DEER CREEK
WATERSHED IMPLEMENTATION PLAN

FINAL DRAFT
MARCH 18, 2008

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WATERSHED IMPLEMENTATION PLAN

Prepared for

Deer Creek Watershed Association

Through

Basin Management Branch
Mississippi Department of Environmental Quality
Jackson, MS

Prepared by

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EXECUTIVE SUMMARY

Deer Creek is a 159-mile waterway that extends from Lake Bolivar in Bolivar County through Washington, Sharkey, and Issaquena counties, before entering Warren County and flowing into Whittington Auxiliary Channel near Vicksburg. This draft of the Watershed Implementation Plan focuses on the upper Deer Creek watershed, which extends from Lake Bolivar to Rolling Fork, and drains about 71,000 acres of the Yazoo River Basin in western Mississippi. In 2005, a Washington County Deer Creek Watershed Association was formed to address the water quality issues in Deer Creek and its watershed. In 2007, the Watershed Association expanded to consider Deer Creek from its source above Lake Bolivar to Rolling Fork, Mississippi.

The Deer Creek Watershed Association is a cooperative, inclusive organization of residents dedicated to improving the quality of life for people who live near and visit Deer Creek, by providing examples of effective stewardship through restoration, management, and conservation of our natural resources. Information on the Deer Creek Watershed Association Executive Committee members is listed in Table ES.1.

The Committee talked to stakeholders, floated Deer Creek, identified stakeholder concerns about Deer Creek, and then developed a watershed implementation plan of activities to address a number of these concerns and water quality problems. The perceived problems and needs are listed in Table ES.2. Plans for addressing these problems and needs are listed in Table ES.3. Other concerns will be addressed in later revisions to the implementation plan.

Table ES.1. Deer Creek Watershed Association Executive Committee.

Name	Organization	Telephone	Cell	E-mail
Barbara Brooks	Leland, MS	(662) 686-4577	(662) 347-1896	brosebrooks@hotmail.com
Mala Brooks	Leland, MS	(662) 686-9996		mubrooks@bellsouth.net
Steve Goff	MDEQ	(601) 961-5238	(601) 955-6298	Steve_Goff@deq.state.ms.us
Cliffton Harris	Arcola, MS	(662) 827-2063	(662) 827-7347	
Shelby Newell	Arcola, MS	(662) 827-8633		
Bo Olswanger	US Fish & Wildlife Service	(662) 839-2638		
Raymond Scott Sr.	Metcalfe, MS	(662) 347-6054	(662) 332-4719, (662) 335-0212	
Emmett Smith	Bogue Philia Drainage	(662) 332-3898		
Pamm Trough	Executive Committee	(662) 822-6769		
Ruby White	Arcola, MS	(662) 827-7513	(662) 820-1402	
Myron Wilson	Executive Committee	(662) 827-5592		
J.C. Wylier	Executive Committee	(662) 827-5420	(662) 820-6940	
Ronald Yarborough	Arcola, MS	(662) 827-5820	(662) 827-5884	ytc@i-55.com

Table ES.2. Perceived problems and needs.

Perceived Problems and Needs
Eliminate health hazards (e.g., mosquitoes and sewage).
Funds for fixing sewer and septic systems.
Pesticides in fish.
Failed culverts in all communities – need new culverts, replace damaged culverts.
Snag and clear Deer Creek – sandbars, old dams/weirs, old bridges.
Bank stabilization.
Erosion control.
Construct weirs to hold water.
Increase water supply and flow – include wells if needed.
Trash in Deer Creek and watershed, including chemical containers, oil, and petroleum containers.
Improve poor public image of Deer Creek.
Increase public awareness of environmental concerns.
Publicize problems and beauty of Deer Creek.
Document historical significance of Deer Creek.
Increase recreational opportunities – swimming, boating, fishing, and ongoing scheduled tours of Deer Creek.
Restock fish.
Boat ramps in Metcalfe, Leland, Arcola, and Hollandale.
Fishing piers, boat ramps, and walking trails in all communities on Deer Creek.
Improve the negative economic impact of Deer Creek.
Environmental education coordinator for schools, civic clubs, etc.
Professionally staffed office in Arcola.
Repository and clearinghouse for monitoring, other studies of Deer Creek.
Remove poly pipe.
Hog and dog pens.

