Building a Partnership for West Boley Creek Watershed

2007 Action Plan

Pearl River County, Mississippi

West Boley Creek Watershed Action Plan

sponsored by the Land Trust for the Mississippi Coastal Plain

Funding assistance from EPA, Region IV

Technical Assistance from MDEQ
Pascagoula River Basin Team

Mississippi Department of Environmental Quality
Office of Pollution Control

Prepared by Eco-Logic Restoration Services, LLC

www.ecologic-restoration.com

Submitted to Land Trust for Mississippi Coastal Plain
Spring 2007

Building a Watershed Partnership for West Boley Creek 2007 Action Plan

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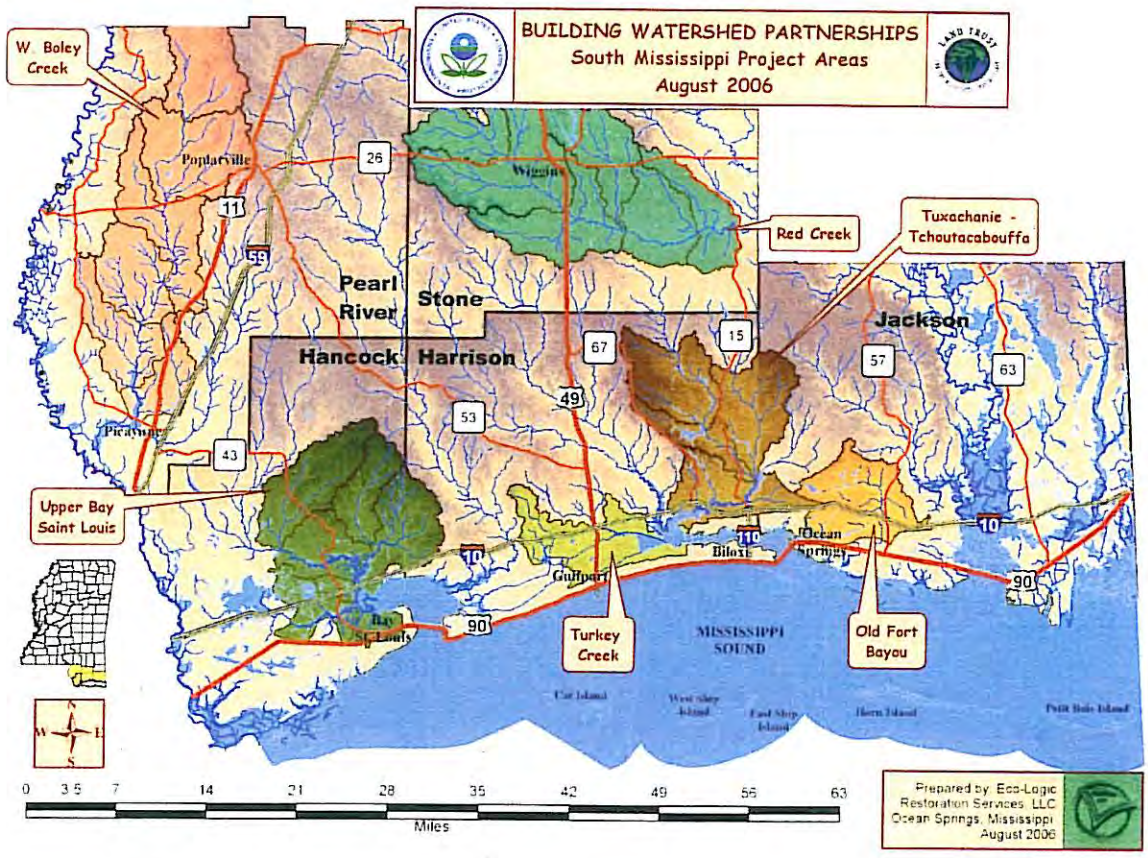
Background

Before Hurricane Katrina, the Land Trust for the Mississippi Coastal Plain (Land Trust) was awarded a grant from EPA Region IV to build watershed partnerships in six watersheds in south Mississippi. Criteria for selecting watershed partnership areas included: (1) watersheds that represented south Mississippi both geographically and ecologically; (2) watersheds where the Land Trust owned and managed lands; and (3) watersheds where there was a demonstrated need for restoration and protection. The six watersheds that were chosen included Turkey Creek in Harrison County, Red Creek (stream sections flowing through Stone County), Old Fort Bayou in Jackson County, West Hobolochitto Creek in Pearl River County, Tchoutacabouffa River (stream sections flowing through Harrison County) and Upper Bay of St. Louis (identified streams in Hancock County).



One of the goals of the watershed partnership was to develop and implement a solution-oriented, action plan. We have two primary objectives: (1) Research, identify and implement watershed protection and associated education strategies for the West Boley Creek; (2) Research, design and implement watershed restoration and associated education strategies for West Boley Creek. Protection is defined as defending the existing natural and

cultural resources of the Watershed from further degradation caused by encroachment, abuse or neglect. Restoration is defined as actively initiating or accelerating the recovery of the ecological and cultural health, integrity and sustainability of the watershed that has been degraded, damaged or destroyed.

The Land Trust's efforts to build a partnership West Boley Creek began in May of 2006 with David Spector agreeing to chair and develop a steering committee. The first steering committee meeting was held in June 2006 followed by field trip investigations with steering committee members and Dr. Michael Hanley (See report, Appendix B, page 22). The first community forum was held at the Pearl River Community College on October 24, 2006. The second community forum was held at the Picayune Sr. Citizen's Center on November 16, 2006. We have learned much from the participants and are very appreciative of their participation; we especially thank J.B. Hodge, Darrin Harris and Julia Anderson who spent hours in the field and on the phone helping shape our direction.

This document is written to provide a strategic approach to watershed planning with particular focus on private sector participation in the process. We want to provide context and a brief overview of the ecological, cultural and scenic significance of the West Boley. This is a record of our planning efforts and an accounting of actions identified to address watershed concerns. The hope of participants is to foster better stewardship of the natural resources of the watershed.

Forum participants were asked, "What are the qualities and resources that we want to protect for future generations?" They responded with consensus:

- Diverse, native hardwood forests
- Fish habitat (woody debris and cool-water refugia)
- Clear, clean running streams
- Quiet, shady places along the creek
- Swimming holes

From the impacts of storm debris and tree loss to the threats of failing septic tanks and accelerated erosion in streams, participants clearly want to see their watershed restored and protected and the community educated about watershed issued and "connected" to the Creek. Forum participants are concerned about fragmentation, out-of-town landowners, loss of rural character, motorized vehicles on stream banks and in stream beds. There is a great need to educate the local citizenry and to develop pride in place so that littering and dumping can be minimized, streamside management can be better understood and implemented, and appropriate public policy can be implemented as the population grows.

Purpose

We will create a unique, engaged partnership dedicated to developing a more sustainable future for the natural resources, residents and businesses located within the West Boley Creek Watershed. We will accomplish this by addressing natural and cultural resource concerns in a locally-driven, comprehensive planning process. We will identify the desired future condition of West Boley Creek, developing an action plan and building partnerships to achieve success.

- West Boley Creek Steering Committee, June 2005

The mission of the LTMCP is to conserve, promote and protect the open spaces and green places that have ecological, cultural or scenic significance in the counties of the Mississippi Coastal Plain. Riparian corridors, or streamside management zones, have great ecological, cultural and scenic significance and are a primary focus of the LTMCP. Healthy riparian corridors are essential elements for maintaining clean water. The mission of EPA is to protect human health and to safeguard the natural environment - air, water, and land - upon which life depends. The foundation for building a West Boley Creek watershed partnership is funded through a grant from EPA Region IV to the LTMCP.

LTMCP is committed to achieving its mission in the West Boley Creek Watershed and is grateful for the EPA watershed grant that funded the exploration and initiation of this watershed partnership. LTMCP is committed to working with stakeholders –private landowners, local governments and natural resource agencies, to implement the following education, protection and restoration strategies for the West Boley Creek Watershed

West Boley Creek Watershed Partnership Teams

Local Steering Committee

Judy Steckler, Land Trust for Mississippi Coastal Plain
Julia Anderson
Dan Beavers
Darrin Harris
J.B. Hodge
Suzanne Shean
David Spector (relocated)
Matt Warstler (relocated)

Technical Advisory Team

MDEQ, Pearl River Basin Team Coordinator, Janet Chapman
South Mississippi RC&D Council, Patty Rogers
MS Department of Wildlife Fisheries & Parks, Scenic Streams Program, Andrew Whitehurst
MS Department of Marine Resources, CRMP
Mississippi Gulf Coast Heritage Program
MS Soil and Water Conservation, Pearl River County SWCD
Natural Resource Conservation Service
Pearl River County Utility Authority
EPA, Gulf of Mexico Program (Habitat restoration team)
EPA, Region 4, Watershed program

Education and Recreation Advisory Team

Land Trust for Mississippi Coastal Plain
MSU Extension Service
South MS Environment and Agricultural Coordination Organization (SMEACO)
Watershed Harmony Puppet Show
Pearl River, Picayune and Poplarville School Districts
Pearl River Community College
City of Picayune, Planning and recreation
City of Poplarville, Planning and recreation
Rivers, Trails, Conservation Assistance Program - National Park Service
Pearl River County Planning Department

Brief Description of the West Boley Creek Watershed

The West Hobolochitto Creek is located in the East Gulf Coastal Plain Ecoregion, in the Pearl River Basin: Hydrologic Unit Codes (HUC) 031800040801, 031800040802, 031800040803, 031800040804, 031800040805 and 031800040806. The West Boley Creek has a reach of approximately 39.7 miles, while the watershed covers about 231 square miles.

