run, (2) areas north of Highway 26, (3) the Mill Creek area, (4) areas south of Interstate 10, and (5) unprotected areas in the Upper Wolf River Watershed. Areas of general concern communicated by stakeholders were associated with those geographical areas with the greatest potential for new development within the watershed. Areas such as Lamar County near Lumberton, Pearl River County near Poplarville, and areas of Harrison County south of I-10 will likely receive the greatest development pressures in coming years. Given these assumptions, stakeholders desire measures designed to provide protection to these areas prior to the onset of development activities. The following sections provide specific information obtained from the surveys and stakeholder meetings including specific responses to the survey.

4.1 SURVEY RESULTS

In this section, the survey results are presented graphically where appropriate, and a narrative is provided when graphic representation was not an option.



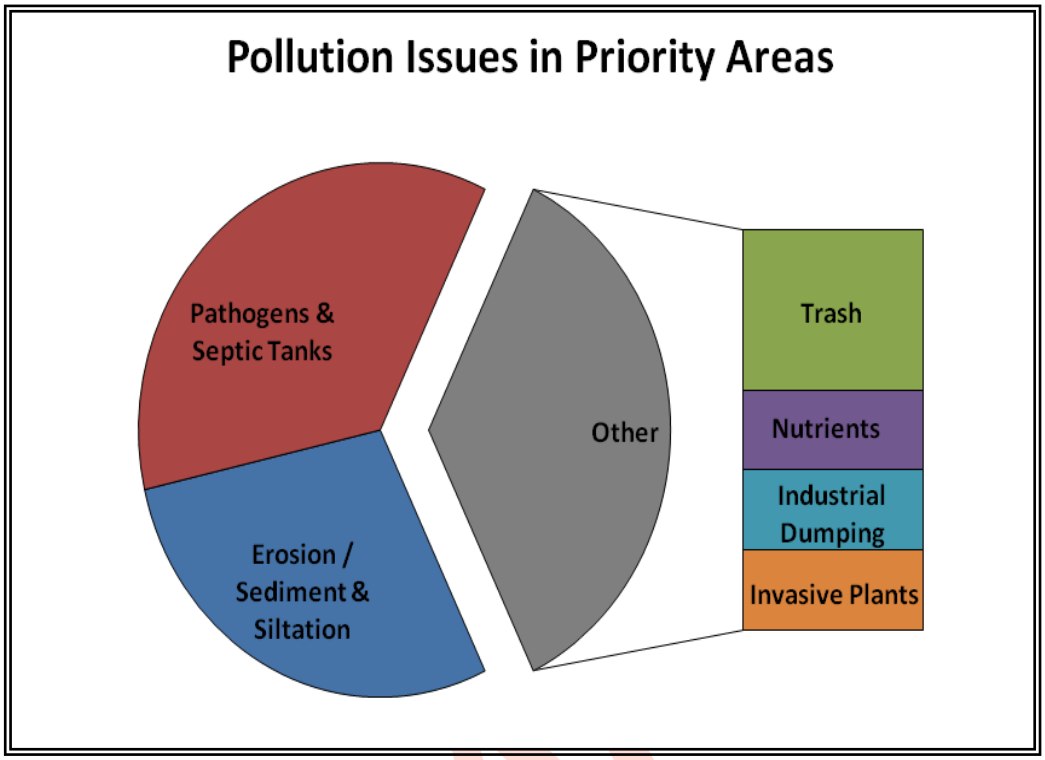
What are the water quality concerns you have in this watershed?

As the graphic above shows, one of the main areas of concern for impacts to water quality comes from erosion and sediment due to land development. Forty-one responses were given on this topic, with twelve of those listing general pollution topics such as "non-point source pollution, point source pollution, pathogens, and excess nutrients." The remaining responses described water quality concerns related to recreational such as ATV use and littering. The forestry and wildlife concerns focus on protection of riparian forest, preventing invasive plant species, and destruction of fish and wildlife habitat.

What do you consider as priority areas within this watershed in terms of geography? Where are these priority areas located (specifically)?

Survey results provided in response to the previous questions showed the greatest concern lying in Pearl River County, specifically Poplarville to Silver Run – North of Highway 26 and the Mill Creek area. Other general areas of concern are areas north of Harrison County where the WRCS does not hold conservation easements. Some stakeholders felt that the southern end of the watershed, including Harrison County required the most attention due to development pressures.

What are the pollution issues or concerns associated with identified priority areas?

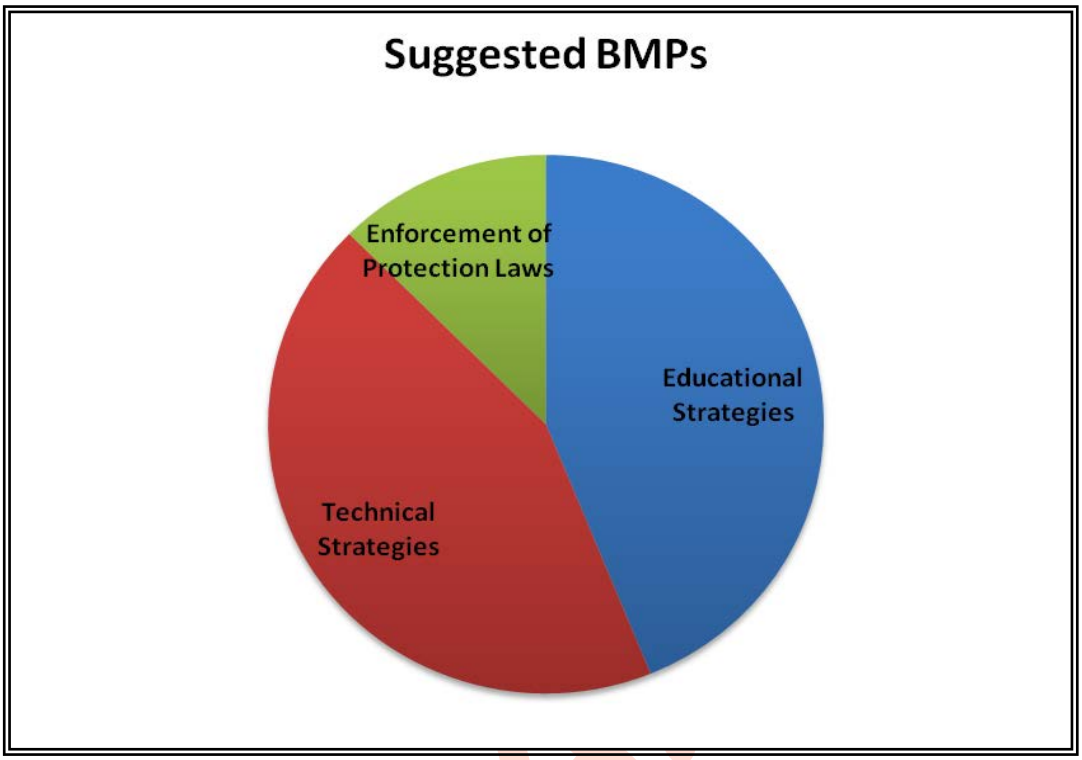


Increased runoff, sediment and siltation were concerns expressed throughout the watershed. The biggest concern associated with the northern portion of the watershed, including the headwaters in Lamar County and all of Pearl River County, is leaking septic tanks and pathogens. Littering and industrial dumping were also mentioned as issues in the northern portion of the watershed. Nutrient runoff and exotic species invasion was presented as a concern for areas south of Interstate 10. A total of 14 responses were given to this prompt. 5 responses were related to pathogens and septic system concerns and 4 responses were related to sedimentation and siltation with the remaining responses related to various topics.

What do you consider as priority areas within the watershed in terms of significant water quality issues of concern, impacts of human activities, etc.?

The majority of the 15 responses related to stream bank protection from riparian forest removal and channelization and the subsequent erosion potential. Litter and trash removal was mentioned twice as were specific locations (North of Interstate 10 in Harrison County and Pearl River County). Singular responses included concerns about pathogens, fish and wildlife protection, education of landowners, land owner involvement and development hazards.

Do you have any suggestions regarding best management practices to address the issues of concern in these priority areas?



In response to this question, the stakeholders suggested technical strategies with approximately the same frequency as educational strategies. The technical strategies include water quality testing, conservation easement acquisition, riparian BMPs for forestry, bank stabilization, wetland and floodplain restoration, and establishment of green belts. The survey results suggest that the stakeholders would like to see increased education on the current protection laws. Other educational suggestions include a wildlife conservation awareness program, public signage at basin crossings, signage at public access points, educational nature hiking trails, and river conservation education programs for schools and tourism. On the enforcement side, stricter enforcement of water quality protection laws and stormwater containment from construction sites were listed as suggested BMPs.

Do you have any suggestions regarding water quality and watershed management education needs within the Wolf River Watershed?

This question provided results relating to specific audiences for education such as developers, landowners, and people who use the river for recreation. The specific strategies suggested in the survey results include school and children's outreach programs, signage to promote the Wolf River as a "scenic stream" and a media campaign to include newspaper, magazines, television and the internet.

What do you value most about the Wolf River Watershed?

- Excellent example of a black water stream;
- Scenic value;
- It is a pristine, unpolluted stream located in an urban area;
- The quality of water and wildlife; and
- Opportunities for recreation: nature hikes, swimming, canoeing, camping, a cure for "Nature Deficit Disorder"

4.2 RESOURCE RANKINGS AND POTENTIAL ENVIRONMENTAL STRESSORS

The MDEQ recently developed the Mississippi Watershed Characterization and Ranking Tool (MWCRT) for use by planners, scientists, and other environmental professionals to determine the relative value of watersheds within the State based on the presence of important natural resource features. The MWCRT utilizes a combination of spatial attributes placed into categories to determine their resource value on the environment, their impacts on human welfare, and the presence of potential stressors within the watershed. The spatial attributes contained in these categories are used to generate values that are normalized and weighted to produce a final score and ranking for each watershed. The MWCRT was used in development of the Wolf River WIP as a comparison to resource values, issues, and concerns communicated through the survey.

Table 4.1 provides an overview of stakeholder's perceived problems and specific geographic locations of concern as communicated through the stakeholder survey. The MWCRT was used in this instance to compare stakeholder concerns with quantified resource values and concerns based on known attributes and spatial data. Generally, the MWCRT supports the perceptions communicated in the stakeholder survey and lends validity to the overall perceived value of the Wolf River Watershed and concerns that have potential to impact water quality in the watershed.

Table 4.1 Stakeholders' Perceived Stressors

Issue	Geography	Suspected Stressor or Cause
Siltation and Erosion	Pearl River County	Unauthorized ATV use
Siltation and Erosion	Pearl River County	Increases in development activity
Pathogens	Entire Watershed	Failing septic tanks
Nutrients	Mill Creek Area	Agricultural Activities
Siltation	Upper Watershed	Unregulated and unprotected activities
Invasive species	Entire Watershed	Removal of Native Species

The MWCRT evaluates basins based on sub-watershed categories indicated by 12-digit HUC codes. Data provided through the MWCRT for the Coastal Streams Basin covers

all fifty-six sub-watersheds within the basin including the eight sub-watersheds comprising the Wolf River Watershed. Each 12-digit HUC code sub-watershed was scored based on a number of factors as indicated below. The scoring for each category considered was then evaluated to provide a ranking for each 12-digit HUC. Each sub-watershed is ranked 1 through 56 based on their environmental resource values, human welfare resource values, and potential stressors. In general terms, the lower the numbered ranking, the higher the potential is for that particular 12-digit HUC to have either significant resources or potential stressors. The sub-categories of data contained within the three broad categories are listed in **Table 4.2** below:

Table 4.2 Mississippi Watershed Characterization and Ranking Criteria

Environmental Resource Values	
	Endangered Species
	Bottomland Hardwood Forests
	Estuarine Emergent Wetlands
	Estuarine Woody Wetlands
	Palusturine Emergent Wetlands
	Pine Savannahs
	Swamps
	Freshwater Shrub/Scrub Wetlands
	Palusturine Non-vegetated Wetlands
	Wildlife Management Areas
	National Wildlife Refuges
	National Forests
	Lakes
	Perennial Streams
Human Welfare Resource Values	
	Recreation Lakes
	Recreation Streams
	Public Waterways
	National Parks
	State Parks
	Recreation Locations
Potential Stressors	
	Non-Riparian
	Erosion Potential
	Impervious Surfaces
	Nutrient Potential
	Livestock Operations

An evaluation of the data specific to the Wolf River Watershed was conducted utilizing the MWCRT, which is provided in this document as **Appendix C.** The following sections provide a description of the values and stressors evaluated in the MWCRT.

4.2.1 ENVIRONMENTAL RESOURCE VALUES

The MWCRT uses measurable and quantifiable attributes to establish environmental resource values. These attributes include the presence of a variety of wetlands types, water features, and other resources such as established wildlife management areas, wildlife refuges, and national forests to determine overall environmental resource values.

4.2.2 HUMAN WELFARE RESOURCE VALUES

The Human Welfare Resource Value component of the MWCRT includes an assessment of attributes that have particular value to human activities in the watershed including the presence and value of recreational lakes and streams, public waterways, and public parks.

4.2.3 POTENTIAL STRESSORS

The Potential Stressors component of the MWCRT analyzes watersheds based on a series of attributes or conditions that have potential to negatively impact water quality. These attributes include erosion potential; the presence of impervious surfaces; the potential for imputation of nutrients from both agricultural and urban environments; and the existence of livestock operations within the watershed.

5.0 WATER RESOURCES

5.1 HISTORY OF ACTIVITY IN THE WATERSHED

Human activity in the watershed has historically consisted of sporadic residential development and the development of small family farm settlements. In more recent history, land in the watershed has been used for tree farming, small parcel grazing lands and other agricultural activities combined with recreational activities such as hunting, fishing, hiking, and camping. The watershed is devoid of significant urban development with a portion of the City of Poplarville being the only incorporated area of the watershed.