Table ES.3. Deer Creek Watershed Implementation Plan Summary.

	Milestones	Schedule	Responsibility	Date Achieved
Deer Creek Survey	Review aerial photography to identify areas of concern	March 2008	Mississippi Department of Environmental Quality (MDEQ)	
	Technical assistance with planning and conducting survey	March – June 2008		
	Put together and train two survey teams	June 2008		
	Stream survey	August 2008		
	Prepare survey reports	November 2008		
Fix Failing Septic Systems and Eliminate Direct Discharges	Evaluate aerial photography from 2002 for evidence of failing septic systems	March 2008	Mississippi State Department of Health (MSDH)	
	Confirm failing systems identified from aerial photography	October 2008	MSDH	
	Provide landowners with information on repair options	December 2008	MSDH	
	Follow up to ensure systems are repaired	October 2009	MSDH	
	Sewage Summit	May 2008	MDEQ	
Fix Failed Culverts	As part of Deer Creek survey, investigate/confirm areas of head-cutting to determine cause	August 2008	TBD	
	Develop and submit grant proposal for funding to fix failed culverts	October – December 2008	TBD	
	Work with Natural Resources Conservation Commission (NRCS) or County Engineers offices to design and install replacement culverts under field or county roads	June – August 2009	TBD	
	Pre-repair sediment load estimates	2008	TBD	
	Post-repair sediment load estimates	2013	TBD	
Deer Creek Bank Stabilization	Investigate/confirm areas of bank erosion to determine cause during Deer Creek survey	August 2008	TBD	
	Develop and submit grant proposal for funding to stabilize banks, including maintenance	October – December 2008	TBD	
	Install bank stabilization best management practices (BMPs)	June – October 2009	TBD	
	Administer funds and document change in erosion and sediment loading to Deer Creek following installation of BMPs	October 2008 – December 2012	TBD	
	Maintain bank stabilization BMPs	October 2009 on	Landowners	

Table ES.3. Continued.

	Milestones	Schedule	Responsibility	Date Achieved
Aquatic Weed Control Training	Investigate/confirm communities where aquatic weeds occur in Deer Creek	Summer 2009	Mississippi Bureau of Plant Industry, Mississippi State University Cooperative Extension Service	
	Contact communities for interest in controlling aquatic weeds	Fall 2009		
	Develop training program for weed control	Fall 2009		
	Find funding for training	Winter 2010		
	Present the training program	Winter 2010		
	Implement the aquatic weed control program in interested communities	Spring/Summer 2010		
	Monitor reduction in aquatic weeds	Fall 2010 – Fall 2015		
Implement Agricultural BMPs	Identify and prioritize area sources contributing organic matter and nutrients to Deer Creek	Spring 2009	NRCS, MSWCC, and MDEQ	
	Contact landowners and determine receptiveness to implementing BMPs	Summer 2009		
	Prepare Environmental Quality Incentives Program (EQIP), Section 319, or similar proposals	Fall 2009		
	Implement BMPs	Spring 2010		
	Monitor success of BMPs in reducing organic matter and nutrient loads to Deer Creek	Fall 2010 to Fall 2015		
Fish Tissue Sampling Survey	Design and plan fish tissue survey	March – July 2008	MDEQ	
	Collect fish tissue samples	August 2008		
	Analyze fish tissue samples	September 2008 – March 2009		
	Provide summary report and fact sheet to Deer Creek Watershed Association	June 2009		
Sediment Pesticide Survey	Design and plan survey	March – July 2008	MDEQ	
	Conduct survey	August 2008		
	Analysis of samples	September 2008 – March 2009		
	Prepare and submit survey report	June 2009		
	Prepare and submit fact sheet	July 2009		
Establish Minimum Flow for Deer Creek	Monitor Deer Creek flows	2008 – 2011	MDEQ	
	Establish minimum flow based on flow and water quality monitoring	2011		
	Monitor, permit, and regulate water withdrawals from Deer Creek	2012		

Table ES.3. Continued.