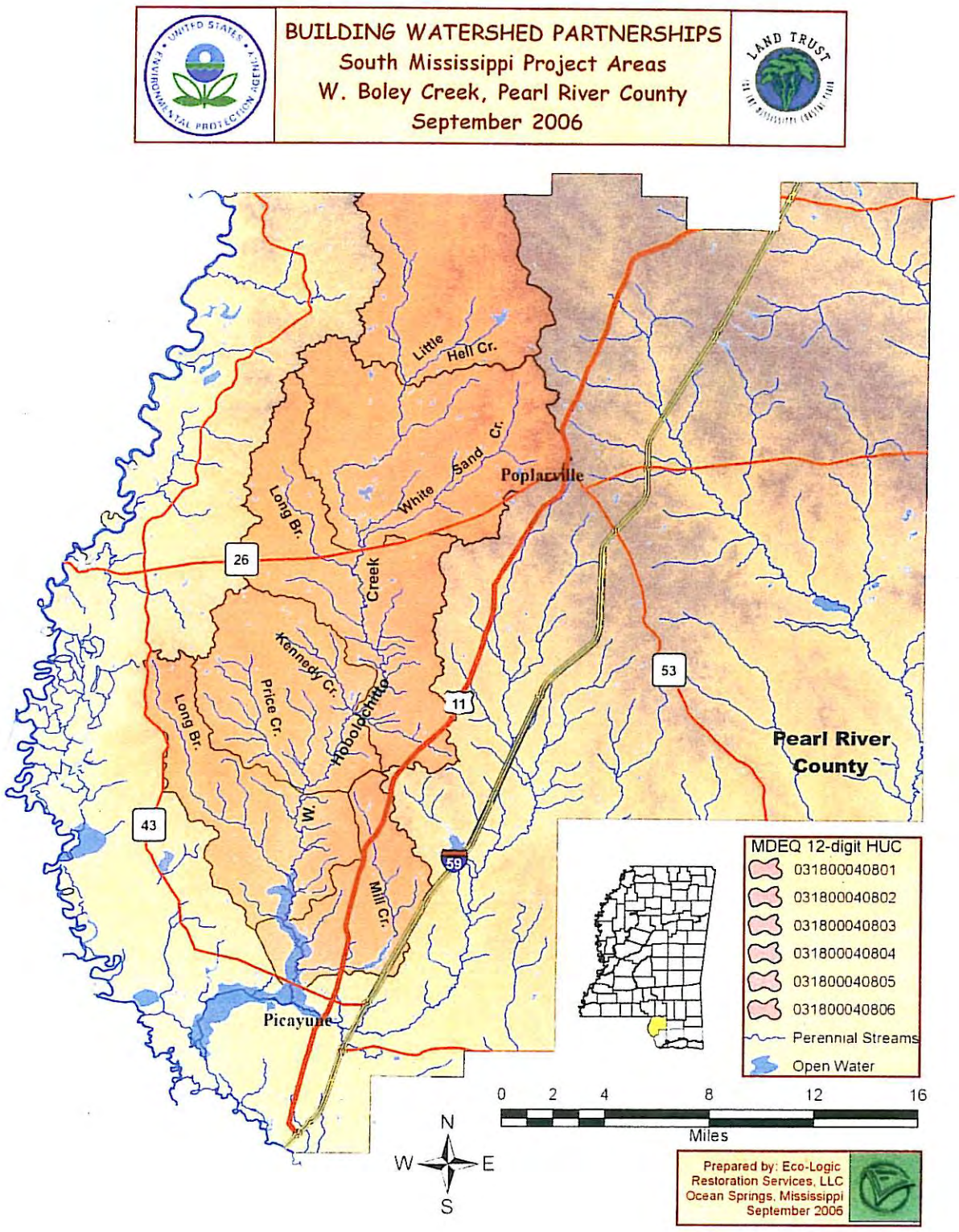
"The West Boley" is what the locals call the West Hobolochitto Creek. It runs south through Pearl River County just west of Poplarville to Picayune where it joins with the East Hobolochitto before flowing to the Pearl River. The West Boley is navigable most of the year from Sones Chapel Road to its confluence with East Boley. Its tributaries include Mill Creek, Long Branch, Kennedy Creek, Price Creek, White Sands Creek and Little Hell Creek. The upper watershed remains rural in nature; outside of Poplarville, the county seat, the primary land uses are timber production and pastureland. In the lower watershed, new housing demands are acute since many people from New Orleans and coastal Mississippi are relocating in order to escape storm surges as well as "city pressures".

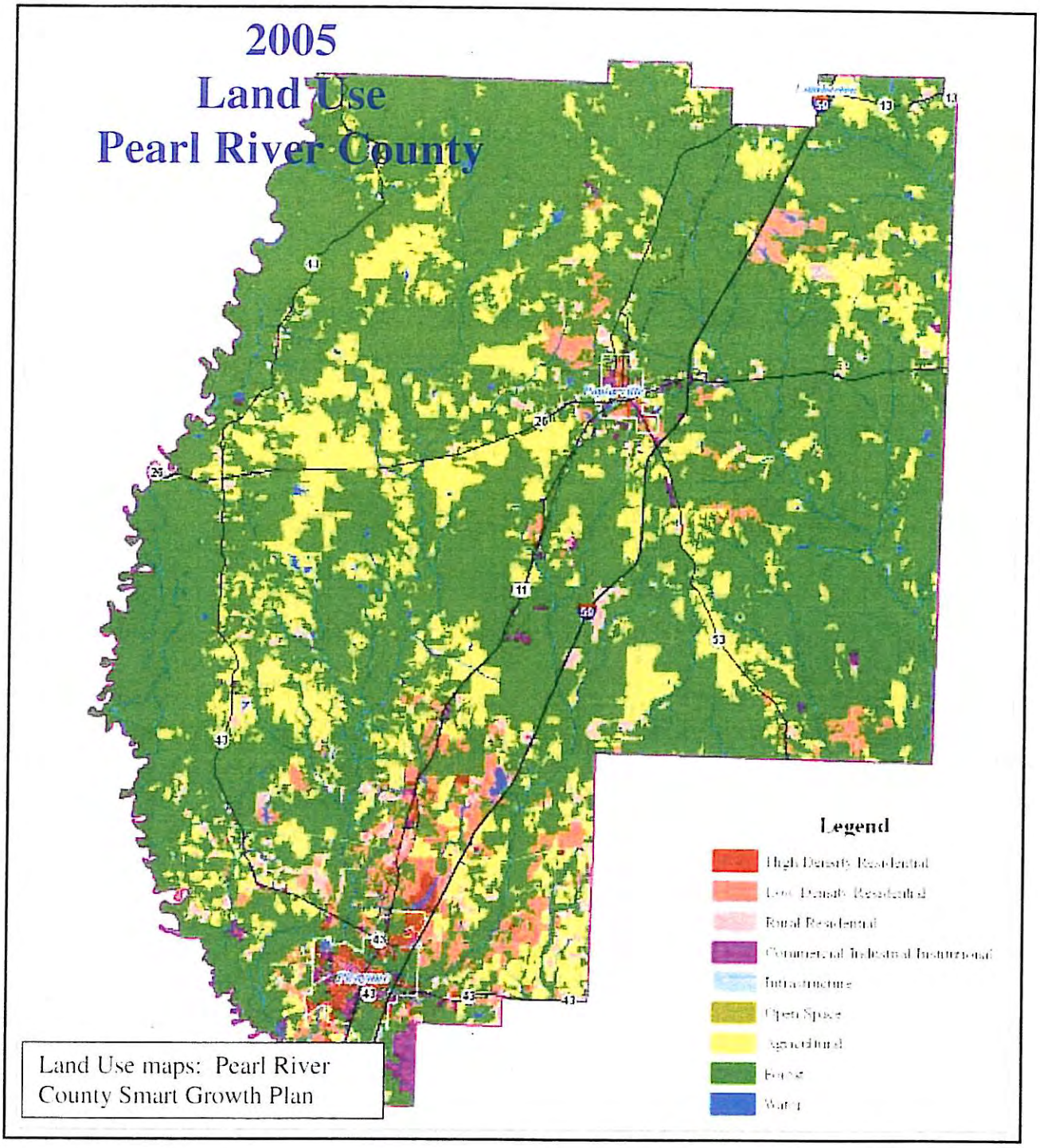
Accelerated population growth in a traditionally rural landscape has the potential to create many environmental and social problems. Population changes and projected growth provided by Pearl River County Planning Department in summer 2006:

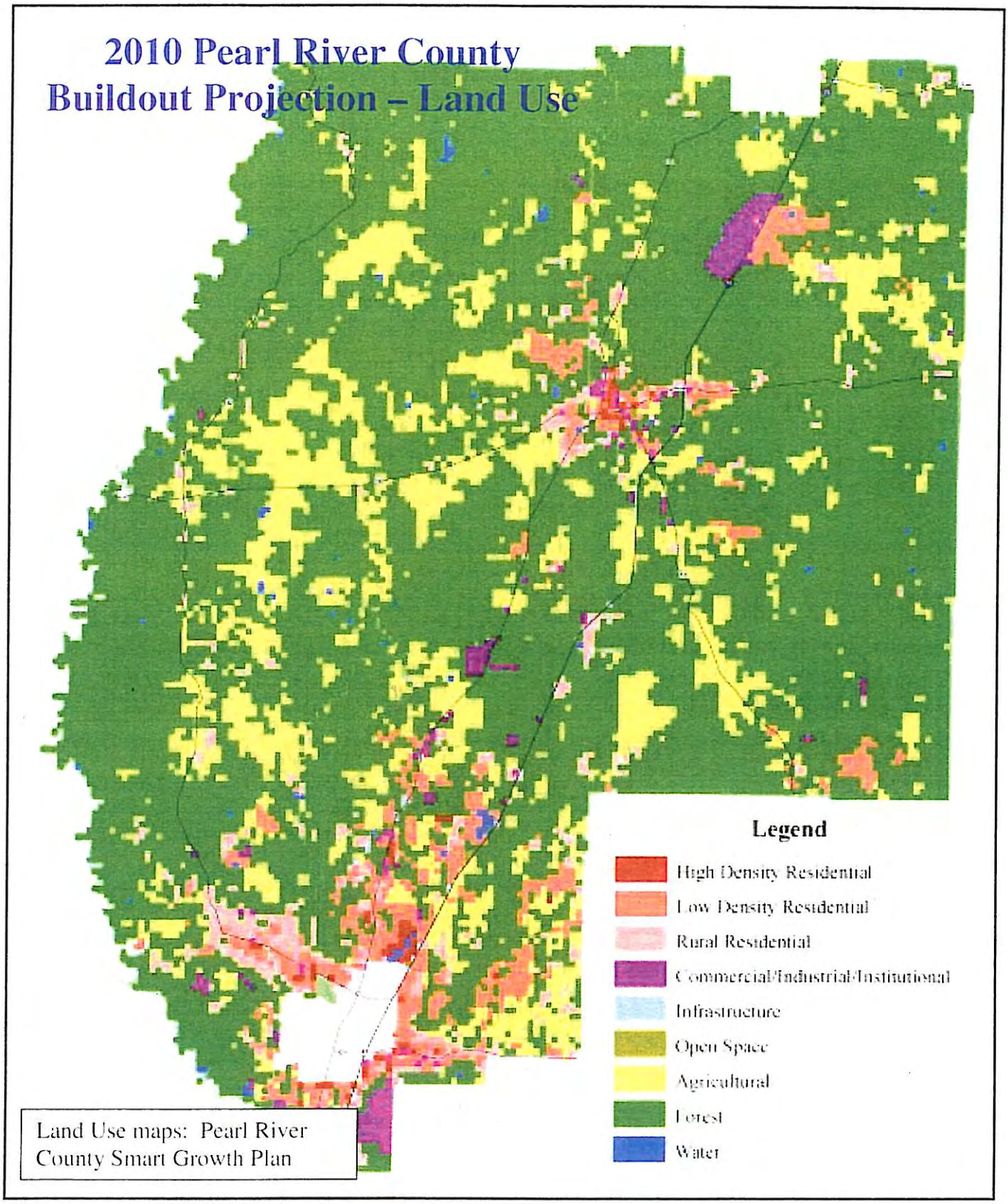
1990	36,500	
2000	48,621	
2005	52,000	Pre-Katrina
2006	75,000	(Post-Katrina Estimated)