The Wolf River holds the distinction of being the first river in the State of Mississippi to be designated as a Scenic Stream through the State's Scenic Streams Stewardship Program. The Mississippi Scenic Streams Stewardship Program was established as a voluntary program designed to encourage conservation and stewardship by riparian (stream-side) landowners. Through this designation, property owners in the watershed are encouraged to voluntarily adopt practices designed to protect the river and to maintain the water quality of the river.

Because of this lack of urbanization and the sparsely populated nature of the watershed, human activities have not yet had considerable impacts on the river channel and the water quality of the river and its tributaries. Activities such as the acquisition of conservation lands and the designation of the lower portion of the river near its mouth as a coastal preserve further serve to enhance and protect water quality in the Wolf River. However, there is a sense that the watershed and the river are becoming harder to protect due to increases in development activity and increases in population.

Evidence of the impacts of these human activities is demonstrated in a Total Maximum Daily Load (TMDL) Report published by MDEQ in 2000 for fecal coliform in a segment of the Wolf River. The Wolf River TMDL addresses a thirty-one mile segment of the river from near Lizana from Cable Bridge Road to the mouth of the river at the Bay of St. Louis. The TMDL report indicates the presence of pathogens exhibiting as fecal coliform in levels that exceed the maximum level allowed. The report also attributes the primary source of fecal coliform to septic tanks within the watershed with other contributing factors being wildlife, grazing animals, land application of poultry litter, urban development, and direct inputs. However, it is important to note that at a point

between 2000 and 2006, the Wolf River was de-listed from the State's 303(d) impaired waterbodies list.

5.2 INTEREST IN THE WATERSHED

The Wolf River Watershed and the Wolf River are unique treasures in south Mississippi and contribute to the region's heritage, culture, and way of life. The Wolf River also helps to solidify the coastal region's cultural connection to the water by providing a link from inland areas of the region to the Bay of St. Louis and the Gulf of Mexico. Interest in this watershed extends past the immediate region into neighboring regions and states through active participation in the WRCS. Originally organized in 1998 with a mission to conserve, protect, and manage the Wolf River and its resources, the WRCS continues today to be a leader in promoting the watershed and engaging in activities designed to provide further protection to the water quality and natural ecosystems that exists within the watershed. At the present time, the WRCS is over 150 members strong and continues to be an advocate and a voice for the Wolf River and surrounding lands.

In addition to activities undertaken by the WRCS, other groups have been active in the watershed including Mississippi Power Company. In 1993, Mississippi Power began efforts to collect monitoring data in the Wolf River Watershed. The group's report, finalized and published in April, 2009, concluded that good water quality conditions exist throughout the entire 66-mile length of the river. Through Mississippi Power's efforts and the combined efforts of other organizations such as the Soil Conservation Service (now the Natural Resources Conservation Service, NRCS), and the Wildlife Federation, a significant amount of data was collected at twelve monitoring stations established along the entire length of the river. Data collected includes stream bottom profiles, water temperature recordings, surface water chemistry, trace metals analysis of surface waters, organic analysis of surface waters, organic analysis of river bottom sediments, and water quality monitoring including monitoring for fecal coliform and macroscopic benthic invertebrates.

5.3 WATER QUANTITY

The watershed is currently experiencing no shortage of surface or groundwater quantity. Average monthly stream discharge rates read from the USGS Stream Gauging Station 02481510 near Landon, Mississippi and have remained relatively consistent throughout

the study period from 1993-2008 with expected variations during seasonal wet and dry months. Drinking water supply for the coastal region of Mississippi is sourced primarily from groundwater wells reaching into deep water aquifers. MDEQ has an established source water protection policy that applies to every public well in the State. An interactive map providing information on source water protection areas can be found on MDEQ's website at http://landandwater.deq.ms.gov/swap/onlinemaps/viewer.asp. Factors typically affecting water quantity are primarily associated with land use, which is largely rural in this watershed. The rural land in the Wolf River Watershed is dominated by forested land, farm land and timber production and is generally believed not to impact overall water quantity.

5.4 WATER CONSERVATION

Little effort has been expended towards water conservation in the watershed primarily due to the sparsely populated nature of the watershed and the resulting low demands in the watershed for potable water and irrigation. However, a statewide effort has been underway to promote water conservation in households, businesses, and industry.

5.5 WILDLIFE AND FISHERIES

The Wolf River Watershed is characterized by the diversity of aquatic and terrestrial species. The watershed provides habitat to a number of species including several listed as rare, endangered and/or threatened. Protected species in the watershed include: Dahoon Holly, Bog Spice Bush, Chapman's Butterwort, Southern Butterwort, coastal shiner, bluenose shiner, gopher tortoise, American alligator, rainbow snake, eastern coral snake, ribbon crayfish, and lavender burrowing crayfish. Terrestrial species found in the watershed include: whitetail deer, turkey, mink, nutria, otter, beaver, coyote, red wolf, raccoon, and bobcat. The Wolf River and associated streams and tributaries are rich with a diversity of aquatic life that includes approximately ninety documented species of fish ranging from small shiners, minnows and chubs to larger game fish such as shadow bass, largemouth bass, black crappie, and channel catfish. [3]

No specific fish consumption advisories have been established for streams in the watershed but there is a national advisory for mercury in effect. Due to the relatively unencumbered water quality found in the Watershed, the fishery appears to be in good health.

Recreational activities associated with identified fish and wildlife species is primarily related to hunting and fishing. Since the majority of land is currently under protected or private ownership, the probability of issues associated with over-hunting or over-fishing are minimal.

[3] Mississippi Power Company, "Wolf River Preservation Project Environmental Monitoring Program: 1993-2008, 2009

Threatened and Endangered Species By County[4]			
Hancock	**Threatened**	**Endangered**	**Candidate**
	Louisiana Black Bear (*Ursus a. luteolus)*	Louisiana quillwort (*Isoetes louisianesnsis)*	Pearl darter (*Percina aurora)* [Pearl River System]
	Gopher Tortoise (*Gopherus ployphemus*)	Leatherback turtle (*Dermochelys comacea*)	
	Green turtle (*Chelonia mydas)*	Kemp's ridley turtle (*Lepidochelys kempii)*	
	Loggerhead turtle (*Caretta caretta)*	West Indian manatee (*Trichechus manatus)*	
	Inflated heelsplitter (*Potamilus inflatus)*	Brown pelican (*Pelecanus occidentalis)*	
	Piping Plover (*Charadrius polyphemus)* [Critical habitat]		
	Gulf sturgeon (*Acipenser oxyrhynchus desotoi)* [Critical habitat]		
Harrison	**Threatened**	**Endangered**	**Candidate**
	Louisiana Black Bear *(Ursus a. luteolus)*	Kemp's ridley turtle (*Lepidochelys kempii)*	Black pine snake (*Pituophis melanoleucus ssp. lodingi)*
	Gopher Tortoise (*Gopherus ployphemus)*	Mississippi gopher frog (*Rana capito sevosa) [Distinct vertebrate population]*	
	Green turtle (*Chelonia mydas)*	Louisiana quillwort (*Isoetes louisianesnsis)*	
	Loggerhead turtle (*Caretta caretta)*	Alabama red-bellied turtle (*Pseuodomys alabamensis)*	
	Gulf sturgeon (*Acipenser oxyrhynchus desotoi)* [Critical habitat]	Leatherback turtle (*Dermochelys comacea)*	
	Piping Plover (*Charadrius polyphemus)* [Critical habitat]	West Indian manatee (*Trichechus manatus)*	
		Brown pelican (*Pelecanus occidentalis)*	
		Red-cockaded	

[4] http://www.fws.gov/southeast/jackson/

		woodpecker (*Picoides borealis)*	
Lamar	**Threatened**	**Endangered**	**Candidate**
	Louisiana black bear *(Ursus a. luteolus)*	Red-cockaded woodpecker (*Picoides borealis)*	Black pine snake – (*Pituophis melanoleucus ssp. lodingi)*
	Gopher Tortoise (*Gopherus ployphemus)*		
Pearl River	**Threatened**	**Endangered**	**Candidate**
	Louisiana black bear *(Ursus a. luteolus)*	Louisiana quillwort (*Isoetes louisianensis)*	Black pine snake (*Pituophis melanoleucus ssp. Lodingi)*
	Gopher Tortoise (*Gopherus ployphemus)*	Red-cockaded woodpecker (*Picoides borealis)*	
	Gulf sturgeon (*Acipenser oxyrhynchus desotoi)* [Critical habitat]		
	Inflated heelsplitter (*Potamilus inflatus)*		
Stone	**Threatened**	**Endangered**	**Candidate**
	Louisiana Black Bear (*Ursus a. luteolus)*	Louisiana quillwort (*Isoetes louisianensis)*	Black pine snake (P*ituophis melanoleucus ssp. Lodingi)*
	Gopher Tortoise (*Gopherus ployphemus)*	Red-cockaded woodpecker (*Picoides borealis)*	
	Yellow-blotched map turtle (*Graptemys flavimaculata)*		

5.6 WATER QUALITY

5.6.1 Narrative of Water Quality Issues

According to the MDEQ, designated uses for the majority of the 270 miles of streams and rivers in the watershed are classified as fish and wildlife streams intended for fishing and propagation of fish and aquatic life and wildlife. Based on the 2008 Mississippi 305(b) Water Quality Assessment Report, the Wolf River and associated streams are currently classified as attaining their designated uses. This data reveals that water quality in the watershed is generally good. However, there are potential threats to the current status of water quality in the watershed that include future urbanization, agricultural and silvaculture activities, improper ATV use, and pathogens associated with failing septic systems.

5.6.2 Designated Use Classifications and Water Quality Standards

All water bodies within the Wolf River Watershed have a designated use classification as Aquatic Life Support and Recreation. Based on the 2008 State of Mississippi 305(b) Water Quality Assessment Report, all watershed streams identified in the report are currently meeting standards for use.

6.0 WATERSHED TECHNICAL MANAGEMENT ACTIVITIES

6.1 OBJECTIVES

The primary objectives of the technical management activities as outlined in this section are to increase the level of data and technical knowledge of human activities within the watershed; to provide a basis for monitoring of environmental conditions within the watershed; and to establish technical strategies specifically designed to prevent future water quality impairments in the watershed. It should be understood and clearly stated that current funding through the EPA Section 319 Water Quality Grant does not provide for implementation of technical management activities outlined in this section. The Conservation Society and the WIT will need to identify and pursue alternative means of funding implementation of these activities.

Table 6.1 Technical Strategies

Technical Strategies	Where	When	Budget
Water Quality Sampling and Monitoring	Entire Watershed	On-going	TBD
Conservation Easement and Buffer Zone Establishment	Entire Watershed	On-going	TBD

Specific objectives of the technical committee include:

6.2 WATER QUALITY SAMPLING AND MONITORING

6.2.1 Desired Benefits

Water quality sampling and monitoring will continue as appropriate to fill gaps in existing data or to better identify areas of concern. The information gathered by sampling and monitoring will allow environmental concerns to be identified in a timely fashion. Addressing these concerns early and pin-pointing the cause can prevent wide-spread contamination of the river. Water quality monitoring will also provide information regarding the effectiveness of recently implemented BMPs.

6.2.2 Activities

Sampling and monitoring of water quality will be conducted as appropriate at selected sites throughout the watershed. These activities may include physical assessment such as inspection and ground surveys, surface water sampling for biological and chemical analysis, and biological monitoring for macroinvertebrates and/or fish and may involve contract staff, agency staff, and WIT participation.

6.2.3 Participants

MDEQ — Provide assistance with sampling and monitoring as appropriate. MDEQ will also provide assistance by offsetting some of the lab costs associated with the analysis of collected samples.

MDWFP — Provide assistance with sampling and monitoring if appropriate.

USGS — USGS has committed through an agreement with MDEQ to provide sampling and monitoring activities within the watershed.

USACE — Provide assistance with sampling and monitoring if appropriate.

USDA — Provide assistance with sampling and monitoring if appropriate.

6.2.4 Schedule

Sampling conducted in association with this plan will begin in the spring of 2010. Additional monitoring and/or sampling will be conducted as determined appropriate and specific schedules will be developed for the monitoring proposed.

6.2.5 Budget

An estimated budget for water quality monitoring would primarily be dependent on the frequency and extent of monitoring and sampling activities. However, in comparative terms, the WRCS has received in-kind services for sampling and monitoring to-date with an estimated value of approximately $15,000 per year.

6.3 CONSERVATION EASEMENT AND BUFFER ZONE ESTABLISHMENT

6.3.1 Desired Benefits

The WRCS has worked diligently to procure conservation easements along the Wolf River. These easements provide a protective buffer zone in which no development and only selective timber harvesting/maintenance is allowed.

6.3.2 Activities

The WRCS will continue to establish conservation easements. The WRCS will continue its analysis of the watershed to determine specific lands to target, prioritization of available lands, and negotiations with landowners and stakeholders.

6.3.3 Participants

WRCS — The WRCS will participate in all aspects of acquisition including but not limited to: identifying available properties, educating landowners on the tax breaks available and the environmental benefits of conservation easements, procuring funds for procurement of conservation easements, and legal establishment of the conservation easement.

MDEQ — Will participate in the process of easement acquisition by providing information on prioritized sites relative to the sites' environmental or recreation qualities.

MDWFP — Will provide information to the WRCS regarding locations of priority conservation sites. MDWFP will also provide assistance by providing information related to participation in the Mississippi Scenic Streams program.

6.3.4 Schedule

The WRCS will prioritize its acquisition goals based on the analysis of available lands.

6.3.5 Budget

The budget for this task is dependent in part on negotiations with landowners seeking to place conservation easements on targeted properties. In addition, the procurement of grant monies and other financial support for the establishment of conservation easements will affect the estimated cost of this goal.

7.0 EDUCATION OUTREACH ACTIVITIES

7.1 OBJECTIVES

The public education component of the WIP is designed to increase awareness of watershed issues such as the impacts of human activities on water quality impairment. Multiple stakeholders and demographic groups will be targeted by the WIT's Education Campaign.