	Milestones	Schedule	Responsibility	Date Achieved
Develop Walking Trails along Deer Creek in Towns	Identify and contact two communities with potential to develop walking trails along Deer Creek	Summer 2008	Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP)	
	Estimate the effort and cost associated with developing and maintaining trails	Fall 2008		
	Apply for funds to construct walking trails	Winter 2008 – 2009		
	Construct walking trails	2009 – 2010		
	Monitor and document trail use	2010 on		
Boat Ramps on Deer Creek	Identify access points for Deer Creek and possible areas to upgrade access	2010	MDWFP	
	Design boat ramp and solicit funds	2010		
	Construct boat ramp	2011		
	Monitor use	2012		
Develop Information for Self-Guided Tours of the Area	Conduct research on historical and cultural significance of Deer Creek	2010	Mississippi Dept. of Archives and History, Division of Tourism	
	Document location, access, and context of historical and cultural sites along Deer Creek	2011		
	Request funds to prepare brochures and to purchase and erect historical/cultural markers	2012		
	Prepare brochures, erect markers, and distribute brochures through Division of Tourism and local businesses	2013 on		
Sewage Summit	Sewage Summit	May 2008	MDEQ	
Deer Creek Signage	Contact communities to determine where to install signs	Done	Deer Creek Watershed Association (DCWA)	
	Solicit funds for signs and installation from Mississippi Partners for Fish and Wildlife program	Done	DCWA	
	Make signs	Done	US Fish and Wildlife Service (USFWS)	
	Install signs	Done	USFWS	
Annual Deer Creek Clean-Up Day	Organize Clean-Up Day	Annual	DCWA	
	Clean-Up Day	Annual		
	Evaluate Clean-Up Day	Annual		

Table ES.3. Continued.

	Milestones	Schedule	Responsibility	Date Achieved
Essay Contest	Raise prize money	January - October	DCWA	
	Advertise for essay submittals (including contest rules)	October		
	Arrange for essay judges	September - October		
	Collect essays	November 30		
	Judge essays	December		
	Announce contest winner	December		
	Submit press releases about contest and winner to local news media	December		
	Transfer of prize money to selected college/university	January		
Float Contest	Raise prize money	January - October	DCWA	
	Advertise float contest, including contest rules	October		
	Transfer money for float materials to participating schools	October		
	Arrange for float judges	September - October		
	Due date for floats	November 30		
	Judge floats	December		
	Announce contest winner	December		
	Submit press releases about contest and winner to local news media	December		
	Transfer prize money to winning school	December		
Website	Gather information about Deer Creek and Deer Creek projects	TBD	TBD	
	Select service/person to design, develop, and maintain website	TBD		
	Website design and development (including testing and modification)	TBD		
	Update information on website	Quarterly		
	Website maintenance (including problem solving, updating information, and upgrading programming as required)	TBD		
Newsletter	Select service/person(s) to design and publish newsletter	TBD	TBD	
	Select service/person(s) to create and maintain distribution/mailing list	TBD		
	Select service/person(s) to gather information for newsletter issues, write articles for newsletters, and manage/edit newsletters	TBD		
	Newsletter design	TBD		
	Newsletter publication (including layout design and production)	TBD		
	Newsletter distribution	TBD		
	Confirm/update distribution/mailing list	Annually		
Media Coverage	Write and send out press releases and/or call media	TBD	TBD	
	Write and submit articles	TBD		
	Arrange interviews	TBD		

Table ES.3. Continued.

	Milestones	Schedule	Responsibility	Date Achieved
Deer Creek Watershed Coordinator Position	Put together committee to work with agencies and organizations in creating the watershed coordinator position	2008	DCWA	
	Develop position description, including expectations and objectives	2008	Committee	
	Develop terms for the position, including salary, length of time, terms for dismissal, evaluation criteria, evaluation schedule, evaluation procedures, and terms for hiring (e.g., majority vote of committee)	2008	Committee	
	Acquire funding for salary and maintenance of office	2009	Committee	
	Locate and outfit office for watershed coordinator	2010	Committee	
	Advertise and interview applicants for position	2010	Committee	
	Hire watershed coordinator	TBD	Committee	
Environmental Education Coordinator	Develop committee rules (including committee structure, how members are selected/elected, length of term, conditions of membership) and responsibilities	TBD	TBD	
	Select/elect committee members			
	Schedule and hold regular meetings			
	Write up meeting minutes and provide to newsletter staff			
	Write up annual report and provide to DCWA and newsletter staff			
	Define requirements and responsibilities of Environmental Education Coordinator position			
Deer Creek Information Repository	Contact communities to determine if one of the community libraries would be willing to house information regarding Deer Creek	2008	TBD	
	Develop grant to fund Deer Creek repository	2009	TBD	
	Repository setup	March 2010	TBD	

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1.0 MISSION STATEMENT

The Deer Creek Watershed Association (DCWA) is a cooperative, inclusive organization of residents dedicated to improving the quality of life for people who live near and visit Deer Creek by providing examples of effective stewardship through restoration, management, and conservation of our natural resources.