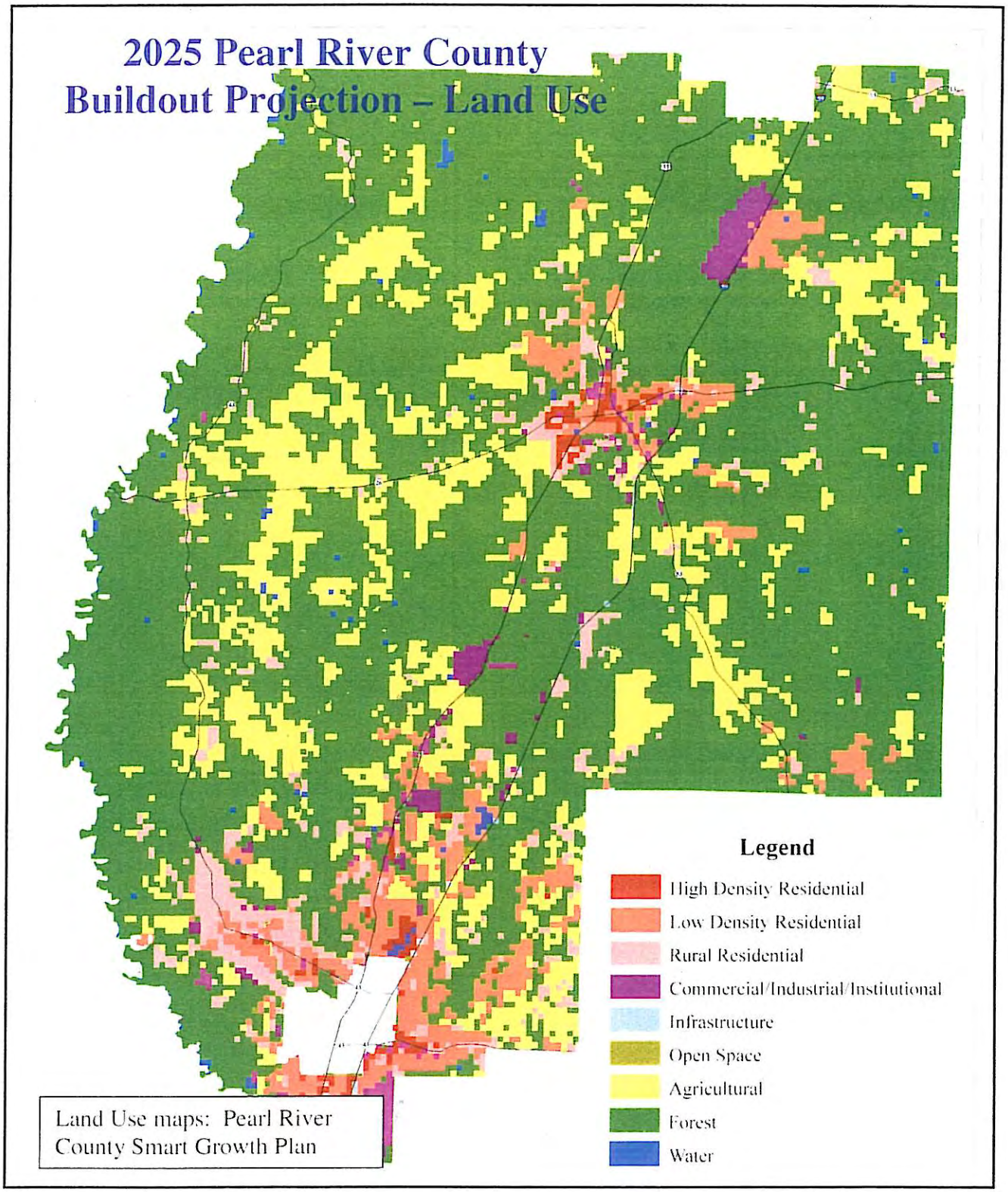
According to the Southeast Watershed Forum, excess sediment is the single greatest contributor to poor water quality. After a general field investigation in July 2006, Dr. Michael Hanley made this observation: "*The actively degrading channels and headwater channels of the Upper West Boley have the potential to yield enormously large loads of sediment into the downstream inchannel environs...*". A watershed approach to stream restoration and land use planning is critical to restoring and maintaining clean water and a healthy ecosystem. Increased sediment into downstream environs can "cause downstream flooding problems and lower the water table levels at the watershed scale. (Reference: Field Trip Report from Dr. Michael Hanley, Sustainable Watershed Technologies, Appendix B)

The Lower West Hobolochitto River near Picayune from Kennedy Creek to the confluence with the East Boley is on the Mississippi Department of Environmental Quality's 303d list. This section of stream is impaired by pathogens for the designated use of secondary contact. Monitoring data exists for this determination and a TMDL is expected by the end of 2007. The Mississippi watershed number for the impaired stream section is MWS185E1.


BUILDING WATERSHED PARTNERSHIPS
South Mississippi Project Areas
W. Boley Creek, Pearl River County
September 2006
LAND TRUST
Little Hell Cr.
White Sand Cr.
Poplarville
Long Br.
Creek
Kennedy Cr.
Price Cr.
Long Br.
Hobolochitto
W.
Mill Cr.
Picayune
Pearl River County
26
53
11
43
59
MDEQ 12-digit HUC
031800040801
031800040802
031800040803
031800040804
031800040805
031800040806
Perennial Streams
Open Water
0 2 4 8 12 16
Miles
N
W E
S
Prepared by: Eco-Logic
Restoration Services, LLC
Ocean Springs, Mississippi
September 2006


2005
Land Use
Pearl River County
Legend
High Density Residential
Low Density Residential
Rural Residential
Commercial Industrial Institutional
Infrastructure
Open Space
Agricultural
Forest
Water
Land Use maps: Pearl River County Smart Growth Plan


2010 Pearl River County
Buildout Projection – Land Use
Legend
High Density Residential
Low Density Residential
Rural Residential
Commercial/Industrial/Institutional
Infrastructure
Open Space
Agricultural
Forest
Water
Land Use maps: Pearl River County Smart Growth Plan


2025 Pearl River County
Buildout Projection – Land Use
Legend
High Density Residential
Low Density Residential
Rural Residential
Commercial/Industrial/Institutional
Infrastructure
Open Space
Agricultural
Forest
Water
Land Use maps: Pearl River County Smart Growth Plan

Stakeholder interests:
Results from West Boley Creek Watershed Forums

October 24, 2006 - Pearl River Community College, Poplarville
November 16, 2006 - Senior Citizen Center, Picayune

In fall 2006, the Land Trust together with the West Boley Creek Steering Committee hosted two facilitated forums for invited residents and landowners of the watershed. Participants were encouraged to discuss the following questions within the group as well as by filling out survey forms. While not attended by large numbers, the forums included lively, frank discussions and helped identify those persons who have a passion to restore and protect ecosystem functions within the watershed.

The Poplarville Democrat and the Picayune Item, two local newspapers, printed several articles about the West Boley Creek forums. With Hurricane Katrina's devastation still before residents in Pearl River County, there were many questions about woody debris in streams and what actions to take. (See Appendix C)

Below is a summary of findings from the forums:

Is there anything about the West Boley that you want to protect?
Timber species diversity
Native hardwood canopy
Fish habitat
Water Park
Identify healthy areas and protect them
Water quality and water quantity
Quiet places on the creek

What is the current condition for West Boley?
Fair to Poor (indicating a need for restoration)

What would you like to see for your watershed's future?
Public access (for education and recreation)
Trash picked up - stop the dumping and littering
Restoration projects
Deeper water - better fishing and boating
More habitat for wildlife
Better water quality

What are the concerns and challenges we face?
Lack of participation by public
Woody debris in stream
Projected increase in human population
Protecting resources enhances economic growth
Water use tax

Education
Clean Water Revolving loans
Identify and educate headwater and wetland landowners
Landowners have a fear of regulation

<u>What are the qualities and resources that we want to protect for future generations?</u>

- Diverse, native hardwood forests
- Fish habitat (woody debris and cool-water refugia)
- Clear, clean running streams
- Quiet, shady places along the creek
- Swimming holes

--Consensus from watershed forums, fall 2006

WEST BOLEY CREEK PARTNERSHIP
WATERSHED ACTION PLAN

After reviewing literature about the watershed and developing maps for use in community discussions, the Land Trust for the Mississippi Coastal Plain (LTMCP) hosted two community watershed forums, one in Poplarville and one in Picayune. These meetings, held in fall of 2007, were the first formal discussions with landowners and the foundation of building a long-term partnership to address the health of the West Boley Creek.

First, we recommend an assessment at the watershed scale to determine the full extent of geomorphic changes causing accelerated erosion and impaired water quality. Such an assessment will identify priority areas for restoration, protection and landuse planning at the watershed scale, particularly in the flood plain. Based on July field investigations, meetings with steering committee and the community forums, the following management practices and actions should be prioritized and implemented. Further study and partnership efforts may ultimately result in the development of a watershed implementation plan that will include prioritized action, timelines, budget estimates and measures of success. We recommend continued strategic planning efforts to improve the scope of the West Boley Creek Watershed Action Plan.

EDUCATION STRATEGIES

1. Create a webpage for the Upper Bay of St. Louis that can provide answers to questions asked by local stakeholders:
    a. General information and map of the watershed
    b. Watershed Action Plan
    c. Information about natural services of wetlands
    d. Information about economic value of blueways and greenways
    e. Streamside Management and Best Management Practices (BMPs)
    f. Links to county and city zoning maps
    g. Links to primary collaborators and partners in the watershed and pertinent watershed information

2. Design and implement environmental education programs specific to the West Boley Creek
    a. Print and distribute watershed education coloring books for children: focus on litter reduction, recycling - Keeping the environment clean, Grades K-3
    b. Design *Find the animal in the swamp* activity page for Grades 3-5
    c. Host Watershed Harmony Puppet Show during 2007-2008 school year, use above educational materials in conjunction with performance
    d. Educate the public about watersheds and streamside management:
        i. Design and install roadside and streamside signage on private lands

ii. Print and distribute streamside management handbooks to landowners

3. Prioritize other watershed education projects proposed for the watershed
    a. Provide information about woody debris in streams (Appendix B)
    b. Host an annual Aqua Fair or other educational celebration, such as Soil and Water Conservation Fair
    c. Provide education venues to tie the water quality to economic development, property values and quality of life
    d. Develop a speakers bureau to educate general public about watershed issues
    e. Identify and develop programs to get the MDEQ Enviroscape watershed education into local classrooms
    f. Find meaningful ways to engage civic groups: Farm Bureau, Cattleman's Association, Pearl River Forestry Association, Rotary, Kiwanis, Master Gardeners, Leadership Program
    g. Work with MDOT and other partners to implement a watershed signage along major federal, state and county roads
    h. Design education campaign about septic tank maintenance for landowners

4. Design and provide more education about erosion and sediment control (construction BMPS) for contractors, city and county decision-makers, public works employees and MDOT. Provide public education campaign about water quality problems caused by sedimentation. Establish the political will to require MDOT to follow and take a leadership role in storm-water management and compliance. (Look to examples in Georgia, especially river keepers. We need enforcement along with education.) Identify the means to be a catalyst for change, especially in changing the mindset that taking care of our resources is "whacko"! Demonstrate and communicate the economic advantages of clean, sediment-free water. Suggestions: write monthly articles for local newspapers, place contests in local newspapers, etc.