Specific objectives of the education committee include:

- Increase public awareness of watershed systems and the cumulative effects of human activities within the watershed;
- Increase the awareness of culture, heritage, and how the watershed provides a sense of place to the region;
- Increase public awareness of the value of clean water;
- Increase awareness of the benefits of riparian zones and conservation easements;
- Increase public awareness of the hazards of ATV use within stream/river systems; and
- Target younger generations with a positive message relaying the importance of environmental stewardship.

Specific activities designed to implement the strategies listed include:

- Stakeholder Meetings and Presentations;
- Coordinated Media Campaign to include development of Public Service Announcements;
- Development of Educational Materials;
- Expedition Based Education;
- Placement of Watershed Signage; and
- West Harrison High School Partnership.

Table 7.1 Summary of Education Strategies

Education Outreach Activity	Where	When	Budget
Stakeholder Meetings and Presentations	Entire Watershed	2009 – 2010	$10,000
Watershed Maps & GIS Database	Entire Watershed	2009 – 2010	$10,000
Coordinated Media Campaign	Entire Watershed	2009 – 2010	$10,000
Development of Educational Materials	Entire Watershed	2009 – 2010	$30,000
Expedition Based Education	Entire Watershed	2009 – 2010	$20,000
Watershed Signage	Entire Watershed	2009 – 2010	$10,000
West Harrison High School Partnership	Entire Watershed	2009 – 2010	$10,000
		Total Cost – Education Strategies	$100,000

7.2 STAKEHOLDER MEETINGS AND PRESENTATIONS

7.2.1 Desired Benefits

An educational presentation will be developed to provide water quality information and education to a variety of stakeholder groups. This presentation will be created utilizing information from MDEQ, MDWFP, and the WRCS to highlight concepts of non-point source pollution, best management practices, the function of watersheds, conservation easement, buffer/riparian zones, and the impacts of human activities on water quality.

7.2.2 Activities

The WRCS and WIT will deliver the presentation to stakeholder groups such as civic clubs, professional associations, organized meetings and other venues as those opportunities present themselves. The specific groups targeted will include property owners within the watershed, local elected officials, builders and developers, and specific industries such as the timber industry. Regular meetings of the WIT will be included as a reported item for this strategy. It is anticipated that once the WIP is approved by MDEQ, the WIT will meet on a quarterly basis. Additional stakeholder presentations will be conducted in 2010.

7.2.3 Participants

WRCS	Deliver presentations to specific stakeholder groups with presentation materials assembled by the consultant and the WIT.
MDEQ	Provide data, research, images and other components to be included in the presentations.
MDWFP	Provide data, research, images and other components to be included in the presentations.
WIT	The WIT will assist with coordination of meetings and will participate in development of presentation materials.

7.2.4 Schedule

The WIT began meeting on April 16, 2009 to begin the process of developing the WIP. During the plan development process, the WIT met four times from April 16, 2009 – January 2010. The process of conducting other stakeholder meetings will begin in early 2010 and will be held at various times throughout the year. It is anticipated that in addition to WIT meetings, the WRCS will conduct four stakeholder meetings in 2010.

7.2.5 Budget

Costs associated with conducting stakeholder meetings will be primarily associated with preparation of presentation materials, travel to meeting locations, and consultant personnel time, if necessary. It is anticipated that the overall cost of conducting stakeholder meetings will be approximately $10,000.00.

7.3 WATERSHED MAPS

7.3.1 Desired Benefits

A comprehensive database of mapping data will be developed for the targeted watershed. All data will be compiled in GIS shapefile format and will include the consolidation of existing data as well as development of additional data as opportunities present themselves and as appropriate. The purpose of the mapping efforts will be to provide a thorough documentation of existing conditions in the watershed, to provide effective illustrations of watershed features, and to provide a spatial context for the watershed. Collection of map data and creation of watershed maps will begin immediately and will be on-going as additional mapping data is obtained or generated. The effectiveness of this measure will be determined primarily by the direct usefulness for development and implementation of related actions of the WIP.

7.3.2 Activities

The WRCS and the WIT have initiated preparation of maps of the watershed based on currently available sources of geospatial data. Map development at this stage of planning is primarily developed in support of the WIP and to provide a spatial context for planning efforts. Several thematic maps have been developed as exhibits to this plan. Data currently being used have been derived from a variety of sources including the U.S. Geological Survey (USGS), the Federal Emergency Management Agency (FEMA), the Mississippi Automated Resource Information Service (MARIS), and the Mississippi Geospatial Clearinghouse.

Development of the GIS database for the watershed is planned to assist in the planning process. Existing data regarding water quality, conservation areas, wildlife and fishery resources, land use, and environmental resource rankings will be compiled and used to help establish historic and baseline conditions, identify existing issues and concerns, develop educational materials, and to plan for the implementation of educational strategies as communicated.

7.3.3 Participants

The following activities are proposed according to the listed participants:

WRCS — WRCS will compile mapping data and will assist in the creation of a GIS database specifically for planning purposes and to support concepts illustrated through the WIP. The database will be updated periodically as new information is collected.

MDEQ — Will provide monitoring information for the watershed regarding locations and parameters monitored. MDEQ has also provided location information with respect to impaired water bodies and approved TMDLs. MDEQ also provided data used in the environmental resource and stressor ranking as discussed in previous sections of the plan.

USGS — Will provide monitoring information for the watershed regarding locations and parameters monitored based on historic activities. USGS may provide additional mapping resources as deemed appropriate.

MDWFP — May provide information regarding locations of priority conservation sites and records of occurrence of protected species. MDWFP may also provide specific information relative to participation in the Scenic Streams Stewardship Program for the Wolf River.

MARIS — A significant amount of data currently being used to map and analyze the watershed has been provided by MARIS.

USFS — May provide information for the watershed regarding locations and nature of forest resources such as management areas, inventories, agency sponsored program areas, and locations of existing forestry BMPs.

FEMA — Will provide information regarding Flood Insurance Rate Maps (FIRM) and floodplain/floodway modeling and locations.

WIT — Will prepare maps for both presentations and inclusion in the WIP. WIT will also prepare and maintain a database of GIS data.

7.3.4 Schedule

Development of mapping information and published maps is on-going in support of the development of the WIP. Development of a GIS database has been initiated and base maps have been prepared. It is anticipated that aspects of data collection and map preparation will continue throughout the term of the project.

7.3.5 Budget

The budget for this item includes time for collection and compilation of existing GIS data as well as the incorporation of newly collected data into the GIS database. The budget

also includes map preparation, compilation, and integration into the WIP. The budget for watershed mapping is anticipated to be at $10,000.

7.4 COORDINATED MEDIA CAMPAIGN

7.4.1 Desired Benefits

Local media outlets will be encouraged to present information on watershed-related activities such as opportunities for public involvement and general news stories relating to conservation efforts taking place in the watershed. The media campaign will specifically target those media outlets with exposure in and around the watershed. The primary goal of the coordinated media campaign will be to increase the level of awareness of the watershed and water quality issues associated with the watershed.

Through the coordinated media campaign, the WRCS and the WIT will develop a series of public service announcements focusing on recreation opportunities in the watershed and general water quality issues in the watershed.

7.4.2 Activities

Through the coordinated media campaign, the WRCS and the WIT will develop a series of public service announcements focusing on recreation opportunities and general water quality issues in the watershed.

The media campaign will focus its efforts on providing information through fishing and hunting television programs, newspaper and magazine articles. In addition, a public service announcement will be prepared and provided to local radio and television stations.

7.4.3 Participants

WRCS — The Wolf River Conservation Society and the WIT will work together to establish priority messages for public service announcements and other information to be distributed to media outlets.

WIT — The WIT will assist the WRCS in identifying appropriate media outlets and opportunities for media coverage of implementation activities.

7.4.4 Schedule

The WRCS has previously coordinated educational opportunities via print media outlets and will continue to lead the media campaign with the assistance of other entities and

the WIT. The coordinated media campaign will begin in early 2010 and is expected to be completed by December 2010.

7.4.5 Budget

It is anticipated that the overall cost of conducting the coordinated media campaign will be approximately $10,000.00

7.5 DEVELOPMENT OF EDUCATIONAL MATERIALS

7.5.1 Desired Benefits

The WRCS and the WIT will utilize a variety of strategies to provide general educational information to stakeholders and other interested parties. Through this effort, the WRCS desires to reach a broad audience with a series of messages related to water quality, recreational opportunities, benefits of conservation easements, and other issues of concern related to the Wolf River Watershed.

7.5.2 Activities

Through the development of educational materials, the WRCS will employ four specific strategies to include:

- Development of factsheets and brochures specific to the Wolf River Watershed;
- Execution of a mass mail-out of brochures and other information. The mass mail-out will specifically target property owners within the watershed;
- The WRCS will develop a table-top display of materials to include educational information, pictures, and maps of the watershed. The table-top display will initially be set up at public venues within the watershed including schools and other public buildings. The table-top display will also be used by the WRCS at conferences and trade shows throughout the region; and
- The WRCS will also develop a website that will include information about the WRCS but will also include information pertinent to the WIP including the final plan document, images from the watershed, maps of the watershed, a schedule of events, links to agency and other supporting websites, and e-mail links to allow viewers to contact WRCS representatives. In addition, the WRCS will set up a page on a social networking website to facilitate broader coverage of the WRCS's mission and message.

7.5.3 Participants

WIT — Will discuss and provide input on specific information to be included in educational materials to be prepared.

WRCS — Will identify specific issues to be communicated in prepared educational materials and will work with the consultant and a website development company to develop a WRCS website.

7.5.4 Schedule

Brochures and the table-top display will be developed during the first quarter of 2010. It is anticipated that the mass mail-out will be conducted in the second quarter of 2010. Website development will begin in the first quarter of 2010 with the goal of having the website "live" by mid-year 2010.

7.5.5 Budget

Activities to be implemented through this strategy will require the largest component of the project budget and will include:

• Development of factsheets and brochures	$10,000.00
• Mass mail-out	$5,000.00
• Table-top display development	$5,000.00
• Website development	$10,000.00
Total Cost Estimate	**$30,000.00**

7.6 EXPEDITION BASED EDUCATION

7.6.1 Desired Benefits

The desired benefit of this strategy is to create a sense of ownership of the Wolf River in all stakeholders. The concept of "out of sight, out of mind" is often associated with environmental issues such as watershed heath. Once on the river, it is very difficult to deny its beauty, inherent worth and the necessity for conservation.

7.6.2 Activities

Two primary activities are proposed for this strategy and are primarily designed to increase awareness of the watershed and to provide opportunities for participants to gain "first-hand" experiences in the watershed. The proposed activities include:

- Participation in existing community events to include providing educational and promotional materials related to the Wolf River Watershed. The Conservation Society will work to participate in at least three events in 2010 with the intent of

participating in a variety of events to include all areas of the watershed. Examples of existing events the Conservation Society may participate in include:

- The Coastal Development Strategies Conference – May 12-13, 2010
- Blueberry Jubilee: Poplarville, MS – Dates to be announced
- Mississippi Coastal Cleanup 2010 – October 16, 2010
- Celebrate the Gulf 2010 – Environmental Education Festival – April 10, 2010
- Lumberfest: Lumberton, MS – Dates to be announced

- The WRCS will organize and execute a series of stream clean-up events through which local stakeholders may participate in cleaning up targeted stream segments along the Wolf River. It is anticipated that two events will be organized and executed in 2010.

7.6.3 Participants

WRCS	Will identify specific events and will coordinate and facilitate participation.
WIT	Organization and advertisement of expedition events.
MWFP	Will provide educational information and participation in both the watershed fair and clean-up events to include an Adopt-A-Stream workshop to be held in conjunction with the watershed fair.
MDEQ	Will provide logistical support for both proposed events.
Volunteers	Will participate in both events and will assist with logistical and planning support

7.6.4 Schedule

The WRCS will conduct two stream clean-up events during 2010 to include one in the spring and one in the fall. It is anticipated that participation in fairs and events throughout the watershed will be based on actual scheduling of events.

7.6.5 Budget

The budget for this strategy is approximately $20,000 and includes support for clean-up and watershed fair activities.

7.7 WATERSHED SIGNAGE

7.7.1 Desired Benefits

The placement of signage throughout the watershed will have the benefit of creating watershed awareness and will also serve to educate the motoring public on the various elements of the watershed including the location of specific streams and water bodies. The placement of signage will also be used to identify public access locations with the desired benefit of increasing the level of recreational activity within the watershed.

7.7.2 Activities

A variety of options exist for the content and placement of signs within the watershed. One option involves the placement of signs on major highways at the entrances to the watershed. Previous experience has indicated that MDOT will not allow watershed signs to be placed on State or Federal highways at watershed boundaries. As an alternative, the WRCS will evaluate county transportation routes that intersect the Wolf River and will work with county Boards of Supervisors to procure and install signs at these intersections.

Placement of signs at public access points will require identification of existing public access locations and development of appropriate signage at these identified locations.

7.7.3 Participants

WRCS	In cooperation with the counties within the watershed, the WRCS will determine strategic locations for placement of the signs.
Counties	Will provide guidance as to the placement of signs and will provide direct assistance in the assembly and installation of signs.
MDEQ	MDEQ will provide assistance by helping to identify optimum sign placement within the watershed and by coordinating installation activities with MDOT.
WIT	Will coordinate with watershed counties to identify sign locations and will coordinate design and acquisition of signs.

7.7.4 Schedule

Sign locations will be identified during the first quarter of 2010. Signs will be purchased and installed during the second and third quarters of 2010.

7.7.5 Budget

The budget for the watershed signage component will be $10,000.00.

7.8 WEST HARRISON HIGH SCHOOL PARTNERSHIP

7.8.1 Desired Benefits

The desired benefit to a partnership with the West Harrison High School (WHHS) is increased awareness of watershed concerns of students and faculty. This partnership is designed to provide supplemental curriculum focused on conservation, environmental concerns, heritage and cultural history related to the Wolf River watershed.

7.8.2 Activities

Volunteers from the Wolf River Conservation Society will facilitate establishment and sponsorship of a Key Club at West Harrison High School. The Key Club will engage in educational and service opportunities related to environmental management and stewardship of the Wolf River Watershed.