2.0 DEER CREEK WATERSHED

2.1 Watershed Description

Deer Creek is a 159-mile waterway that extends from Lake Bolivar in Bolivar County through Washington, Sharkey, and Issaquena counties, before entering Warren County and flowing into Whittington Auxiliary Channel near Vicksburg. This Watershed Implementation Plan (WIP) initially focuses on the upper Deer Creek watershed.

The upper Deer Creek watershed extends from Lake Bolivar to Rolling Fork, and drains approximately 71,000 acres of the Yazoo River Basin in portions of Bolivar, Washington, and Sharkey counties in western Mississippi (Figure 2.1) (MDEQ 2003a, DeLorme 1998). Approximately 12,000 people lived in this watershed in 2000 (based on Census 2000, county data). Portions of the cities of Leland, Arcola, Hollandale, Metcalfe, and Rolling Fork are in the upper Deer Creek watershed. Agriculture is the primary land use in the upper Deer Creek watershed, with 84% cropland and 5% pasture (Figure 2.2).

The watershed is underlain by alluvial deposits of sand and clay. The topography of the watershed is mostly flat, with river terraces and levees providing the main topographic relief (MDEQ 2000). Dundee-Bosket-Beulah-Souva is the major soil association in the watershed (Morris 1961). Soils in this association are nearly level, somewhat poorly drained to well-drained, silt loam and sandy loam soils formed on old natural levees. The watershed is located in the Mississippi Alluvial Plain ecoregion (MDEQ 2000). Native vegetation in the watershed consists of bottomland hardwoods (oak, gum, cottonwood, and cypress) (MARIS online map accessed June 24, 2004).