PROTECTION AND RESTORATION STRATEGIES

1. Develop litter and dumping education/reduction campaigns:
    a. Kick-off a litter campaigns and create annual clean-up days
    b. Need dumpsters and county-wide garbage pickup
    c. Identify rewards
    d. Advocate for sterner fines and more enforcement
    e. Educate the children
    f. Provide recycling opportunities
    g. Make it convenient for disposal
    h. Consider a deposit on bottles
    i. Stop the mowers from shredding litter (clean up litter before mowing)
    j. Focus on developing *Adopt a highway* programs
    k. Focus on designing and creating gateways to cities

2. Identify actions to reduce impairment on the lower West Boley (MS185E1), the stream section is listed for secondary contact with the impairment of pathogens.

3. Identify private landowners interested in critical area plantings, specifically streamside buffers and wetlands.

4. Identify private landowners and funding programs to install passive stream restoration structures (Reference: Hanley's Field Trip Report from July 18, 2007, Appendix C)

5. Work with area developers to promote green design residential developments that protect wetlands and water features with conservation easements in perpetuity. Work with supervisors, city board and planning commissions to identify and change zoning to require 'greener' practices.

6. Work with the new Pearl River County Utility Authority to install sewer service or alternative waste water management systems reducing fecal coli-form contamination from failing septic systems

7. Design landowner contact program and questionnaire about septic tank maintenance (reference: Strong River, Bogan Ridge Water Association)

8. Identify landowners along the stream bank. Distribute West Boley Creek Streamside Management Handbooks. Provide other information about conservation easements and other conservation options for private landowners. Establish programs for West Boley Creek landowners to encourage the implementation of conservation options and installation of BMPs

9. Identify stream sections most desirable for developing public access to the Creek. Develop a plan for low-impact public use and long-term floodplain management. Identify funding and implement the plan. Specifically, work in public/private partnership to develop public access at Hwy 43 N where the road crosses the creek: provide low-impact access to the river, restore creek levees where they have been breached, clean-up trash, and develop public use and education plans.

10. Develop a partnership with PRCUA and Land Trust to develop a greenway in West Boley Creek floodplain for the purpose of reducing storm-water run-off, providing green infrastructure for the county. Develop a plan and identify funding.

11. Provide opportunities to recycle and dispose hazardous waste: see if MSU sponsored program to pick up farm chemicals can be expanded to include household wastes. Maybe once a quarter in Picayune and Poplarville. MDEQ has a grant program that some cities have used in the past to accomplish this goal; it is a one-time funding source for hazardous waste cleanup.

12. Design and fund a model passive stream restoration project. Typical passive stream restoration uses natural log materials to construct bankfull benches and log riffles (grade control) with logs and native earth materials. Post construction these littoral areas and

riparian areas would be reestablished with native vegetation using native trees, shrubs, and grasses (bioengineering materials) to hold the sediments in place and to reduce the boundary velocities. Develop a public/private partnership to implement this strategy.

ORGANIZATIONAL STRATEGIES
TO ENSURE IMPLEMENTATION AND SUPPORT OF ACTION PLAN

1. Identify a local champion(s) for the watershed

2. Ask the Land Trust for Mississippi Coastal Plain Board of Directors to establish a West Boley Creek Partnership Committee (steering committee) that will function as a special action committee under the Land Trust's auspices until which time the partnership desires to create an independent organization. The primary purpose of the committee will be to implement the action plan. This committee will be tasked with:
    a. Categorizing and prioritizing the Action Plan;
    b. Creating a timeline for the Action Plan;
    c. Developing an estimated budget and volunteer staffing program to implement the timeline;
    d. Conducting an annual review of the watershed Action Plan.

3. Formalize the technical advisory committee and send each person a copy of the action plan so that they are better prepared to participate and provide information and assistance as needed.

4. Formalize the education, recreation resources team and send each person a copy of the action plan so that they are better prepared to participate and provide information and assistance as needed.

EVALUATION OF PROGRESS AND PLAN REVISION

Regular evaluation of the watershed action plan will ensure that the plan remains a vital tool for developing a strong watershed partnership and to guide future management efforts in the watershed. LTMCP advisory team shall appoint a small working group to review the action plan annually. **Watershed plans are living documents that must be adapted to changing conditions within the watershed.** The annual review shall include consideration of tasks completed as well as reviewing changes in the watershed, in stakeholder interests and in understanding of the West Boley Creek Watershed.

RESOURCES

Watershed Description:
MARIS on-line mapping for Mississippi at www.maris.state.ms.us/HTM/maps.htm

Wildlife Resources:
Mississippi Natural Heritage Inventory on-line at www.mdwfp.com/museum/html/research/general_info.asp, NatureServe Explorer database of species information on-line at www.natureserve.org/explorer/

Water Quality Standards:
Through MDEQ Basin Management water quality standards website at www.deq.state.ms.us/MDEQ.nsf/page/WMB_Water_Quality_Standards?OpenDocument

Designated Beneficial Uses: through the MDEQ Basin Management website at www.deq.state.ms.us/MDEQ.nsf/page/WMB_Basin_Management_Approach?OpenDocument

Biological Ratings: Contact MDEQ.

303(d) List and 305(b) report: MDEQ on-line at www.deq.state.ms.us/MDEQ.nsf/page/TWB_Total_Maximum_Daily_Load_Section?OpenDocument

Approved TMDLS: MDEQ TMDL website at www.deq.state.ms.us/MDEQ.nsf/page/TWB_Total_Maximum_Daily_Load_Section?OpenDocument
or through Basin Management website at www.deq.state.ms.us/MDEQ.nsf/page/WMB_Basin_Management_Approach?OpenDocument

Potential management actions:
Mississippi NRCS program website at www.ms.nrcs.usda.gov/programs/, particularly the EQIP program conservation practice, sign up, and ranking documents

Mississippi Streamside Landowner's Handbook. By Andrew Whitehurst, Scenic Streams Stewardship Program, Mississippi Museum of Natural Science, Mississippi Dept of Wildlife, Fisheries and Parks

Handbook for Developing Watershed Plans to Restore and Protect Our Waters, U.S. Environmental Protection Agency, Office of Water, Nonpoint Source Control Branch, Oct. 2005

Economic values (Natural Capital):
From Open Spaces to Wild Places, The Economic Value of Habitat protection to Your Community, a publication of the Southeast Watershed Forum.
www.southeastwaterforum.org

APPENDIX A

MISSISSIPPI NATURAL HERITAGE DATA

PLANTS AND ANIMALS FOUND IN PEARL RIVER COUNTY

Source: Mississippi Naturage Heritage Program, located in the Mississippi Museum of Natural Science, Mississippi Department of Wildlife Fisheries and Parks:
www.mdwfp.com/museum/html/research/

The Mississippi Natural Heritage Program identifies the state's most significant natural areas through a comprehensive inventory of rare plant and animal species, exemplary natural communities, special geological features, and significant natural areas. From the inventory, the Natural Heritage Database compiles information on the distribution, biology, status, and preservation needs of these species and communities. The database is updated continuously and is used to set state, national and global priorities for the preservation of natural diversity.

The Natural Heritage Database

The Natural Heritage Database is a continuously updated inventory of rare plant and animal species and representative natural communities in Mississippi. Today current information on the statewide status and locations of special animals, plants, and natural communities is available in a central location. By utilizing the Heritage Program, resource planners are able to save time and money. The information contained within the Program's database was compiled from a broad range of sources, including museum and herbarium collection records, publications, unpublished reports, and experts throughout the southeast.

Specific Information Available:

- Tracks the status of more than 700 species of plants and animals that are rare or imperiled at the state or global level.
- Contains more than 9,400 records of locations for rare plants, animals, and natural communities.
- State and Federal protection status of select species.
- State and global ranking of species and communities.
- Protection and management priorities and urgency.

PLANTS – Pearl River County

Scientific Name	Common Name	Global Rank	State Rank
AGALINIS PSEUDAPHYLLA	SHINNERS' FALSE-FOXGLOVE	G1G2Q	S2
ANDROPOGON CAPILLIPES	CHALKY BLUESTEM	G4Q	S1?
ANDROPOGON PERANGUSTATUS	ELLIOTT'S BLUESTEM (VAR.2)	G5T3T4	S1?
ARISTIDA SIMPLICIFLORA	SOUTHERN THREE-AWNED GRASS	G3	S1
CALOPOGON BARBATUS	BEARDED GRASS-PINK	G4?	S2S3