7.8.3 Participants

WHHS	Students will participate in Key Club meetings and associated educational and service activities.
WRCS	The Wolf River Conservation Society will facilitate organization and sponsorship of a Key Club at West Harrison High School including identification of teachers to serve as staff representatives for the club.
WIT	The WIT will coordinate with WHHS and the WRCS to facilitate implementation of activities.

7.8.4 Schedule

Organization of the Key Club will take place by the end of the 2009-2010 school year with planned activities in the spring and in the fall of the 2010-2011 school year.

7.8.5 Budget

Activities related to the Key Club will be volunteer based with the WRCS and the School providing support. It is anticipated that costs associated with this activity will be minimal.

8.0 PLAN EVALUATION

This watershed implementation plan will be evaluated and revised during the first quarter of 2011. The purpose of this evaluation is to ensure that the provisions of the plan are having the intended effect and to ensure that the goals and objectives of the plan are being met. In the event that the intended results are not being achieved, the plan will be revised as appropriate. In addition, the plan evaluation and revision process is designed to provide for a mechanism for the WRCS to continue to follow plan elements beyond the period of grant funding from MDEQ.

The review process will involve a meeting of the WIT to discuss and review progress made during the previous year as determined by on-going monitoring conducted throughout the year. During that meeting, the team will determine if recommendations need to be made concerning the revision of the plan. Once those determinations have been made, participating stakeholders will be notified of the intended revisions and will be given an opportunity to review and comment on the proposed revisions. The following schedule is representative of the review and revision schedule that will be followed by the WIT:

	January				February				March			
Review Activity	**Wk 1**	**Wk 2**	**Wk 3**	**Wk 4**	**Wk 1**	**Wk 2**	**Wk 3**	**Wk 4**	**Wk 1**	**Wk 2**	**Wk 3**	**Wk 4**
WIT Review Meeting												
Submission of Proposed Changes to Stakeholders												
Stakeholder Review and Comment Period												
Incorporation of Comments into Plan Revisions												
Finalize Revisions and Submit to DEQ for Review												

9.0 PLAN REVISION

After the plan has been appropriately evaluated, and if revisions have been deemed necessary, the WRCS, the WIT and MDEQ will prepare a revised watershed implementation plan that will include changes requested by the stakeholders. If necessary, a follow-up meeting may be called to reconcile conflicting comments or modification requests.

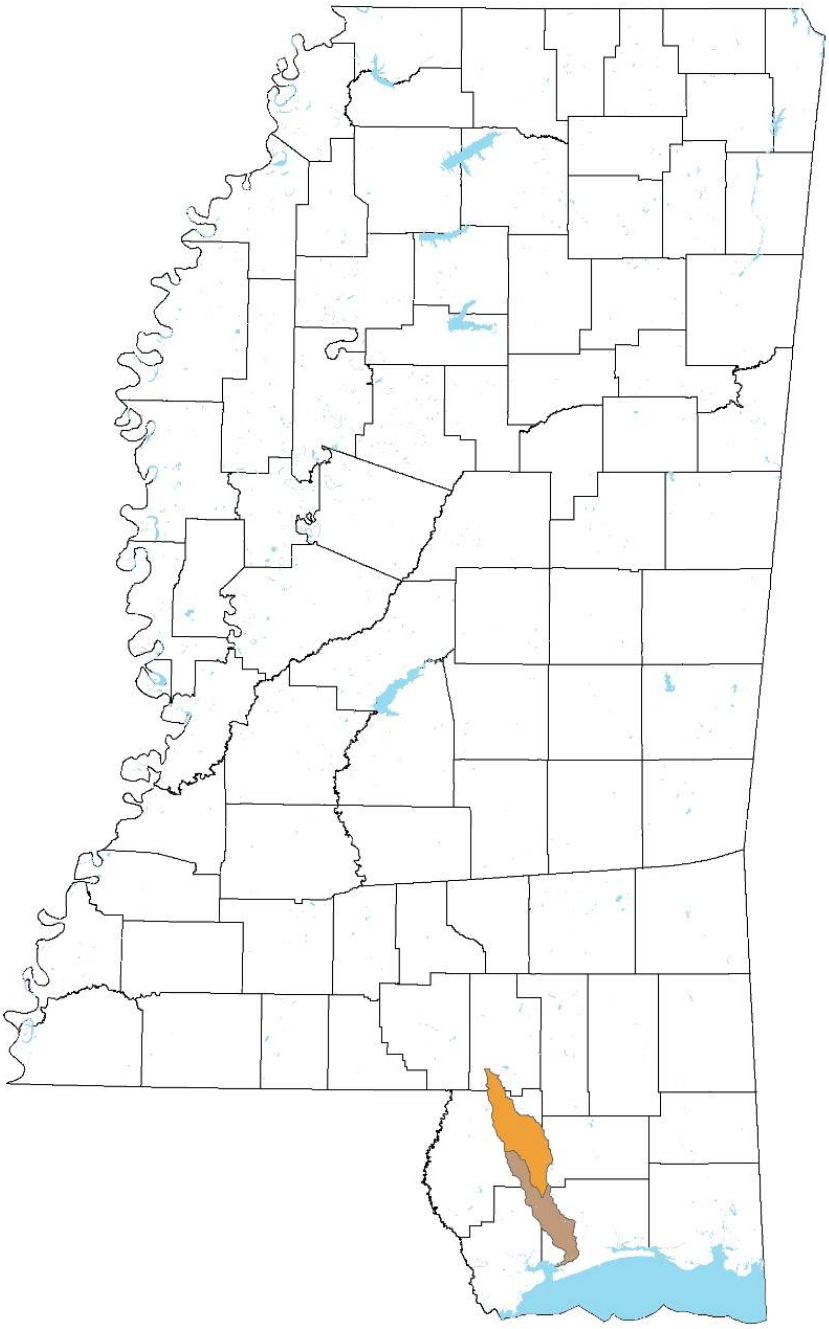
In the event that implementation of the plan is achieving the desired results, the plan may still be modified to address different, new or emerging issues that may have the potential to impact water quality and the objectives of the plan. If the evaluated results are satisfactory and changes specific to the scope of the plan are warranted, the same procedure for plan review and revision will be followed to ensure that all appropriate elements of the plan are addressing water quality issues affecting the watershed. In either case, the procedures to be followed for plan review and revision will include those elements listed in the above table.

10.0 APPENDICES

APPENDIX A: COMMONLY USED ACRONYMS

ATV	All Terrain Vehicle
BMPs	Best Management Practices
CFR	Code of Federal Regulations
FEMA	Federal Emergency Management Agency
GEMS	Gulf Ecological Management Site
GIS	Geographic Information Systems
HUC	Hydrological Unit Code
MARIS	Mississippi Automated Resource Information System
MDEQ	Mississippi Department of Environmental Quality
MDMR	Mississippi Department of Marine Resources
MDOT	Mississippi Department of Transportation
MWF	Mississippi Wildlife Federation
MWFP	Mississippi Department of Wildlife and Fisheries
NRCS	Natural Resources Conservation Service
SMZs	Streamside Management Zones
TMDL	Total Maximum Daily Load
USFS	United States Forest Service
USGS	United States Geological Survey
WHHS	West Harrison High School
WIP	Watershed Implementation Plan
WIT	Watershed Implementation Team
WRCS	Wolf River Conservation Society

APPENDIX B: MISCELLANEOUS WATERSHED MAPS



Wolf River Watershed
Location Map

Wolf River Watershed
Watershed Name
Lower Wolf River
Upper Wolf River
Water Bodies
State of Mississippi

0 20 40 80 120
Miles

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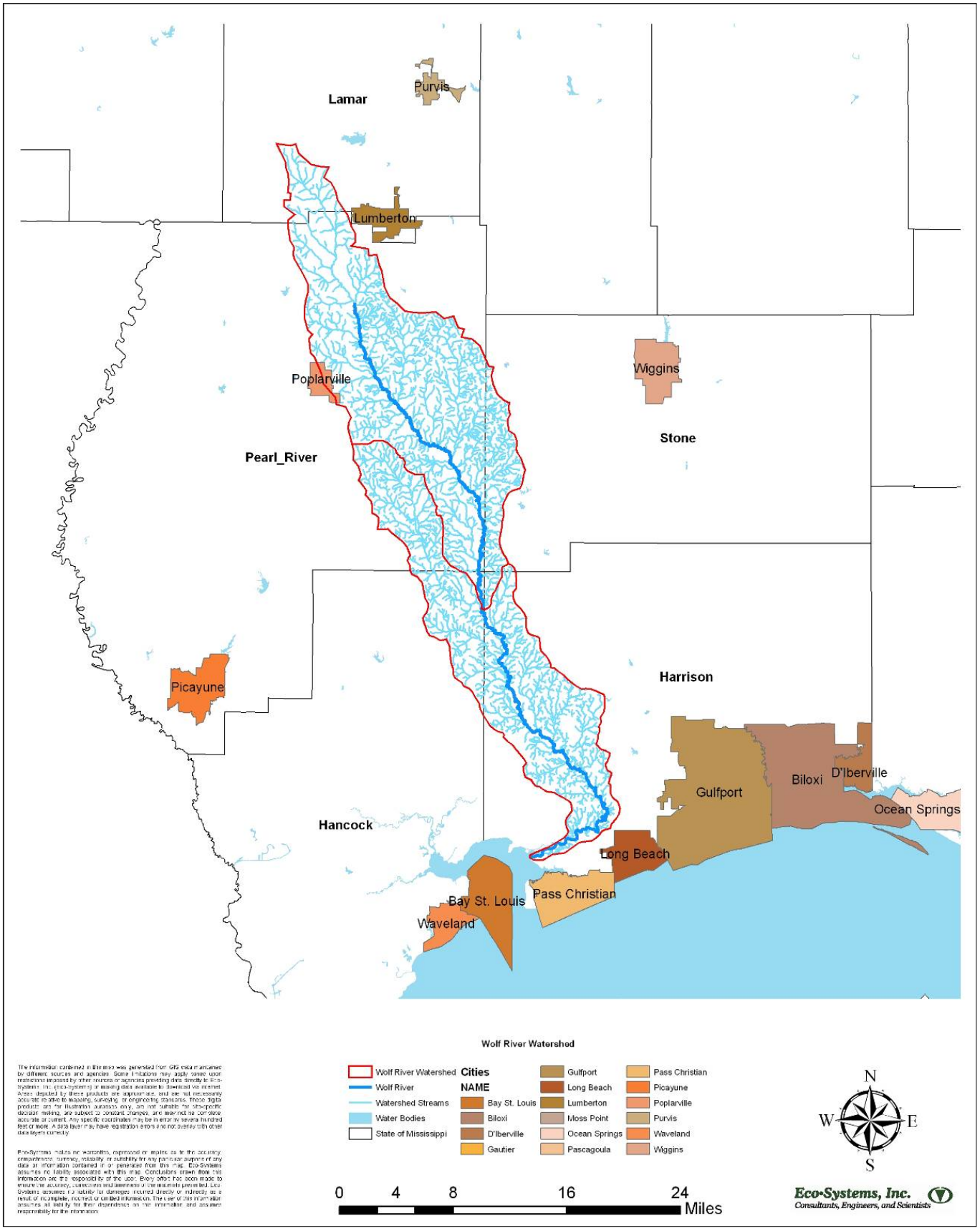
W E
S

Eco•Systems, Inc.
Consultants, Engineers, and Scientists


Lamar
Purvis
Lumberton
Poplarville
Pearl_River
Wiggins
Stone
Harrison
Picayune
Hancock
Gulfport
Biloxi
D'Iberville
Ocean Springs
Long Beach
Pass Christian
Bay St. Louis
Waveland
Wolf River Watershed
Wolf River
Watershed Streams
Water Bodies
State of Mississippi
Cities
NAME
Bay St. Louis
Biloxi
D'Iberville
Gautier
Gulfport
Long Beach
Lumberton
Moss Point
Ocean Springs
Pascagoula
Pass Christian
Picayune
Poplarville
Purvis
Waveland
Wiggins
0 4 8 16 24
Miles
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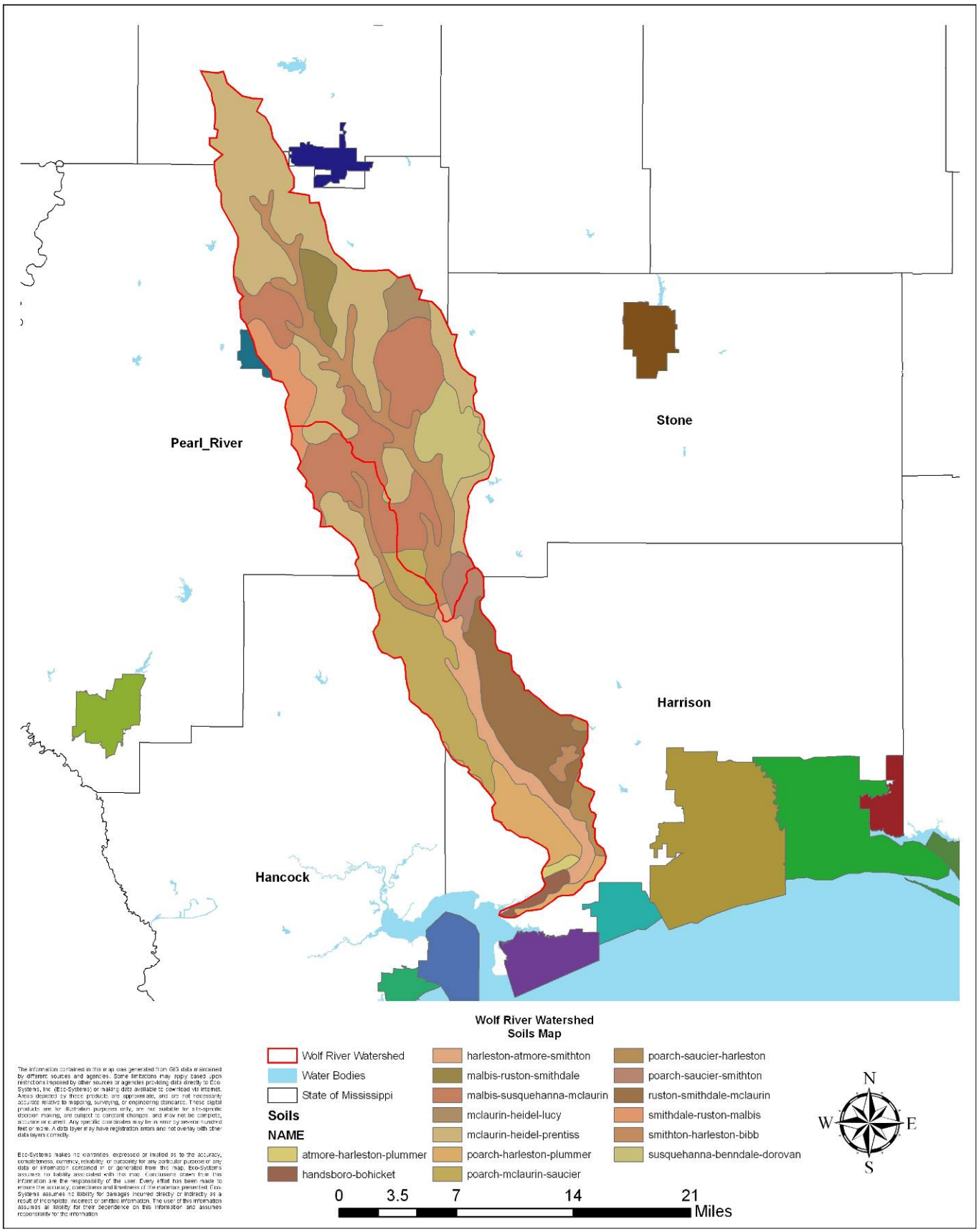
Eco-Systems, Inc.
Consultants, Engineers, and Scientists