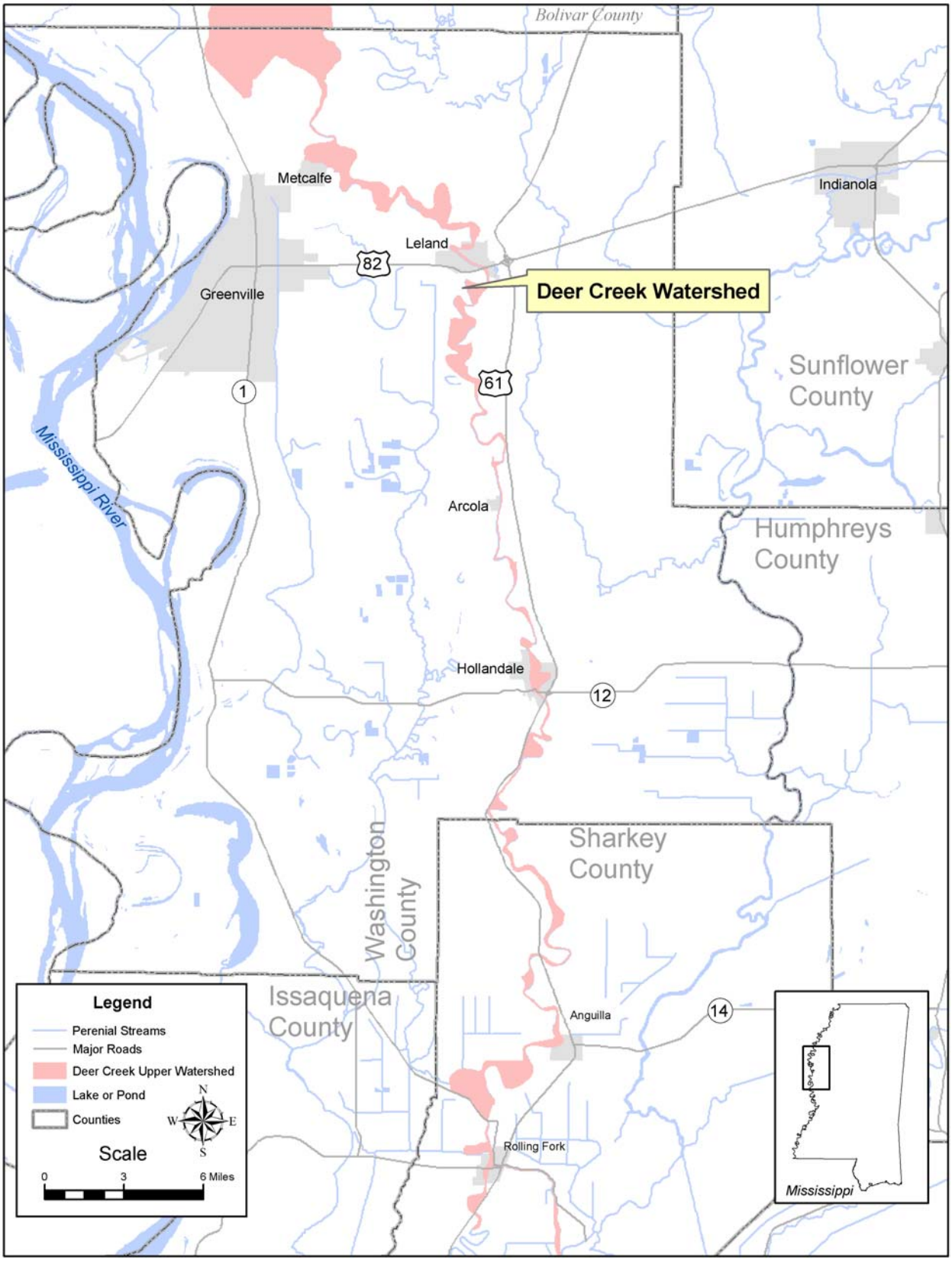

Figure 2.1. Deer Creek watershed.