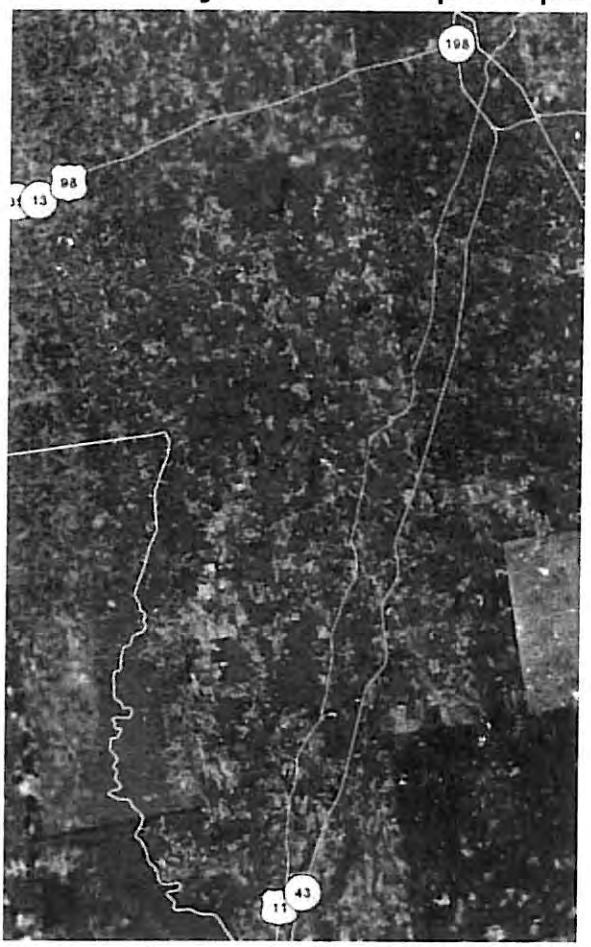
CAREX EXILIS	COAST SEDGE	G5	S2
CAREX PICTA	PAINTED SEDGE	G4G5	S2S3
CHAMAECYPARIS THYOIDES	ATLANTIC WHITE CEDAR	G4	S2
COREOPSIS BASALIS	GOLDEN-MANE TICKSEED	G5	S1?
CORNUS ALTERNIFOLIA	ALTERNATE-LEAF DOGWOOD	G5	S2
CRATAEGUS BRACHYACANTHA	BLUEBERRY HAWTHORN	G4	S1?
EPIDENDRUM CONOPSEUM	GREEN-FLY ORCHID	G4	S2
EULOPHIA ECRISTATA	SMOOTH-LIPPED EULOPHIA	G2	S1S2
EUPATORIUM IVIFOLIUM	IVY-LEAF THROUGHWORT	G5	S2?
HERBERTIA LAHUE SSP CAERULEA	HERBERTIA	G4G5T4	S2
HIBISCUS COCCINEUS	BRILLANT HIBISCUS	G4?	S2
ILEX AMELANCHIER	JUNEBERRY HOLLY	G4	S3
ILEX CASSINE	DAHOON HOLLY	G5	S2
ILEX MONTANA	MOUNTAIN HOLLY	G5	S3?
LACHNOCAULON DIGYNUM	PINELAND BOGBUTTON	G3	S2
LINDERA SUBCORIACEA	BOG SPICE BUSH	G2	S2
LINUM MACROCARPUM	LARGE FRUITED FLAX	G2?	S2
MARSHALLIA TRINERVIA	BROAD-LEAF BARBARA'S BUTTON	G3	S3
MIKANIA CORDIFOLIA	FLORIDA KEYS HEMPVINE	G5	S3S4
PARNASSIA GRANDIFOLIA	LARGE-LEAVED GRASS-OF-PARNASSUS	G3	S2
PELTANDRA SAGITTIFOLIA	WHITE ARUM	G3G4	S2S3
PINGUICULA PRIMULIFLORA	SOUTHERN BUTTERWORT	G3G4	S3
PLATANTHERA CRISTATA	CRESTED FRINGED ORCHID	G5	S3
PLATANTHERA INTEGRA	YELLOW FRINGELESS ORCHID	G3G4	S3S4
PYCNANTHEMUM SETOSUM	AWNED MOUNTAIN-MINT	G3?	S1
RHYNCHOSPORA DECURRENS	SWAMP-FOREST BEAKRUSH	G3G4	S1
RHYNCHOSPORA MACRA	LARGE BEAKRUSH	G3	S3
RUELLIA PEDUNCULATA SSP PINETORUM	PINE BARREN RUELLIA	G5T3?	S3
SPIRANTHES LONGILABRIS	GIANT SPIRAL LADIES'-TRESSES	G3	S2S3
STEWARTIA MALACODENDRON	SILKY CAMELLIA	G4	S3S4
TRIDENS CAROLINIANUS	CAROLINA FLUFF GRASS	G3	S3S4
TRIDENS FLAVUS VAR CHAPMANII	CHAPMAN'S REDTOP	G5T?	SR
VACCINIUM ASHEI	HIGHBUSH BLUEBERRY	G5	S1S2

ANIMALS - Pearl River County

Scientific Name	Common Name	Global Rank	State Rank
ALOSA ALABAMAE	ALABAMA SHAD	G3	S1
CRYSTALLARIA ASPRELLA	CRYSTAL DARTER	G3	S1
ELANOIDES FORFICATUS	SWALLOW-TAILED KITE	G5	S2B
EUDOCIMUS ALBUS	WHITE IBIS	G5	S3B,SZN
FARANCIA ERYTROGRAMMA	RAINBOW SNAKE	G5	S2
GOPHERUS POLYPHEMUS	GOPHER TORTOISE	G3	S2
GRAPTEMYS OCULIFERA	RINGED MAP TURTLE	G2	S2
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4	S1B,S2N
HETERODON SIMUS	SOUTHERN HOGNOSE SNAKE	G2	SH
LAMPROPELTIS CALLIGASTER RHOMBOMACULAT	MOLE KINGSNAKE	G5T5	S3?
MICRURUS FULVIUS	EASTERN CORAL SNAKE	G5	S3S4
NOTROPIS CHALYBAEUS	IRONCOLOR SHINER	G4	S2
NOTURUS MUNITUS	FRECKLEBELLY MADTOM	G3	S2
PERCINA LENTICULA	FRECKLED DARTER	G2	S2
PITUOPHIS MELANOLEUCUS LODINGI	BLACK PINE SNAKE	G4T3	S2
PLEUROBEMA BEADLEIANUM	MISSISSIPPI PIGTOE	G2G3	S3?
POLYODON SPATHULA	PADDLEFISH	G4	S3
PROCAMBARUS BIVITTATUS	RIBBON CRAYFISH	G4	S3
PTERONOTROPIS WELAKA	BLUENOSE SHINER	G3G4	S3
RHADINAEA FLAVILATA	PINE WOODS SNAKE	G4	S3?
UNIOMERUS DECLIVIS	TAPERED PONDHORN	G5	S2

APPENDIX B

West Boley Creek Trip Report



Upper and Lower West Boley Creek
West Hobolochitto Creek

Respectfully Submitted to
The Land Trust for the Mississippi Coastal Plain

Prepared by
Sustainable Watershed Technologies

WEST BOLEY FIELD TRIP LOG: *(Thanks to Mrs. Cynthia Ramseur)*

Tuesday, July 18 – Upper West Boley

Participants:

Dr. Mike Hanley
Darren Harris
JB Hodge
Janet Chapman
Julia Anderson
Jim Kelly
Cynthia Ramseur

Visit & Photo points: Cabin on Creek, north of 26
White Sands area – Red Holden Road and West Boley Creek
Burge & Reyer Road and West Boley Creek (Weyerhauser property)
Hwy 26 and West Boley Creek

Thursday, July 20 – Lower West Boley

Participants:

Dr. Mike Hanley
Darren Harris
JB Hodge
Janet Chapman
Julia Anderson
Suzanne Shean
Judy Steckler
Jim Kelly
Cynthia Ramseur

Visit & Photo points: John Amacker Road and West Boley Creek
Private farm off Sones Chapel Road
Hwy 11 and East Boley Creek (inside City of Picayune
Hwy 43 and West Boley Creek

On Tuesday July 18th and Thursday July 20th of 2006 the West Boley Creek Watershed Field-Team conducted a general investigation of the physical conditions of the West Boley Creek mainstem channel. The Field-Team as seen in Figure 1. was aptly staffed by (from left to right) Mr. Darren Harris; Mr. Jim Kelly; Mrs. Cynthia Ramseur; Mrs. Julia Anderson; Mr. JB Hodge; Mrs. Janet Chapman; and the invisible Mike Hanley (taking the picture).

I would like to extend special thanks to Mr. JB and Darren for leading us all around the West Boley Creek watershed. The field trip would not have been as productive or as much fun without Mr. JB's and Darren's knowledge of the area and their perspectives on the historical conditions of West Boley Creek.

Figure 1. West Boley Creek - Field Team

1. PURPOSE OF INVESTIGATION:

The purpose of the West Boley Creek investigation was to determine the geomorphic trend of the West Boley Creek mainstem channel and then to explore the relevant issues and concerns as identified by the Field Team. The topics of concern are as follows:

a.) Where is the West Boley Creek channel heading in geomorphic trend?
b.) What are the potential water quality threats (increased fluvial sediment supply/ alluvium) that might result from channel instability? (*Source Water Protection*)

c.) What are the potential water quantity threats that might result from channel instability due to West Boley Creek's historical incision and the degree of entrenchment from its floodplain? (Source Water Protection)?
d.) What are some possible solutions that might ameliorate the threats to the channel instability, water quality, and water quantity?
***Section 2 is a five page brief overview of geomorphic concepts and graphics that are referenced in Section 3.

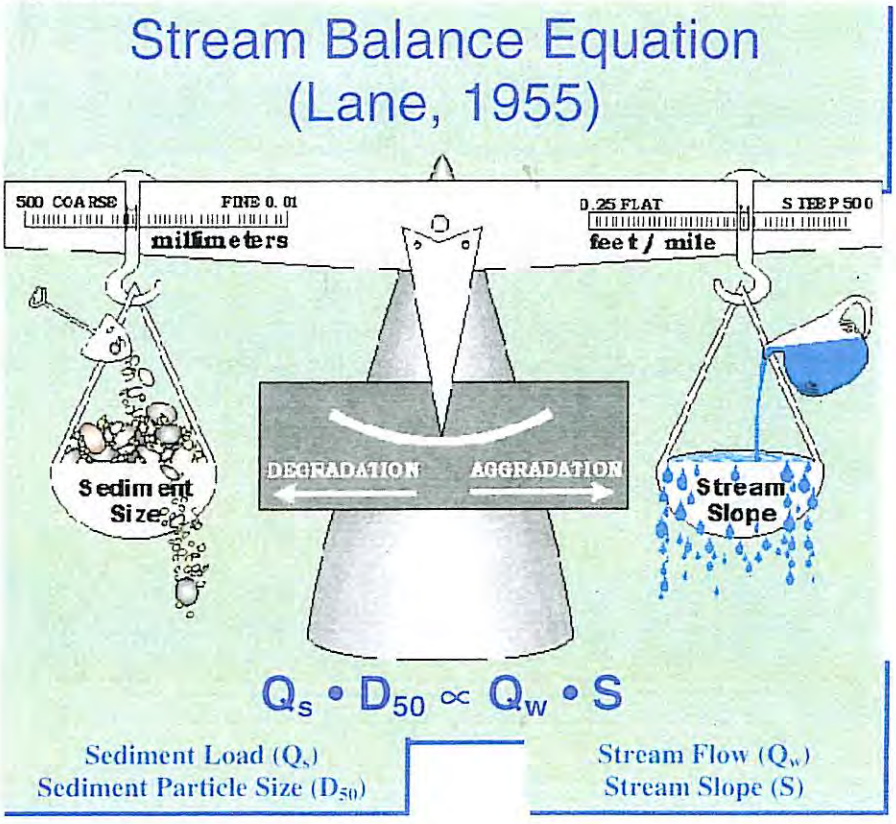
***Section .3 on page 7. begins the West Boley Creek field report information.