Pearl_River
Stone
Harrison
Hancock
Wolf River Watershed
Soils Map
Wolf River Watershed
Water Bodies
State of Mississippi
Soils
NAME
atmore-harleston-plummer
handsboro-bohicket
harleston-atmore-smithton
malbis-ruston-smithdale
malbis-susquehanna-mclaurin
mclaurin-heidel-lucy
mclaurin-heidel-prentiss
poarch-harleston-plummer
poarch-mclaurin-saucier
poarch-saucier-harleston
poarch-saucier-smithton
ruston-smithdale-mclaurin
smithdale-ruston-malbis
smithton-harleston-bibb
susquehanna-benndale-dorovan
0 3.5 7 14 21
Miles
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Wolf River Watershed
Primary Geologic Formations

- Wolf River Watershed
- Water Bodies
- State of Mississippi

0 3.5 7 14 21 Miles

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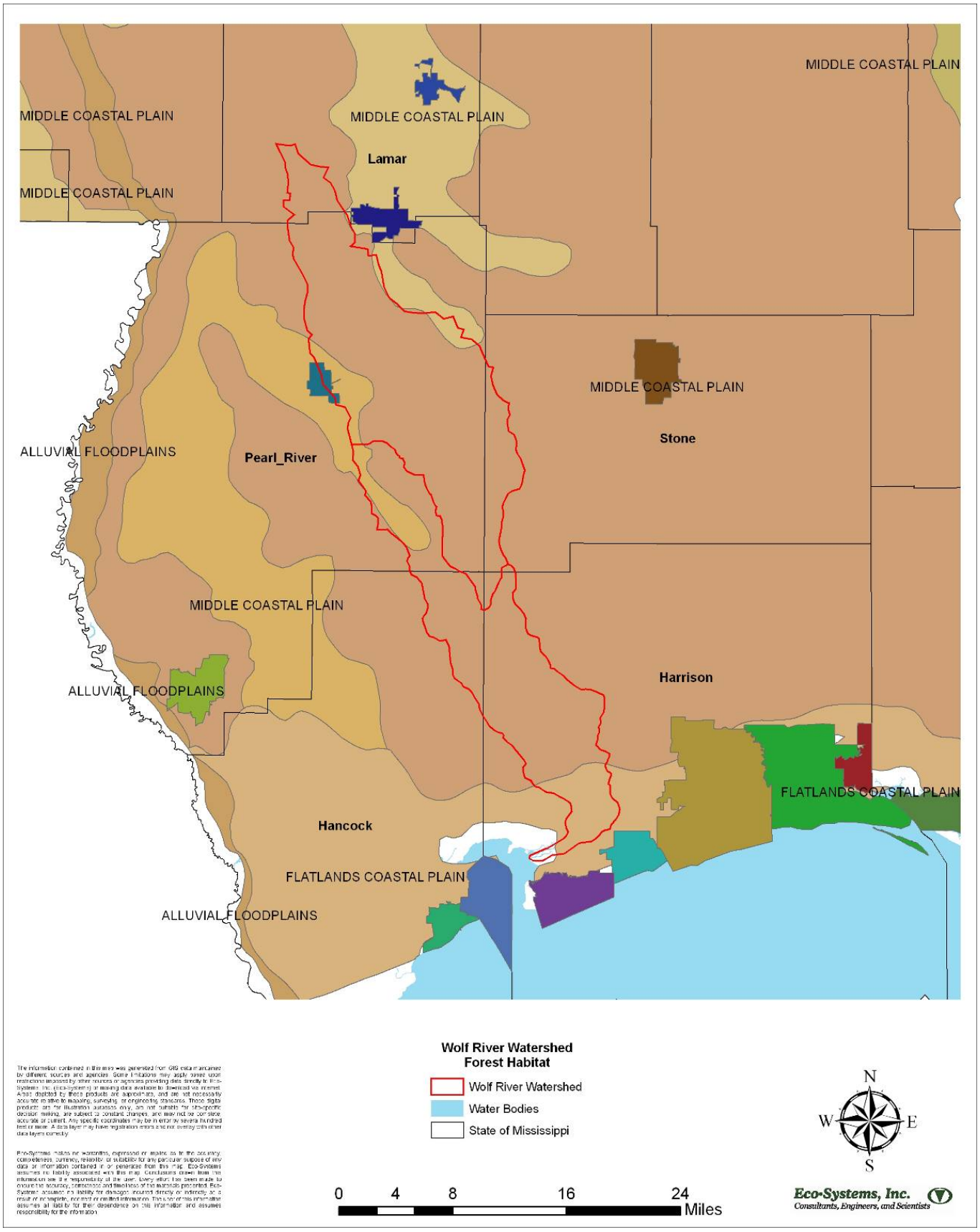
Eco-Systems, Inc.
Consultants, Engineers, and Scientists


MIDDLE COASTAL PLAIN
MIDDLE COASTAL PLAIN
MIDDLE COASTAL PLAIN
Lamar
MIDDLE COASTAL PLAIN
MIDDLE COASTAL PLAIN
Stone
ALLUVIAL FLOODPLAINS
Pearl_River
MIDDLE COASTAL PLAIN
Harrison
ALLUVIAL FLOODPLAINS
FLATLANDS COASTAL PLAIN
Hancock
FLATLANDS COASTAL PLAIN
ALLUVIAL FLOODPLAINS
Wolf River Watershed
Forest Habitat
Wolf River Watershed
Water Bodies
State of Mississippi
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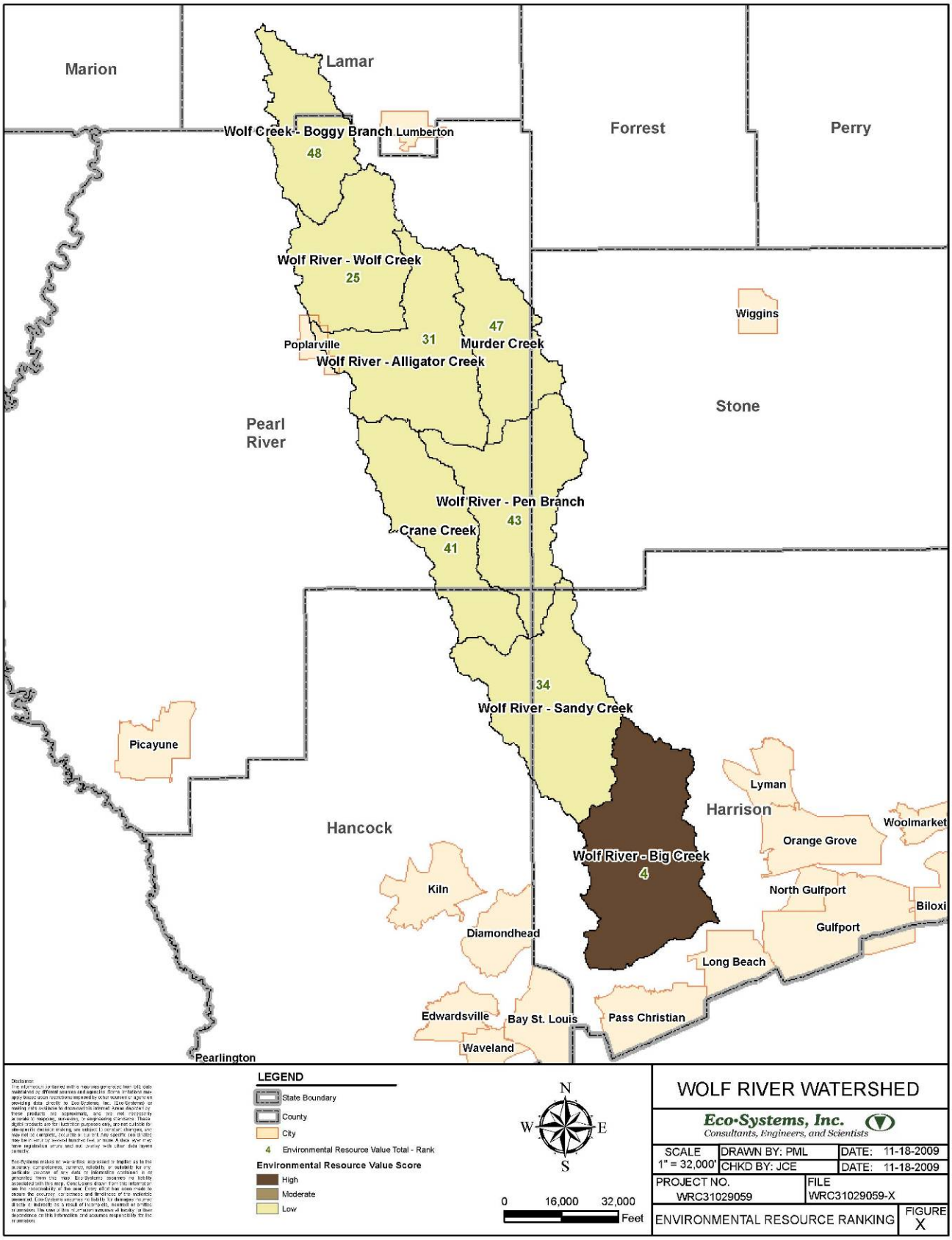
Miles
Eco-Systems, Inc.
Consultants, Engineers, and Scientists

APPENDIX C: MDEQ ENVIRONMENTAL RESOURCE RANKING MAPS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Lamar
Forrest
Perry
Wolf Creek - Boggy Branch
48
Lumberton
Wolf River - Wolf Creek
25
Wiggins
47
Poplarville
31
Murder Creek
Wolf River - Alligator Creek
Pearl River
Stone
Wolf River - Pen Branch
43
Crane Creek
41
34
Wolf River - Sandy Creek
Picayune
Lyman
Harrison
Woolmarket
Orange Grove
Hancock
Wolf River - Big Creek
4
Kiln
North Gulfport
Biloxi
Gulfport
Diamondhead
Long Beach
Edwardsville
Bay St. Louis
Pass Christian
Waveland
Pearlington
LEGEND
State Boundary
County
City
4 Environmental Resource Value Total - Rank
Environmental Resource Value Score
High
Moderate
Low
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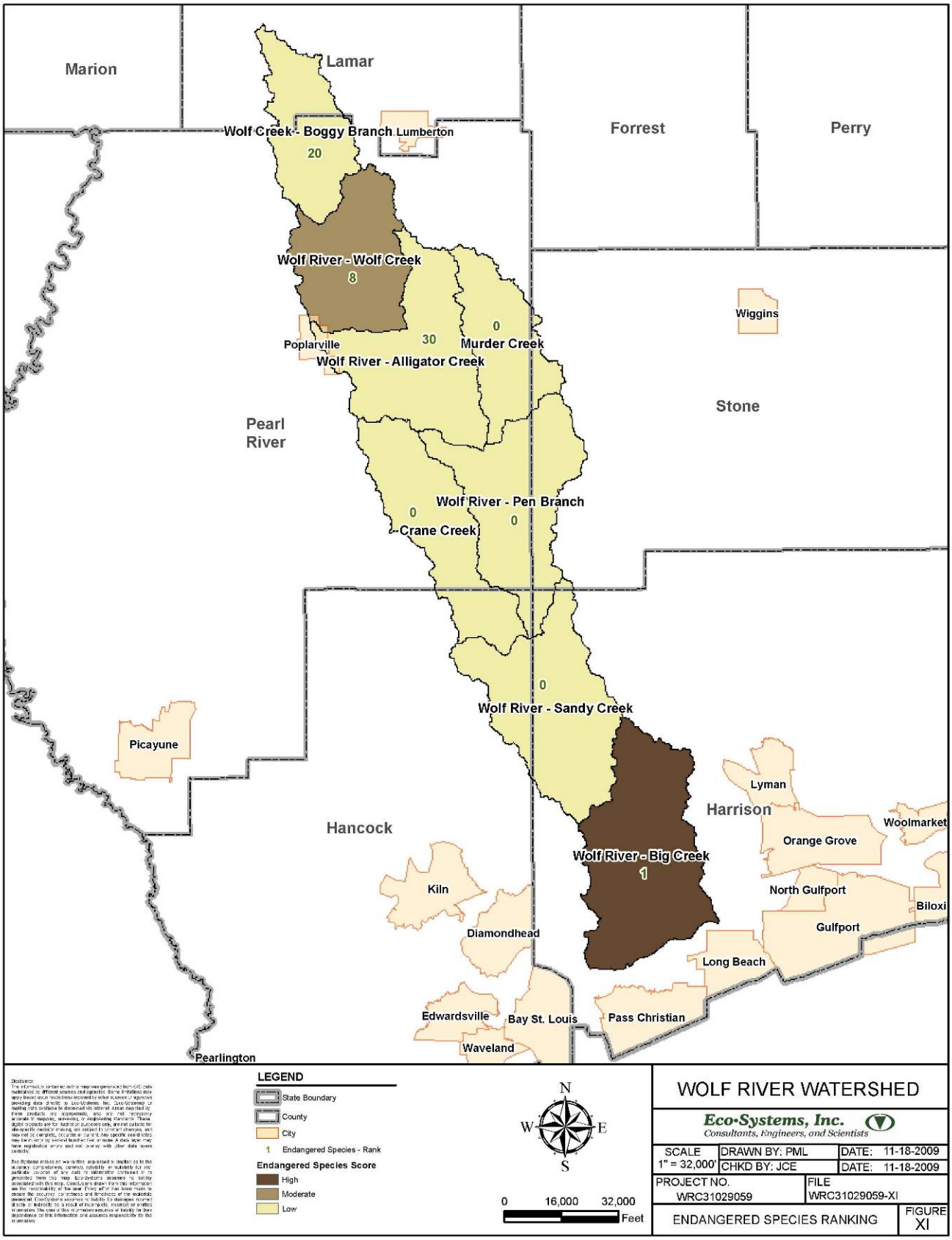
16,000
32,000
Feet
WOLF RIVER WATERSHED
Eco•Systems, Inc.
Consultants, Engineers, and Scientists
SCALE 1" = 32,000'
DRAWN BY: PML
DATE: 11-18-2009
CHKD BY: JCE
DATE: 11-18-2009
PROJECT NO. WRC31029059
FILE WRC31029059-X
ENVIRONMENTAL RESOURCE RANKING
FIGURE X