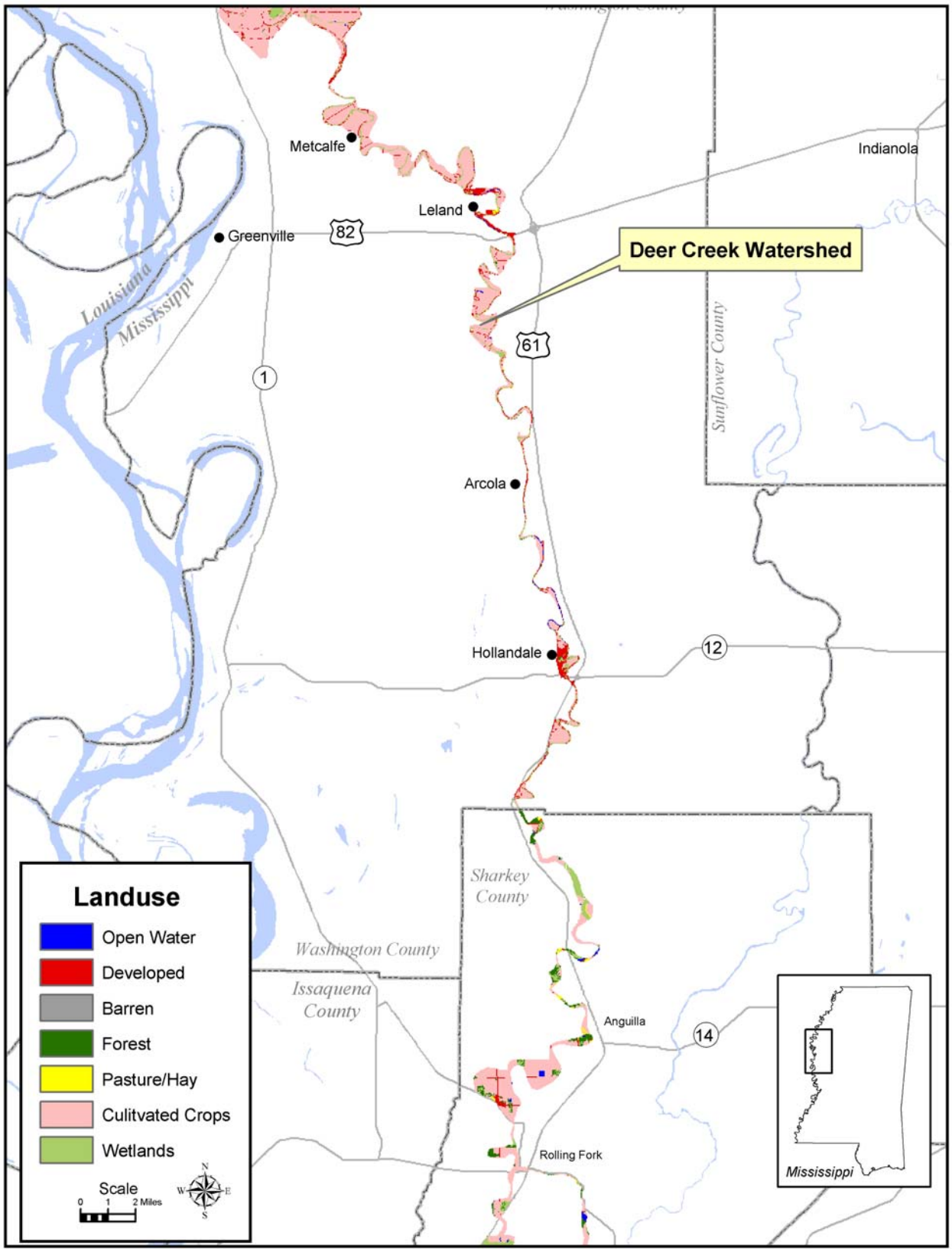

Figure 2.2. Land use in Deer Creek watershed.

Named creeks in the watershed include Deer Creek, Otter Bayou, East Branch, and Williams Bayou. There are two lakes in the upper Deer Creek watershed, Lake Bolivar and Saw Grass Lake. Numerous smaller impoundments and oxbow lakes are present in the watershed (DeLorme 1998). At Rolling Fork, a large portion of Deer Creek flow is diverted to Rolling Fork Creek (MDEQ 2003a). Approximately 5,200 acres of wetlands occur along upper Deer Creek. Water levels in the creeks and wetlands are maintained by the shallow alluvial aquifer that underlies the watershed. Public water supply is primarily provided from deep confined aquifers that are generally protected from contamination. Water for agricultural uses (e.g., irrigation) is primarily drawn from the shallow alluvial aquifer (MDEQ 2000).

2.2 Water Quality

2.2.1 Standards

The designated use class for all perennial surface waters of this watershed, as stated in the Mississippi water quality regulations, is Fish and Wildlife Support. The designated beneficial uses for these waters are Aquatic Life Support and Secondary Contact Recreation (http://deq.state.ms.us/MDEQ.nsf/page/WMB_yazoodesignate?OpenDocument). Portions of Deer Creek are also permitted for irrigation withdrawal. Table 2.1 lists the numeric water quality criteria applicable to Deer Creek watershed surface waters (MDEQ 2002).

Table 2.1. Water quality criteria for Deer Creek watershed.

Parameter	Criteria
Dissolved Oxygen	5.0 mg/L daily average, 4.0 mg/L instantaneous
pH	Between 6.0 and 9.0 su
Temperature	32.2ºC
Fecal coliform	May – October: geometric mean of 200 per 100 mL, 400 per 100 mL less than ten percent (10%) of the time during a 30-day period. November – April: geometric mean of 2000 per 100 mL, 4000 per 100 mL less than ten percent (10%) of the time during a 30-day period.
Specific conductance	1000 µohms/cm
Dissolved Solids	750 mg/L monthly average, 1500 mg/L instantaneous

Mississippi's water quality standard for sediment is narrative and reads as follows: "Waters shall be free from materials attributed to municipal, industrial, agricultural, or other discharges producing color, odor, taste, total suspended or dissolved solids, sediment, turbidity, or other conditions in such degree as to create a nuisance, render the waters injurious to public health, recreation or to aquatic life and wildlife, or adversely affect the palatability of fish, aesthetic quality, or impair the waters for any designated use" (MDEQ 2002).