2. BRIEF OVERVIEW OF FLUVIAL GEOMORPHIC CONCEPTS:

a.) The Master Scale (Watershed Scale) Fluvial Geomorphic Considerations

The Definition of River Stability: *the ability to maintain, over time, its dimension, pattern, and profile in such as manner that it is neither aggrading nor degrading and its ability to transport the flows and sediment generated by its watershed without adverse consequences.* Also termed as dynamic equilibrium

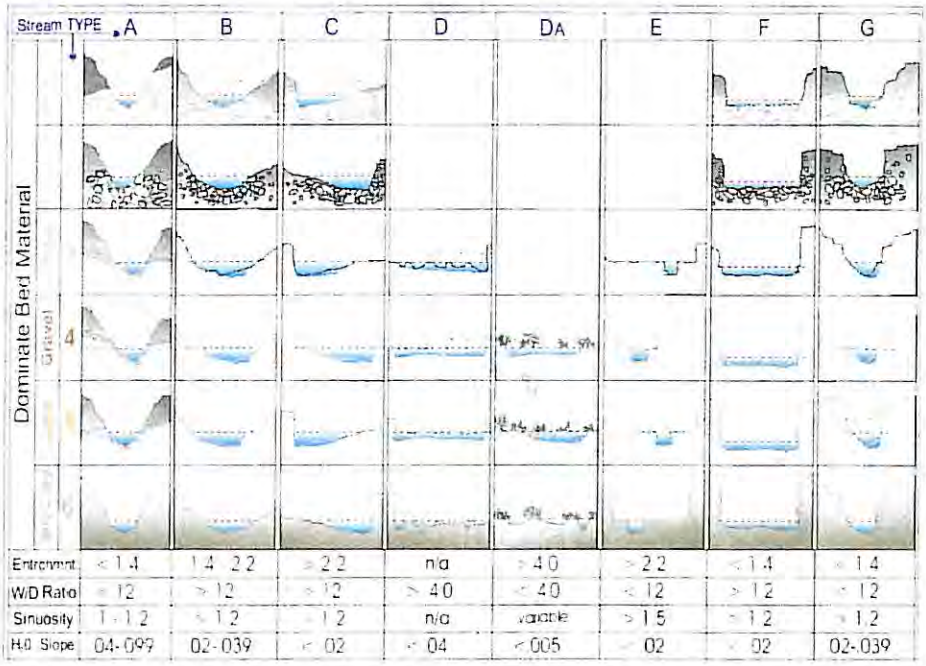
The Concept of Lanes Balance to River Stability and Adjustment:
Figure 2.



A river's sediment budget (both particle size, particle geology, and load of particles) are delicately balanced with a river's water budget (water power) in such a manor that the river's

geomorphic characteristics (hydraulic slope, channel cross-sectional area, and channel shape) have evolved collectively to form a stable relationship called dynamic equilibrium. If one of the master parameters (sediment size, sediment type, sediment load, water flows, riparian vegetation, channel slope, channel shape, channel area) are changed then the result is a corresponding change from one or more (usually more than one) of the other master geomorphic variables that will serve as the input to null out the original change. This is best described as being a natural auto-catalytic feedback mechanism. This process will take the disturbed river through long periods of degradation (eroding and down-cutting) and aggradation (filling in and building new point-bars) but the end result is that the river is seeking to null or balance out excess or deficient forces so the river (West Boley Creek) can do the watershed's work (water and sediment throughput).

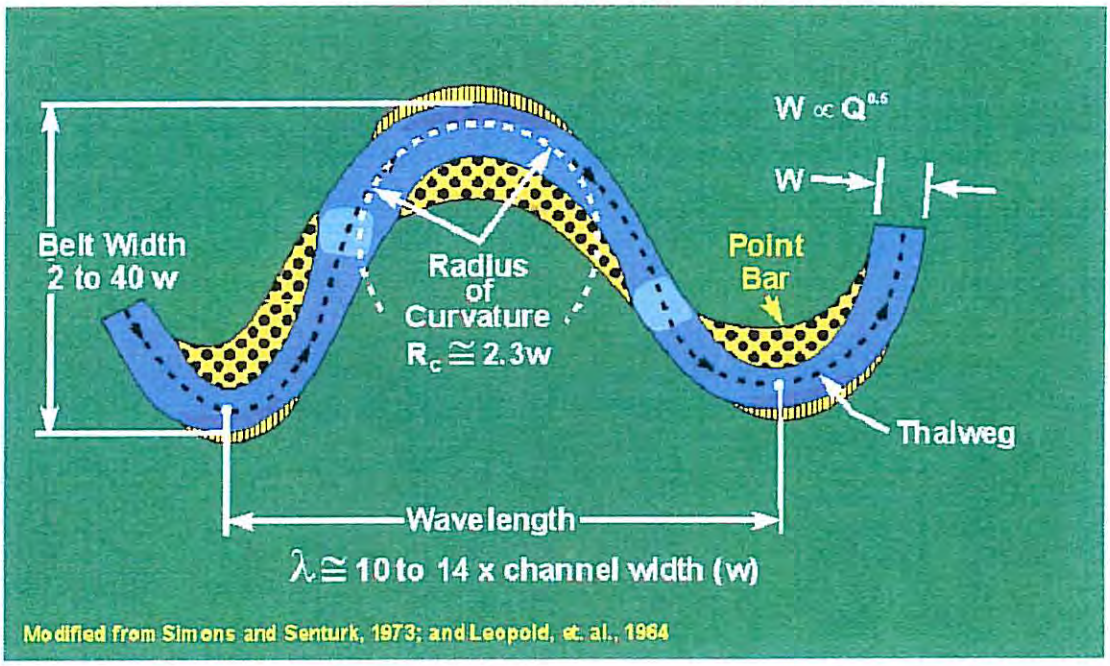
b.) Stream Channel Classification Systems – The stream channel classification system that we used during this field visit was the Rosgen classification system.
Figure 3.



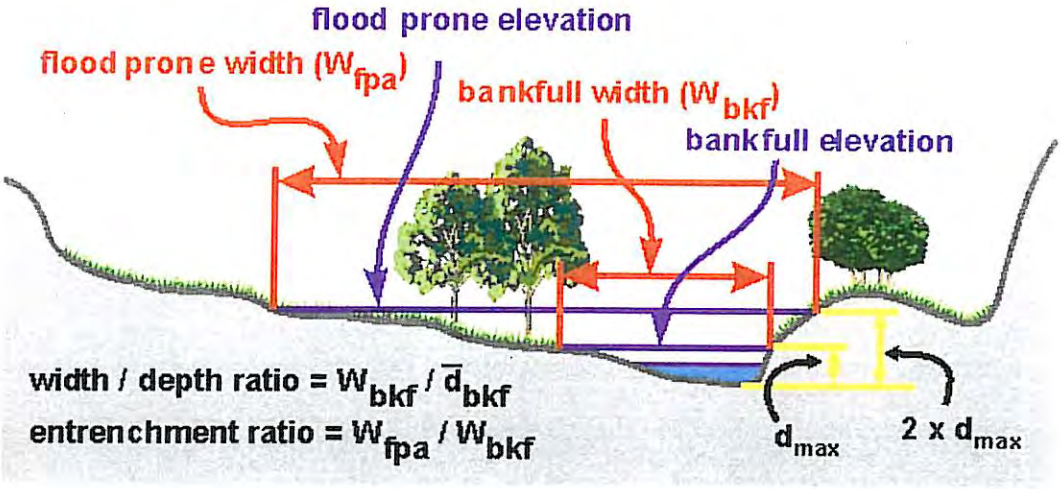
This is one of the most easily understood stream channel classification systems that I have found and I use it often when communicating with watershed groups and municipalities. It is as easy as 1-2-3 and A-B-C. For instance, consider West Boley Creek as our example: Our West Boley Creek started out as an E-5 channel (E channel with sand sized bed material dominant) type about 150 years ago now. But then the E-Channel (West Boley Creek) under went episodes of head-cutting and degraded into a G-5 channel that resulted from channel incision due to dramatic increases in water runoff that was caused most likely from the landscape level deforestation within the entire Boley Creek watershed. *Darren Harris would skin me alive if I didn't mention the damaging inchannel and floodplain hydraulic changes caused by inadequate bridges that fill most of the active floodplain due to the road-bed-prisms acting as dams.* Now back to my sick-river story. Then the G-5 (West Boley Creek) channel cut down to the heavily bedded/ very cohesive blue-grey clay of Miocene age that underlies the surficial deposits of sands and gravels. That tough old grey clay was very

heavily bedded and the West Boley Creek could not cut-down any further. This left West Boley Creek trapped in an incised channel that kept more of the flood waters (and their erosive hydraulic power) within the sandy & more easily erodible channel banks. This condition then transitioned into an F-5 channel type that was keeping even more of the flood flows and stream power within the active channel banks. Overtime the land began to heal in again. Trees were planted and they grew tall on the floodplains. The forests that grew back were now managed in smaller timber harvest operations and were owned by different landowners such that the watershed was not completely deforested at any time period since the original disturbances. The F-5 channel kept on eroding its banks and also reworked & deposited the valuable sediments supplied from the healing landscape. The F-5 channel began to build proto-pointbars (little alternating sand & gravel bars) that were low in elevation. And the F-5 channel began to cut/erode its outside banks such as to add length to it's self and thusly reduce its hydraulic gradient (channel slope). The sick old F-5 channel began to increase its belt-width and was then trending to becoming a poor example of a C-5 channel. Enter the West Boley Creek Watershed Partnership and their field team. Here we are today with an F-5 channel type that is transitioning into a C-5 channel type.

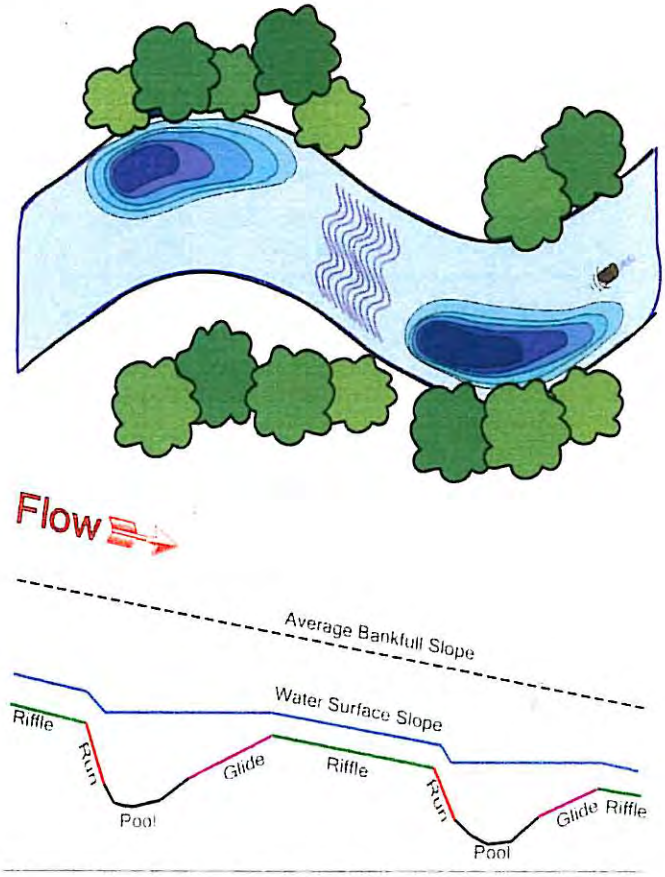
c.) Stream Channel Planform Descriptions
Figure 4.



d.) Stream Channel Cross-Section and Geomorphic Descriptions
Figure 5.