Marion
Lamar
Forrest
Perry
Wolf Creek - Boggy Branch
20
Lumberton
Wolf River - Wolf Creek
8
Wiggins
Poplarville
30
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Murder Creek
Wolf River - Alligator Creek
Pearl River
Stone
Wolf River - Pen Branch
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0
Crane Creek
0
Wolf River - Sandy Creek
Picayune
Lyman
Harrison
Woolmarket
Orange Grove
Hancock
Wolf River - Big Creek
1
Kiln
North Gulfport
Biloxi
Gulfport
Diamondhead
Long Beach
Edwardsville
Bay St. Louis
Pass Christian
Waveland
Pearlington
LEGEND
State Boundary
County
City
1 Endangered Species - Rank
Endangered Species Score
High
Moderate
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WOLF RIVER WATERSHED
Eco•Systems, Inc.
Consultants, Engineers, and Scientists
SCALE 1" = 32,000'
DRAWN BY: PML
DATE: 11-18-2009
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DATE: 11-18-2009
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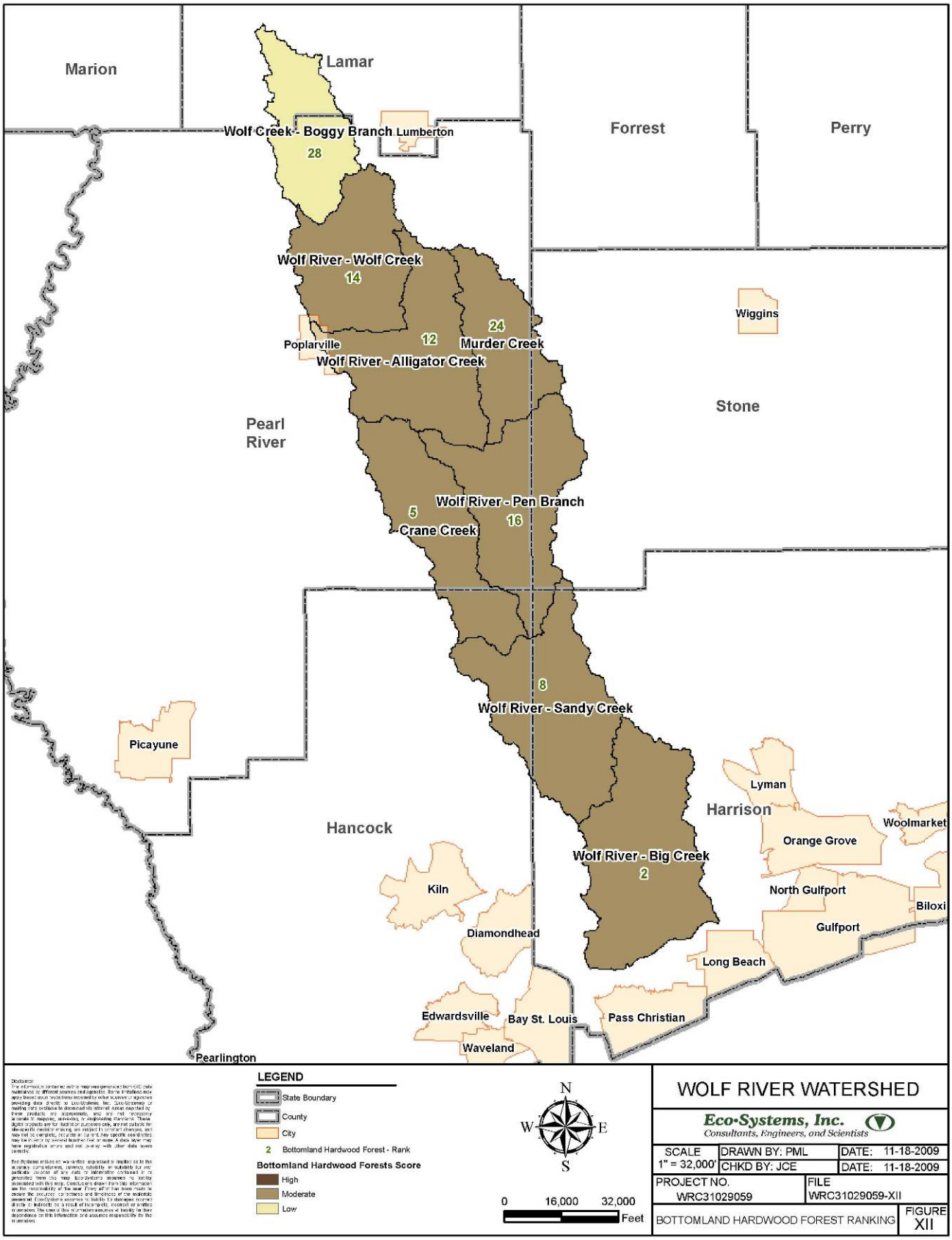
ENDANGERED SPECIES RANKING
FIGURE XI


Marion
Lamar
Forrest
Perry
Wolf Creek - Boggy Branch
28
Lumberton
Wolf River - Wolf Creek
14
Wiggins
Poplarville
12
24
Murder Creek
Wolf River - Alligator Creek
Pearl River
Stone
Wolf River - Pen Branch
5
16
Crane Creek
8
Wolf River - Sandy Creek
Picayune
Lyman
Harrison
Woolmarket
Orange Grove
Hancock
Wolf River - Big Creek
2
Kiln
North Gulfport
Biloxi
Gulfport
Diamondhead
Long Beach
Edwardsville
Bay St. Louis
Pass Christian
Waveland
Pearlington
LEGEND
State Boundary
County
City
2 Bottomland Hardwood Forest - Rank
Bottomland Hardwood Forests Score
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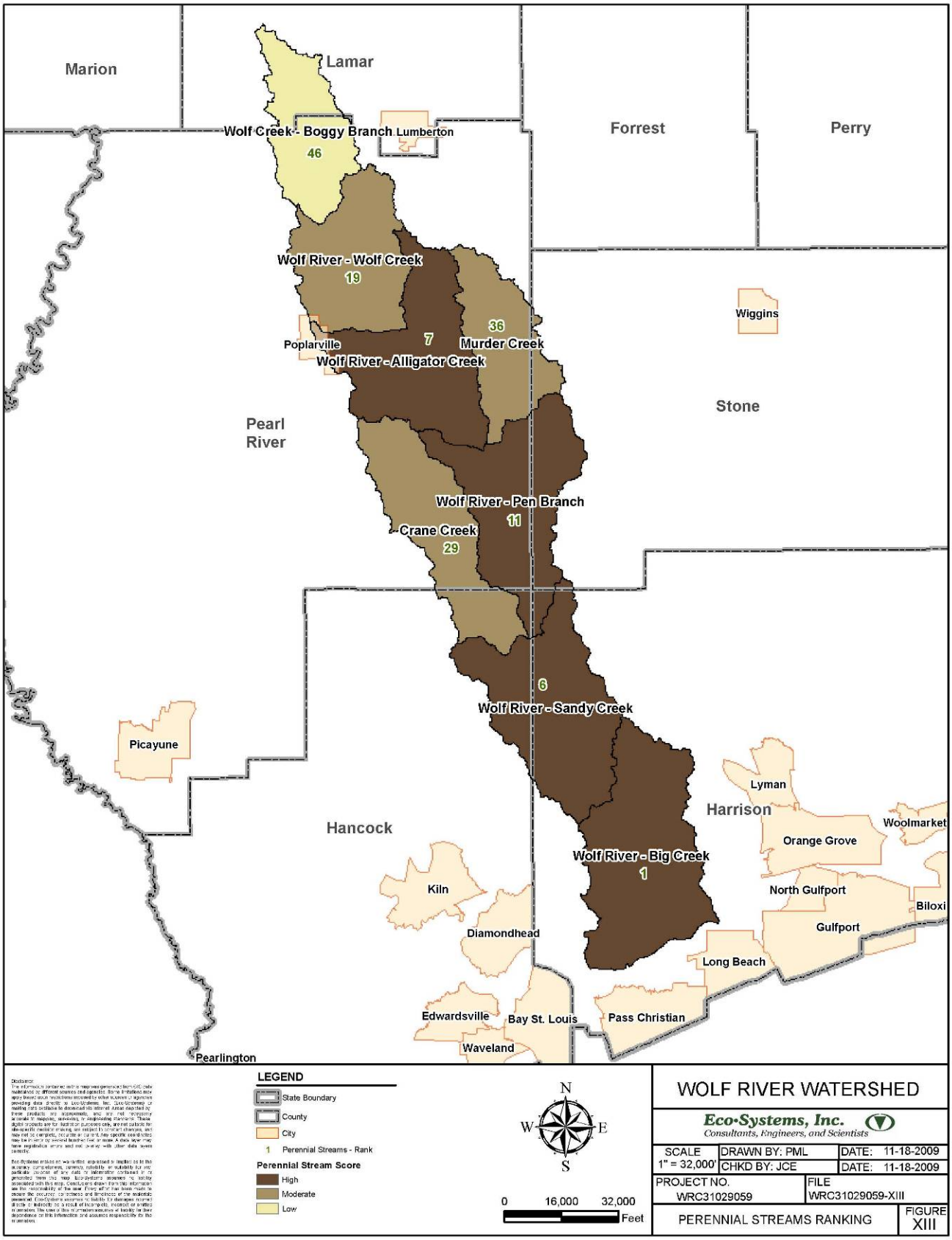
WOLF RIVER WATERSHED
Eco•Systems, Inc.
Consultants, Engineers, and Scientists
SCALE 1" = 32,000'
DRAWN BY: PML
DATE: 11-18-2009
CHKD BY: JCE
DATE: 11-18-2009
PROJECT NO. WRC31029059
FILE WRC31029059-XII
BOTTOMLAND HARDWOOD FOREST RANKING
FIGURE XII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Wolf Creek - Boggy Branch
46
Lumberton
Wolf River - Wolf Creek
19
Wiggins
36
Murder Creek
7
Poplarville
Wolf River - Alligator Creek
Stone
Pearl River
Wolf River - Pen Branch
11
Crane Creek
29
6
Wolf River - Sandy Creek
Picayune
Lyman
Harrison
Woolmarket
Orange Grove
Hancock
Wolf River - Big Creek
1
Kiln
North Gulfport
Biloxi
Gulfport
Diamondhead
Long Beach
Edwardsville
Bay St. Louis
Pass Christian
Waveland
Pearlington
LEGEND
State Boundary
County
City
1 Perennial Streams - Rank
Perennial Stream Score
High
Moderate
Low
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WOLF RIVER WATERSHED
Eco•Systems, Inc.
Consultants, Engineers, and Scientists
SCALE 1" = 32,000'
DRAWN BY: PML
DATE: 11-18-2009
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DATE: 11-18-2009
PROJECT NO. WRC31029059
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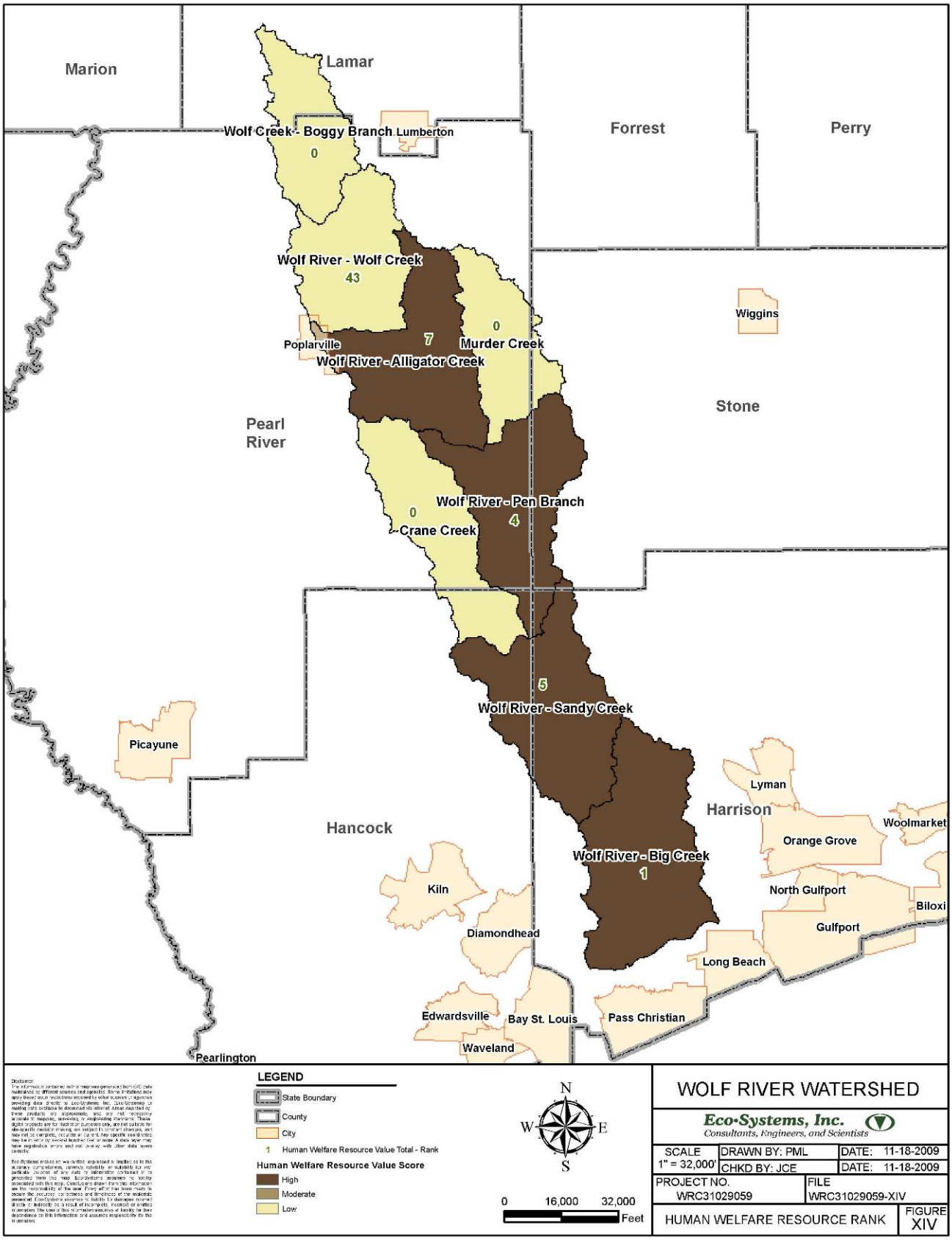
PERENNIAL STREAMS RANKING
FIGURE XIII