2.2.2 Current Condition

2.2.2.1 Surface Water Quality

There is a Mississippi Department of Environmental Quality (MDEQ) ambient monitoring site on Deer Creek at Hollandale. A number of other agencies have conducted water quality studies on Deer Creek. In the early 1970s, Deer Creek was sampled during pollution studies on the Big and Little Sunflower Rivers by the Mississippi Department of Wildlife, Fisheries and Parks (MDWFP) and Mississippi Game and Fish Commission. More recent water quality sampling (in the 1990s and 2000s) has been conducted by MDEQ, the Yazoo-Mississippi Delta Joint Water Management District, United States Department of Agriculture (USDA) Agricultural Research Service, Natural Resources Conservation Service (NRCS), and United States Geologic Survey (USGS). Information on the sampling dates and parameters sampled by the various agencies at various locations on Deer Creek is provided in the Yazoo River Basin Compendium of Water Quality Information (MDEQ 2003) and in the sediment/siltation, organic enrichment/low dissolved oxygen (DO), and nutrients total maximum daily loads (TMDLs) for Deer Creek (MDEQ 2003a).

Two segments of Deer Creek (MS407M1 and MS403M6) and a portion of the Deer Creek watershed associated with segment MS402E have been classified as impaired and included on the Mississippi 303(d) list. Table 2.2 lists the designated uses that were classified as impaired, the listed causes of the impairments, and the year the impairment was identified.

Table 2.2. Mississippi 303(d) listings of Deer Creek segments.

Segment No.	Description	Impaired Use	Pollutant/Cause	Year Listed
MS407M1	Smedes to Valley Park	Aquatic life support	Nutrients, organic enrichment/low DO	2006
MS407M1	Smedes to Valley Park	Fish consumption	Pesticides	1996
MS403M6	Arcola to Percy	Fish consumption	Pesticides	2004
MS403M6	Arcola to Percy	Secondary contact	Pathogens	1998
MS403M6	Arcola to Percy	Aquatic life support	Nutrients, organic enrichment/low DO, sediment/siltation	1998
MS402E	Drainage area near Winterville from Lake Boliver to Deer Creek	Fish consumption	Pesticides	1996
MS402E	Drainage area near Winterville from Lake Bolivar to Deer Creek	Secondary contact	Pathogens	1998
MS402E	Drainage area near Winterville from Lake Bolivar to Deer Creek	Aquatic life support	Nutrients, organic enrichment/low DO, sediment/siltation	1998

2.2.2.2 Groundwater Resources

The majority of drinking water in this watershed is supplied by groundwater from a deep confined aquifer. The majority of agricultural water use in this watershed is supplied by groundwater from the shallow alluvial aquifer. No issues have yet been raised with regard to groundwater quality from either aquifer (MDEQ 2000).

2.2.2.3 Wildlife Resources

A number of threatened or endangered species are listed for the counties of the upper Deer Creek watershed. These species are listed in Table 2.3. However, upper Deer Creek and its environs are significantly modified from natural conditions, and none of these federally listed species are known to occur in the area. There are also approximately 60 species of "special concern" for the upper Deer Creek counties included in the Natural Heritage Inventory (Appendix A) (http://www.mdwfp.com/museum/html/research/downloads.html). These species may be present in the watershed and/or the surrounding area. Deer Creek is included in the Delta

fish consumption advisory issued in 2001 for DDT and toxaphene in all sizes of carp, buffalo, and gar, and catfish over 22 inches (MDEQ 2001).

Table 2.3. Federally listed species for upper Deer Creek counties.

Scientific Name	Common Name	Federal Status	Bolivar County	Washington County	Issaquena County	Sharkey County	Warren County
Puma concolor coryi	Florida Panther	E		X		X	
Ursus americanus luteolus	Louisiana Black Bear	T		X	X	X	
Mycteria Americana	Wood Stork	E				X	X
Scaphirhynchus albus	Pallid Sturgeon	E			X	X	
Falco peregrinus	Peregrine Falcon	E					X
Sterna antillarum athalassos	Interior Least Tern	E	X				X
Pelecanus occidentalis	Brown Pelican	E	X				
Haliaeetus leucocephalus	Bald Eagle	T	X				X
Lindera melissifolia	Pondberry	E	X			X	

Note: E = Endangered; T = Threatened

2.2.3 TMDLs

Segments in the upper portion of Deer Creek that have been included on the Mississippi 303(d) list as impaired are listed in Table 2.2. Four TMDLs have been completed addressing all but the 2006 listing of segment MS407M1. These TMDLs are described below.