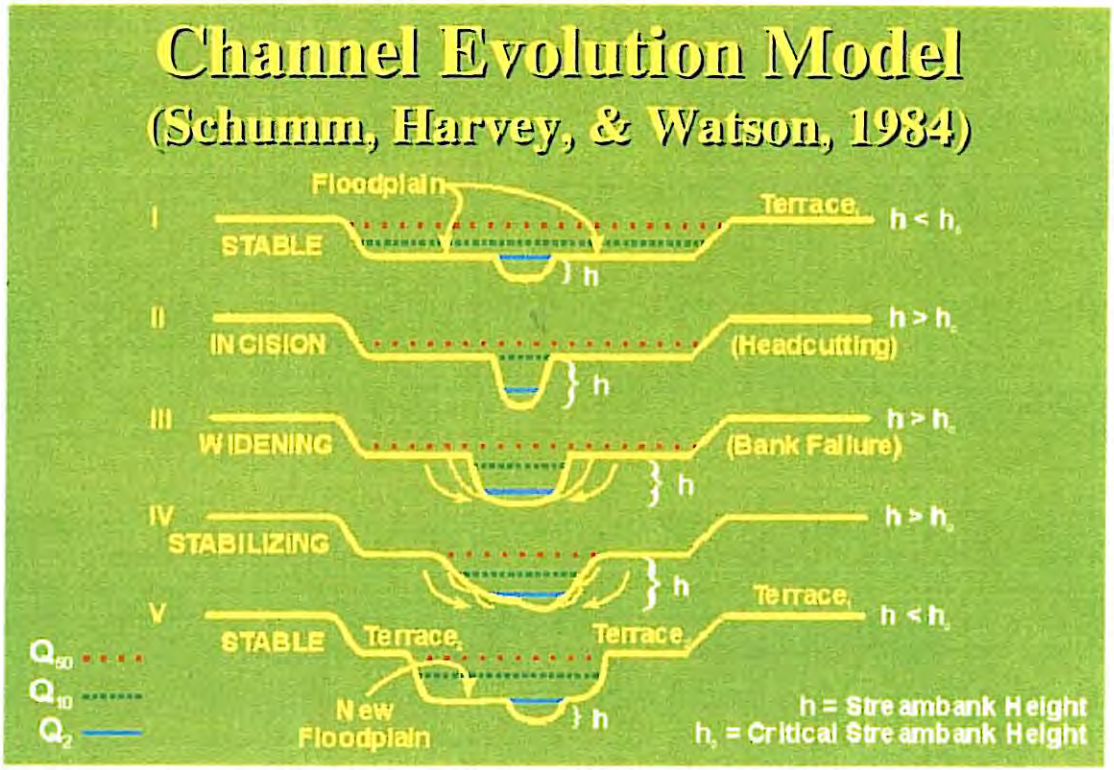


e.) The Stream Channel Geometry in Planform and Longitudinal Profile View
Figure 6.

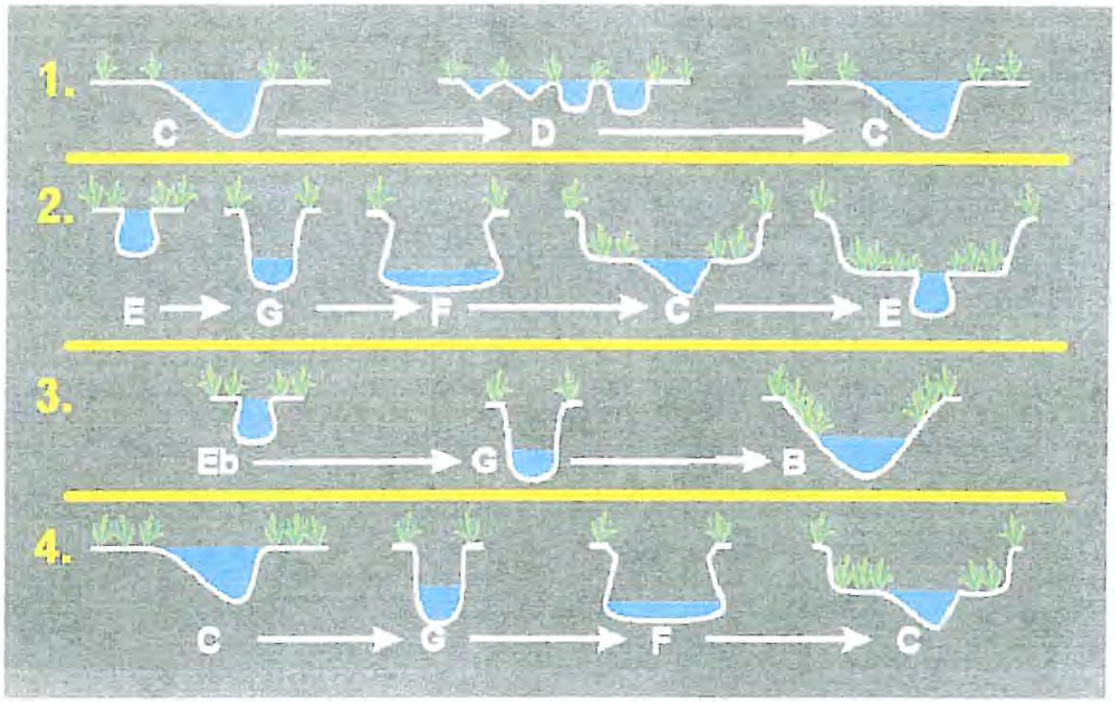


The dark blue colored areas in Figure 6. are the deeper pools that the river needs for energy dissipation during flood events. The pools are also deep water refugia for aquatic species. The waters of the pool are cool, shaded, well oxygenated and that's why the best fishing is usually in the pools. The pool area is where a river mixes surface waters with cooler spring/ground water that discharges into the depths of the pool. The Glide surface (the purple line) is the most stable part of the river. This is where most fishes choose to spawn due to the relative quality of the sediments and the high oxygen levels of water coming up from the pool. Glides and Riffles are important because they set a river's channel slope or to the Engineer, they set the rivers hydraulic gradient (this is important for the streams power). You will notice how the water surface slopes of the pool are more flat than the average bankfull water surface slope. But notice how the Riffle slope is approximately the same as the average bankfull water surface slope. These differences in slopes are extremely important to the river for stability and sediment transport competence.

f.) The Five Phases of Gross Scale Channel Evolution
Figure 7.



g.) The Fine Scale Stream Channel Type Evolution Scenarios
Figure 8.



3.) WEST BOLEY CREEK FIELD REPORT:

The Field Team started their investigation of the Upper West Boley Creek mainstem channel and covered the stream reach from the Highway 26 to the West Boley Creek headwater area near the Weyerhauser landholdings on Burge & Reyer Road. The photo in Figure 9. is of the West Boley Creek channel near the Weyerhauser landholdings. One should notice that in this stream reach the West Boley Creek is still a rather healthy and functioning E-5 channel type and has not undergone down-cutting or incision yet. The headcut is somewhere downstream between this point and the reach of West Boley Creek by the little river-cabin (North of the HWY 26 crossing). Although Weyerhauser's inappropriate forestry practices in the land upslope to the riparian areas are yielding a great deal of sediments to the inchannel environs of the headwater reaches and their wetlands. **Darrin Harris has some really good insights on how to greatly reduce this problem with sedimentation from pine forestry operations.*

Now lets travel on downstream a ways to the reach of West Boley Creek that flows by the little river-cabin north of Highway 26. Refer to Figure 10. This point is near the midpoint of West Boley Creek mainstem channel. One should notice the incised & over-widening G-5 channel type that is transitioning to an F-5 stream channel type that is relict of historical & ongoing head-cutting and beginning the severe over-widening phase. Refer to Figure 7. in Section 2.f. for a description of the gross scale channel evolutionary adjustments. Also refer to Figure 8. and see Scenario # 2. This graphic depicts the most likely stream channel

evolution for West Boley Creek. Again at this point in time and at this location the channel is a G-5 channel type that is further degrading/ transitioning into an over-widening F-5 channel type.

Now let us travel on downstream to a position of approximately 75% of the West Boley Creek mainstem channel length. Refer to Figure 11. One will notice a small sandbar as seen looking over Mrs. Cynthia's left shoulder. Cynthia's little toes on her feet are standing on another low elevation sandbar. These alternating sandbars are just now starting to build up their vertical elevations and to steepen up the sandbar slope angles. *The point-bar/ sandbar angles on stable healthy rivers should average about 18 degrees of slope from horizontal. This is how I know that the West Boley Creek's bars are too short and have too low of a slope angle.* This tells me that the stream channel at this point in time and at this location is a type F-5 channel form trending towards a type C-5 channel form. One can determine this by the presence of alternating low elevation proto-bars as evidenced in figure 11. Refer to Figure 3. in Section 2.b. for a detailed description of the channel classification system used during the field visit.

Now let us travel on downstream to a position of approximately 95% of the West Boley mainstem channel length. This is where the West Boley Creek flows under Highway 43 in Picayune, MS. Please refer to Figure 12. One will see some of the children of the great State of Mississippi enjoying a refreshing dip in the West Boley Creek. I swam at this location when I was a boy. I would cool off at this particular location after finishing hot summer days working on my Uncle Howard's cattle farm up on the West Boley. The creek looked a lot different back then. The present day West Boley Creek along this reach is an F-5 channel type transitioning into a C-5 channel type.

The Synopsis *(I saved it until the end)*

The West Boley Creek was historically a very stable E-5 channel type that supported an extensive bottomland hardwood floodplain wetland system. Refer to Figure 8. in Section 2.g. for West Boley Creek's most provable stream channel evolution scenario. Scenario # 2 in Figure 8. depicts how a stream channel, once degraded/disturbed would then devolve from a stable E channel type into an incising G channel type then further devolve into a very unstable F channel type (that lowers the water table and increases sediment supply) and then begins to evolve/ stabilize slightly to an over widened C channel type and possibly in the distant future would evolve back into a quasi-stable E channel type with a lowered water table and a decreased connection with the floodplain wetland system. The gross scale channel adjustment phase is between Phases three and four as depicted in Figure 7. in Section 2.f.

Figure 9.