Marion
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Wolf Creek - Boggy Branch
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Lumberton
Wolf River - Wolf Creek
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Wiggins
Poplarville
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Murder Creek
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Wolf River - Alligator Creek
Pearl River
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Wolf River - Pen Branch
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Crane Creek
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Wolf River - Sandy Creek
Picayune
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Woolmarket
Orange Grove
Hancock
Wolf River - Big Creek
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North Gulfport
Biloxi
Gulfport
Diamondhead
Long Beach
Edwardsville
Bay St. Louis
Pass Christian
Waveland
Pearlington
LEGEND
State Boundary
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City
1 Human Welfare Resource Value Total - Rank
Human Welfare Resource Value Score
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Moderate
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WOLF RIVER WATERSHED
Eco•Systems, Inc.
Consultants, Engineers, and Scientists
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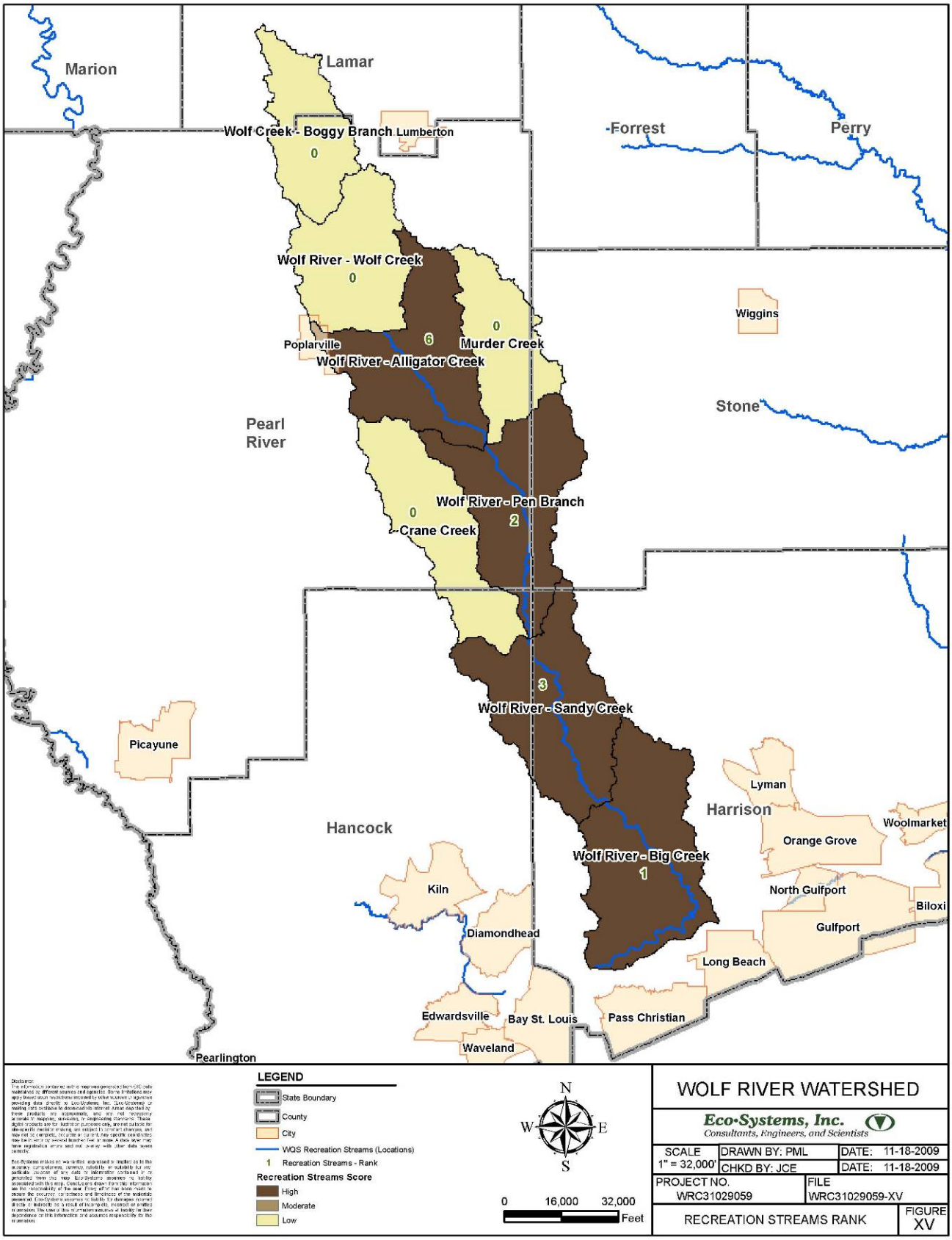
HUMAN WELFARE RESOURCE RANK
FIGURE XIV


Marion
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Wolf River - Wolf Creek
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Murder Creek
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Wolf River - Alligator Creek
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Pearl River
Wolf River - Pen Branch
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Crane Creek
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Wolf River - Sandy Creek
Picayune
Lyman
Harrison
Woolmarket
Orange Grove
Hancock
Wolf River - Big Creek
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North Gulfport
Biloxi
Gulfport
Diamondhead
Long Beach
Edwardsville
Bay St. Louis
Pass Christian
Waveland
Pearlington
LEGEND
State Boundary
County
City
WQS Recreation Streams (Locations)
1 Recreation Streams - Rank
Recreation Streams Score
High
Moderate
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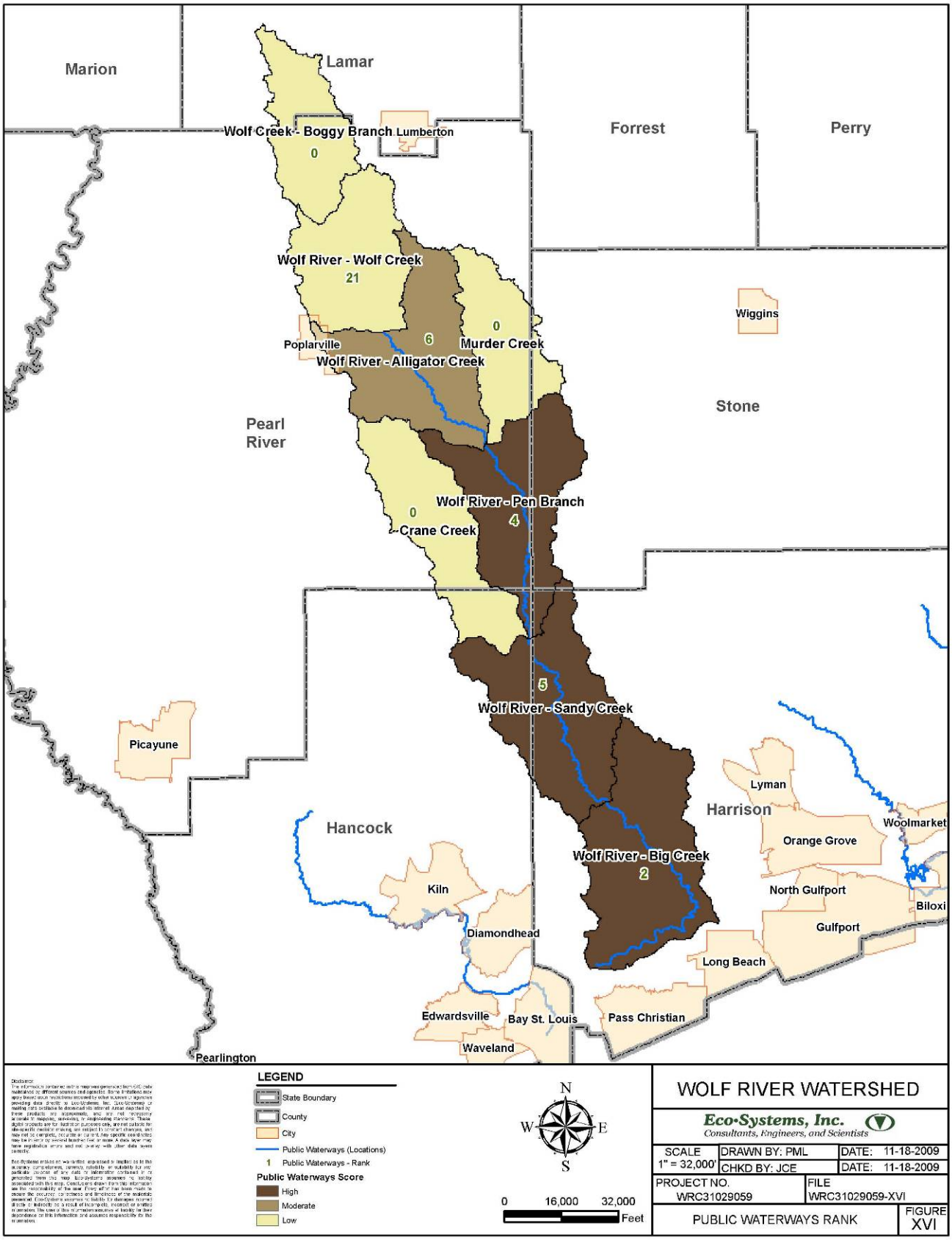
WOLF RIVER WATERSHED
Eco•Systems, Inc.
Consultants, Engineers, and Scientists
SCALE 1" = 32,000'
DRAWN BY: PML
DATE: 11-18-2009
CHKD BY: JCE
DATE: 11-18-2009
PROJECT NO. WRC31029059
FILE WRC31029059-XV
RECREATION STREAMS RANK
FIGURE XV


Marion
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Wolf Creek - Boggy Branch
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Lumberton
Wolf River - Wolf Creek
21
Wiggins
Poplarville
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Murder Creek
0
Wolf River - Alligator Creek
Pearl River
Stone
Wolf River - Pen Branch
4
Crane Creek
0
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Wolf River - Sandy Creek
Picayune
Lyman
Harrison
Woolmarket
Orange Grove
Hancock
Wolf River - Big Creek
2
Kiln
North Gulfport
Biloxi
Gulfport
Diamondhead
Long Beach
Edwardsville
Bay St. Louis
Pass Christian
Waveland
Pearlington
LEGEND
State Boundary
County
City
Public Waterways (Locations)
1 Public Waterways - Rank
Public Waterways Score
High
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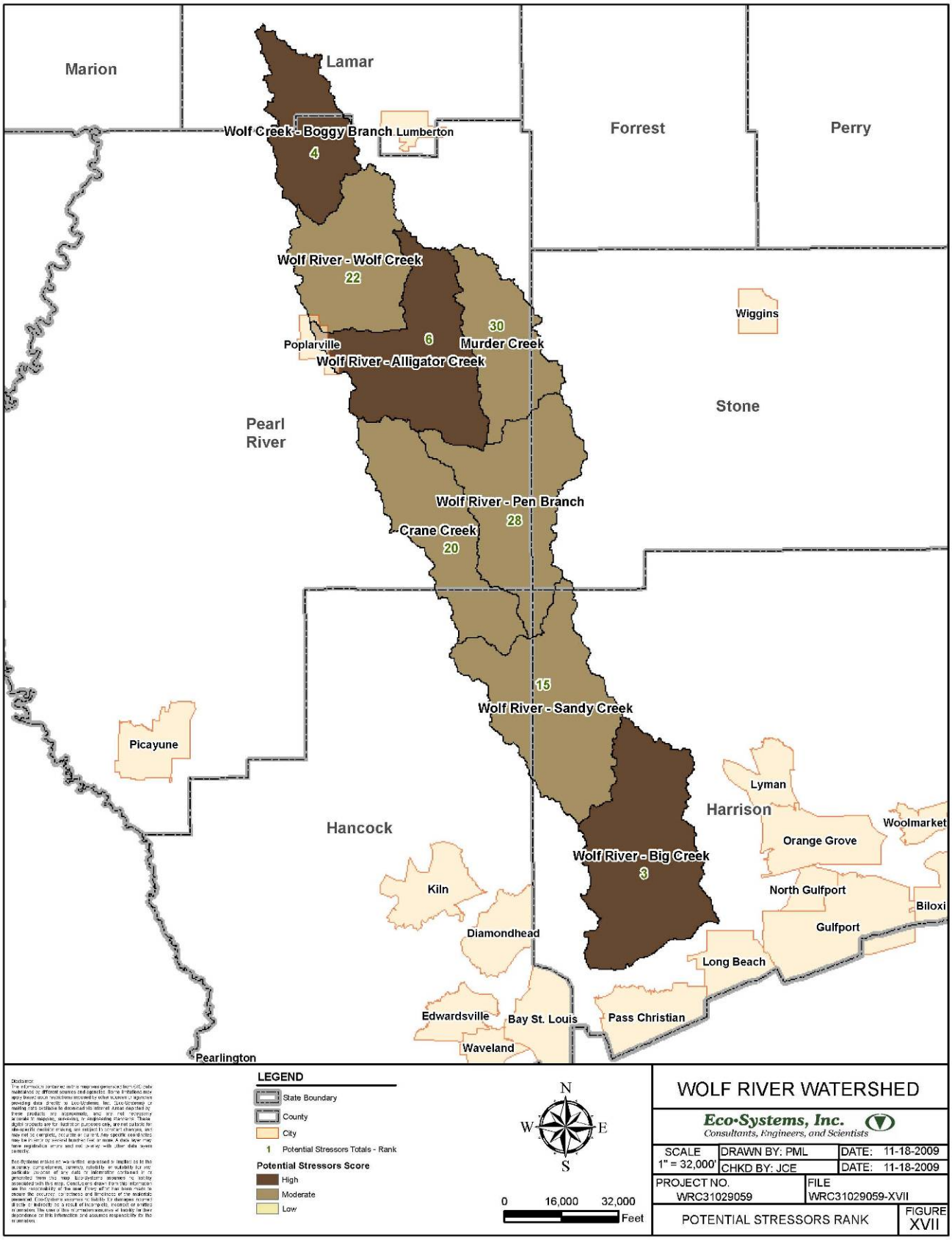
WOLF RIVER WATERSHED
Eco•Systems, Inc.
Consultants, Engineers, and Scientists
SCALE 1" = 32,000'
DRAWN BY: PML
DATE: 11-18-2009
CHKD BY: JCE
DATE: 11-18-2009
PROJECT NO. WRC31029059
FILE WRC31029059-XVI
PUBLIC WATERWAYS RANK
FIGURE XVI


Marion
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Wolf Creek - Boggy Branch
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Lumberton
Wolf River - Wolf Creek
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Murder Creek
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Poplarville
Wolf River - Alligator Creek
Pearl River
Stone
Wolf River - Pen Branch
28
Crane Creek
20
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Wolf River - Sandy Creek
Picayune
Lyman
Harrison
Woolmarket
Orange Grove
Hancock
Wolf River - Big Creek
3
Kiln
North Gulfport
Biloxi
Gulfport
Diamondhead
Long Beach
Edwardsville
Bay St. Louis
Pass Christian
Waveland
Pearlington
LEGEND
State Boundary
County
City
1 Potential Stressors Totals - Rank
Potential Stressors Score
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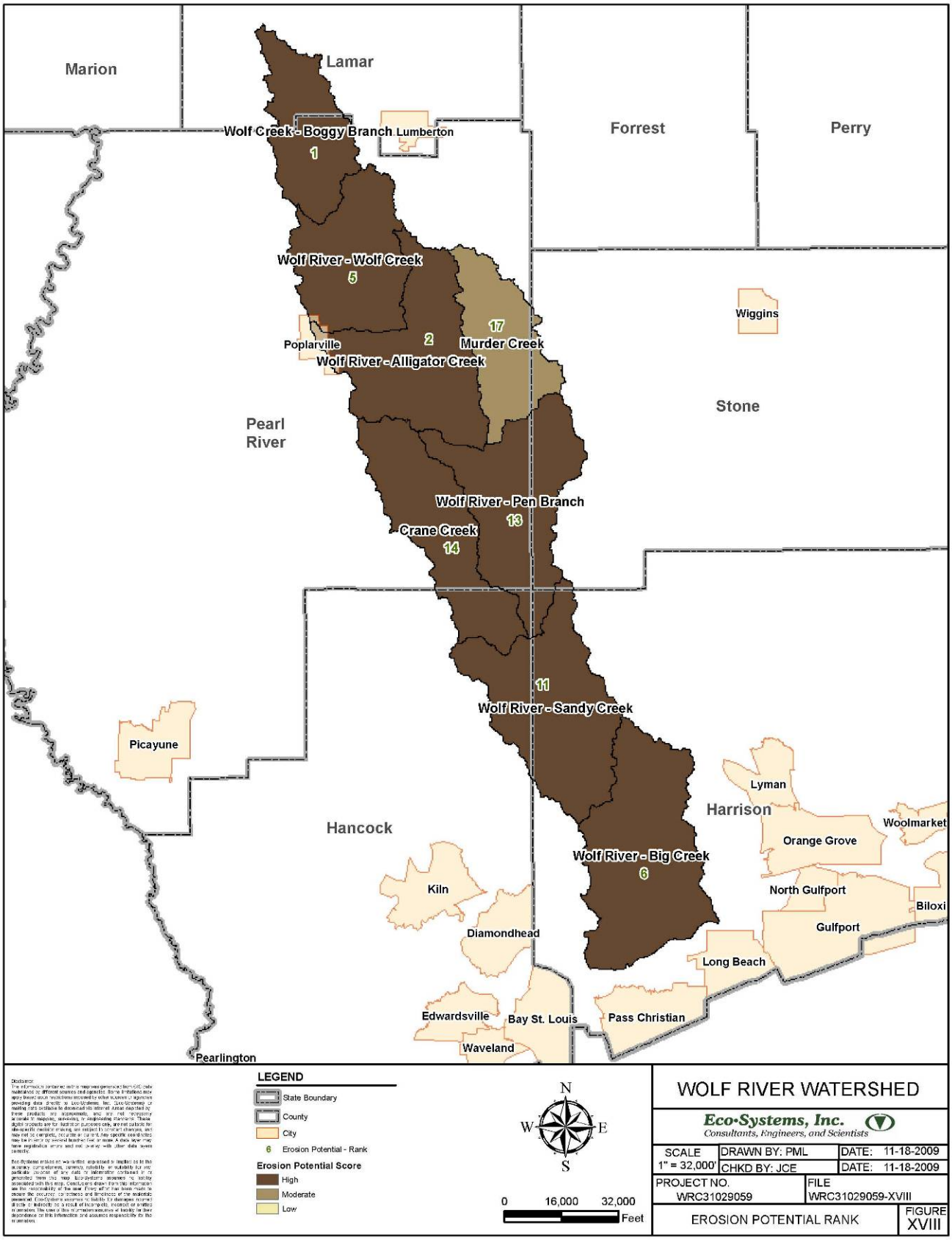
WOLF RIVER WATERSHED
Eco•Systems, Inc.
Consultants, Engineers, and Scientists
SCALE 1" = 32,000'
DRAWN BY: PML
DATE: 11-18-2009
CHKD BY: JCE
DATE: 11-18-2009
PROJECT NO. WRC31029059
FILE WRC31029059-XVII
POTENTIAL STRESSORS RANK
FIGURE XVII


Marion
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Wolf Creek - Boggy Branch
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Wolf River - Wolf Creek
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Murder Creek
Poplarville
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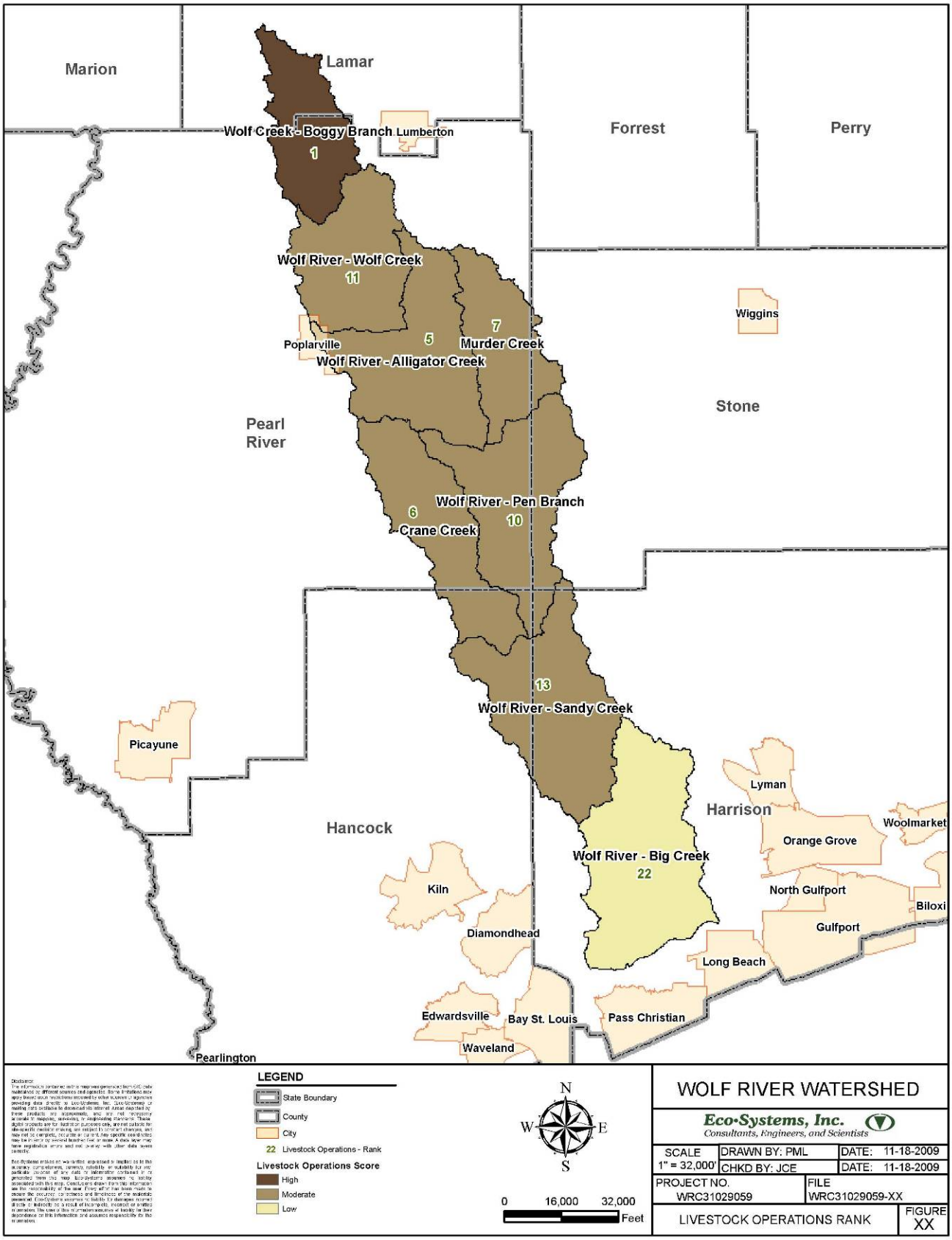
Wolf River - Alligator Creek
Pearl River
Stone
Wolf River - Pen Branch
13
Crane Creek
14
11
Wolf River - Sandy Creek
Picayune
Lyman
Harrison
Woolmarket
Orange Grove
Hancock
Wolf River - Big Creek
6
Kiln
North Gulfport
Biloxi
Gulfport
Diamondhead
Long Beach
Edwardsville
Bay St. Louis
Pass Christian
Waveland
Pearlington
LEGEND
State Boundary
County
City
6 Erosion Potential - Rank
Erosion Potential Score
High
Moderate
Low
N
W
E
S
0
16,000
32,000
Feet
WOLF RIVER WATERSHED
Eco•Systems, Inc.
Consultants, Engineers, and Scientists
SCALE 1" = 32,000'
DRAWN BY: PML
DATE: 11-18-2009
CHKD BY: JCE
DATE: 11-18-2009
PROJECT NO. WRC31029059
FILE WRC31029059-XVIII
EROSION POTENTIAL RANK
FIGURE XVIII


Marion
Lamar
Forrest
Perry
Wolf Creek - Boggy Branch
1
Lumberton
Wolf River - Wolf Creek
11
Wiggins
7
Murder Creek
5
Poplarville
Wolf River - Alligator Creek
Pearl River
Stone
Wolf River - Pen Branch
10
6
Crane Creek
13
Wolf River - Sandy Creek
Picayune
Lyman
Harrison
Woolmarket
Orange Grove
Hancock
Wolf River - Big Creek
22
Kiln
North Gulfport
Biloxi
Gulfport
Diamondhead
Long Beach
Edwardsville
Bay St. Louis
Pass Christian
Waveland
Pearlington
LEGEND
State Boundary
County
City
22 Livestock Operations - Rank
Livestock Operations Score
High
Moderate
Low
N
W
E
S
0
16,000
32,000
Feet
WOLF RIVER WATERSHED
Eco•Systems, Inc.
Consultants, Engineers, and Scientists
SCALE 1" = 32,000'
DRAWN BY: PML
DATE: 11-18-2009
CHKD BY: JCE
DATE: 11-18-2009
PROJECT NO. WRC31029059
FILE WRC31029059-XX
LIVESTOCK OPERATIONS RANK
FIGURE XX