The photo in Figure 9. is of a reach of West Boley Creek in its headwater area. Here the channel is in good geomorphic condition and is currently an E-5 channel type.

Figure 10.

The photo in Figure 10. is of a reach of West Boley Creek just north of HWY 26 crossing. This reach is exhibiting unstable/ eroding stream banks. At this location the West Boley Creek is a G-5 channel type transitioning to an F-5 channel type. Some where upstream of the location in Figure 10. there is a headcut or maybe a couple of headcuts. In sand bed channels the headcuts might show up only as over steepened channel slopes. They will keep on migrating head ward/ upstream all the while lowering/incising the channel bottom and the water table. The sediments eroding from the upstream degrading/incising stream channel will serve to form the future sandbars that rebuild within the reach of West Boley Creek shown in Figure 10. The future does not look good for the upstream reaches of the West Boley Creek and its headwater wetlands unless actions are taken to locate and arrest the channel headcuts from advancing any further upstream.

Figure 11.

Figure 12.

In Figure 11. the West Boley Creek channel needs to (and is going to) increase its belt width and thusly reduce the degree of slope for the stream's hydraulic gradient/ channel slope by lateral extension of the meander bends and also enlarging its point-bar facets (building sandbars bigger, taller, steeper). The lateral extension is accomplished by the stream channel actively eroding its outside cut-banks and depositing sediments in point-bars such as to increase the channel's planform & belt width as described in Figure 4. of Section 2.c.

One should notice in Figure 11. that the stream's point bars are rebuilding in and decreasing the width to depth ratio of the active hydraulic channel. This process is an important aggradational phase as the channel is trending from an F-5 channel type to a C-5 channel type. The channel needs to narrow its width, deepen its pools, and raise the elevations of its riffles in such a way that it will have developed the longitudinal facets (geomorphic facets such as: riffle, run, pool, and glide/tail-out sequences) depicted in Figure 6. in Section 2.e..

At this stage of channel evolution/adjustment, if the correct passive restoration actions are taken carefully then it could serve the river to greatly hasten the channel evolution process and lead to a more stable and functionally interactive river, riparian, and floodplain ecosystem.

Our Original Questions Revisited:

a.) Where is the West Boley Creek channel heading in geomorphic trend?

The overall geomorphic trend of the Lower West Boley Creek an F-5 channel type trending/ aggrading into a proto C-5 channel type as depicted in Scenario # 2 of Figure 8. The gross geomorphic evolutionary adjustment phase is currently between Phases three and four as depicted in Figure 7. Lower West Boley Creek's condition is trending towards a more stable form.
The overall geomorphic trend of the Middle West Boley Creek is a G-5 channel type transitioning into an F-5 channel type. This is a highly degradational phase and so I would say the evidence is that the Middle West Boley Creek is trending towards instability and excessive sediment production.

The overall geomorphic trend of the Upper West Boley Creek is a currently an E-5 channel type that will most likely undergo channel incision (headcutting) and devolve into a G-5 channel type and then further devolve into an F-5 channel type.

b.) What are the potential water quality threats (increased fluvial sediment supply/ alluvium) that might result from channel instability? (*Source Water Protection Issues*)

The actively degrading channels and headwater channels of the Upper West Boley have the potential to yield enormously large loads of sediment into the downstream inchannel environs. Actions need to be taken to locate and arrest the areas of active headcutting on the West Boley and its tributaries. This headcutting can increase downstream flooding problems and lower water table levels at the watershed scale.

The newly reforming channel of Lower West Boley Creek will erode its banks and riparian vegetation in order to rebuild a stream channel planform; longitudinal profile (hydraulic slope/gradient); and channel cross-sectional area & shape that will allow it to process the water-budget and sediment-budget that its watershed provides to it as depicted in Figure 2.(Lane's Balance). However, during this channel adjustment process the regional sedimentation will most likely increase and remain elevated on trend for as much a two to four decades if left to evolve/ heal in alone under its own hydraulic power.

c.) What are the potential water quantity threats that might result from channel instability due to West Boley Creek historical incision and the degree of entrenchment from its floodplain. (Source Water Protection)?

The present day condition of the West Boley Creek is moderately incised but it still attains interaction with its historical floodplain during higher flows. This condition leads to a more flashy discharge character. This exhibits frequent pulses in hydraulic discharge record with a hasty return to near base-flow/ low-flow conditions for much of the year. This is commonly thought to be natural by local residents but it is a symptom of basin scale impairments to

the water budget and stream. The more frequent but lower floods do not attain the floodplain elevation and are not allowed to be absorbed into the floodplain wetland systems. The flows are not hydraulically attenuated by the wetlands on the floodplains and thusly the rainfall/ stream discharge contributions are more quickly processed through the riverine system and then on to the Gulf of Mexico. Some major results of this impairment are lowed watershed hydraulic storage (storativity); degraded water quality, severely lower aquifer levels during annual drought seasons (water quantify losses).

d.) What are some possible solutions that might ameliorate the threats to the channel instability, water quality, and water quantity?

Priority #1: The headcuts need to be located and arrested from advancing any further upstream.

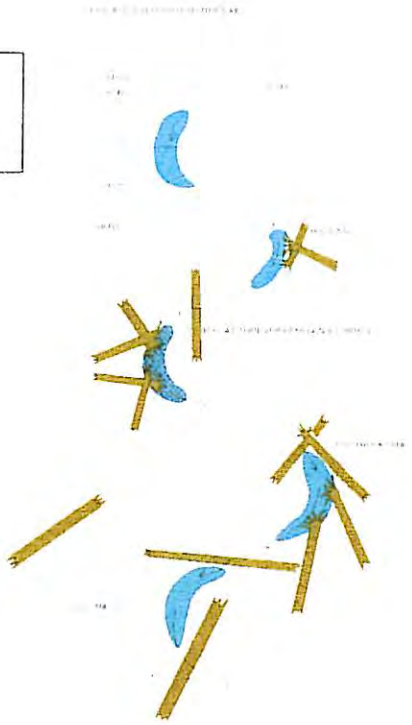
Priority #2: The time is right to take passive restoration actions and work with the reforming stream channel to seed the sediment deposition in the correct locations and form such as to nudge the channel ahead in the evolutionary process. The passive restoration actions would most likely involving using some of the damaged logs from Katrina. Logs are a natural material and have always been part of the riverine ecosystems healing mechanisms. The logs would need to be interlocked so they would stay in place during flood events. Also I would suggest establishing native vegetation on destabilized banks in order to reduce near boundary shear and velocity. We would also suggest establishing native vegetation on newly forming bars to induce further deposition of sediments during higher flows. These processes are called Bioengineering and have been used in the field of river engineering/ restoration for over 200 years. These practices could provide the West Boley Creek watershed with even greater water-quality benefits when used in combinations with other conservation practices like stream-side management zones (SMZs), riparian buffer creation, wetland restoration/ preservation, conservation easements programs, and floodplain management planning.

Priority #3. *In some cases active geomorphic restoration could be needed to address the headcutting and severely incised channels.*

4. Concept typicals for the passive restoration actions using natural log materials to construct bankfull benches and log riffles (grade control) with logs and native earth materials. Post construction these littoral areas and riparian areas would be reestablished with native vegetation using native trees, shrubs, and grasses (bioengineering materials) to hold the sediments in place and to reduce the boundary velocities.

Typical log sizes would be 16-20 feet long or greater and a minimum of 10 inches on the small end.

Design Typicals by R. Michael Hanley
Sustainable Watershed Technologies



APPENDIX C

REMOVAL OF WOODY DEBRIS FROM STREAMS:
A post Katrina issue of concern
for the West Boley Creek and other south Mississippi streams

Last spring, the Land Trust for the Mississippi Coastal Plain began a series of discussions with a small group of citizen for the purpose of *Building a Watershed Partnership for West Boley Creek.* Soon, we will present two forums designed for landowners and stakeholders in the watershed: Poplarville (October 24) and Picayune (November 16).

As we plan these forums and seek to learn more about the natural and cultural heritage of West Boley Creek, one subject keeps surfacing: what needs to be done about the storm debris in the Creek? Should we remove the woody debris? And if so, what methodology should be used?

Photo of upper West Boley Creek. September 2006. Eco-Logic Restoration Services

After conversations with experts and a literature review, let us say – there is no simple answer! Storms are a natural part of the evolution of our coastal environment and therefore play a critical role in the ecology. Woody debris is an ecologically important resource in our forests and stream ecosystems. On the other hand, large amounts of woody debris may result in localized problems for landowners. An open dialogue and balanced approach appears to be the best answer.

Well-established concepts in stream ecology emphasize the importance of organic and inorganic materials for aquatic ecosystems. Research shows that woody debris is a 'hot spot' for invertebrates (aquatic insects, worms and crayfish). In other words, woody debris is an important part of the food chain, providing nourishment for fish and wildlife.

Research has demonstrated that forest harvesting to the stream edge and removal of woody debris from the stream channel results in (1) increased light levels, (2) increased stream temperature and (3) decreased levels of dissolved oxygen. These results are of great concern for aquatic species. Research also shows that stream sections with woody debris in the channel store twice as much organic matter as stream sections without woody debris; more organic matter equals better fishing.

Furthermore, the average water velocities are lower in stream sections with woody debris than in stream sections without resulting in less bank and channel erosion. There is a demonstrated link between the presence of woody debris in streams and geomorphic processes that may in some cases reduce flooding concerns.

While there is well-documented ecological reasoning for leaving woody debris in the stream, this same debris may cause concerns to landowners (human use) that would indicate a need to remove the wood: (1) fear of localized flooding, (2) inability to navigate streams, (3) scenic and aesthetic concerns.

Rather than advocating for cleaning the entire stream of woody debris, perhaps we could plan at the watershed scale: identify those areas that create particular concerns for public land use and identify those methods that cause the least harm to the environment. Woody debris in our streams post-Katrina offers yet another opportunity to work with foresters, fishery biologists, wildlife managers, geomorphologists, recreation specialists and policy personnel to coordinate watershed planning, cooperatively utilize natural patterns and processes, and improve socio-ecological systems. Past and present management of riparian debris on the West Boley and other south Mississippi streams has been inconsistent. A growing body of biophysical evidence, coupled with growing acceptance of ecosystem management on public and private lands, gives hope that together we can restore and sustain ecosystem integrity on West Boley Creek.

Perhaps the best advice that we can give in regards to natural resource management along West Boley Creek: seek an informed and balanced approach! Please join us for citizen watershed forums on October 24 and November 16. For more information, contact Judy Steckler, Land Trust for Mississippi Coastal Plain, 228.435.9191. judysteckler@aol.com, www.ltmcp.org.

Respectfully submitted, October 10, 2006

Cynthia Ramseur
on behalf of the West Boley Creek Watershed Partnership
Compatible Development Specialist
Eco-Logic Restoration Services
228.872.2769
www.ecologic-restoration.com

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