A Phase I TMDL addressing organic enrichment/low DO and biological impairment in segments MS403M6 and MS402E has been completed and approved by the United States Environmental Protection Agency (USEPA) (MDEQ 2003a). This was a Phase I TMDL because no data were available for calibrating the model to critical conditions (summer low flow). A 79% reduction in nonpoint sources of organic material was recommended in the TMDL. Table 2.4 lists the total biological oxygen demand (TBODu) TMDLs for Deer Creek (MDEQ 2003a).

Table 2.4. Deer Creek organic enrichment/low DO TMDL (MDEQ 2003a).

Type	Load (lbs/day TBODu)
Waste Load Allocation	81.8
Load Allocation	84.0
Margin of Safety	(implicit)
TMDL	165.8

A TMDL addressing pathogens in the upper portion of Deer Creek has also been completed and approved by USEPA. This was a Phase I TMDL due to lack of flow data and fecal coliform measurements. Nonpoint pathogen sources were of primary concern in the listed stream segments. No percent reduction was developed in the TMDL study. However, the study did recommend that the nonpoint load be reduced by eliminating failing septic systems and direct pipes that discharge to Deer Creek (MDEQ 2003b).

A TMDL addressing sediment from nonpoint runoff and in-channel processes in the upper portion of Deer Creek has been completed and approved by USEPA. The TMDL study determined that estimated sediment loads for Deer Creek were already within the range of estimated target sediment loads for the creek; therefore, no reduction in sediment load was required (MDEQ 2003c).

The pesticide impairments in Deer Creek were addressed in pesticide TMDLs for the Yazoo River Basin (MDEQ 2003d, 2005). The target for these TMDLs was the removal of fish consumption advisories for DDT and toxaphene and the reduction of water column concentrations to the DDT human health and aquatic organism standards and the toxaphene fresh water chronic standard. The methods proposed for achieving these targets included implementation of best management practices (BMPs) to reduce sediment loading to water bodies (these pesticides are present in basin soils) (MDEQ 2003d) and natural attenuation (historical pesticide monitoring data from the Yazoo River basin has indicated a decreasing trend in pesticide concentrations in soils, fish tissue, and water) (MDEQ 2003d).

2.3 Stakeholder Concerns

Deer Creek was selected for implementation of restoration activities based on its TMDLs and high level of stakeholder interest (MDEQ 2004b). Table 2.5 is a listing of stakeholder perceived problems and needs that have been identified. The location of some of these problems and needs are listed in Table 2.6 and shown in Figure 2.3.

Table 2.5. Perceived problems and needs.

Perceived Problems and Needs
Eliminate health hazards (e.g., mosquitoes and sewage).
Funds for fixing sewer and septic systems.
Pesticides in fish.
Failed culverts in all communities – need new culverts, replace damaged culverts.
Snag and clear Deer Creek – sandbars, old dams/weirs, old bridges.
Bank stabilization.
Erosion control.
Construct weirs to hold water.
Increase water supply and flow – include wells if needed.
Trash in Deer Creek and watershed, including chemical containers, oil, and petroleum containers.
Improve poor public image of Deer Creek.
Increase public awareness of environmental concerns.
Publicize problems and beauty of Deer Creek.
Document historical significance of Deer Creek.
Increase recreational opportunities – swimming, boating, fishing, and ongoing scheduled tours of Deer Creek.
Restock fish.
Boat ramps in Metcalfe, Leland, Arcola, Hollandale, Anguilla, and Rolling Fork.
Fishing piers, boat ramps, and walking trails in all communities on Deer Creek.
Improve the negative economic impact of Deer Creek.
Environmental education coordinator for schools, civic clubs, etc.
Professionally staffed office in Arcola.
Repository and clearinghouse for monitoring, other studies of Deer Creek.
Remove poly pipe.
Hog and dog pens.

Table 2.6. GPS readings from Deer Creek inspection (March 2006).

Map Location	Issue or Comment
Pt 1	Sewer pipes on west side of creek.
Pt 2	Site of irrigation on east side of creek.
Pt 3	Pesticide containers.
Pt 4	Moderate fill in creek near culvert from field.
Pt 5	Illicit septic discharge.
Pt 6	Log jam.
Pt 7	Caved-in culvert.
Pt 8	Creek blocked by plant material forming a mat.
Pt 9	Big ditch coming into upper creek from farm.
Pt 10	Leland sewer leak.
Pt 11	Big ditch south of Leland.
Pt 12	Bridge at Broadway extended; from this point going north is where most sediment loading is occurring.

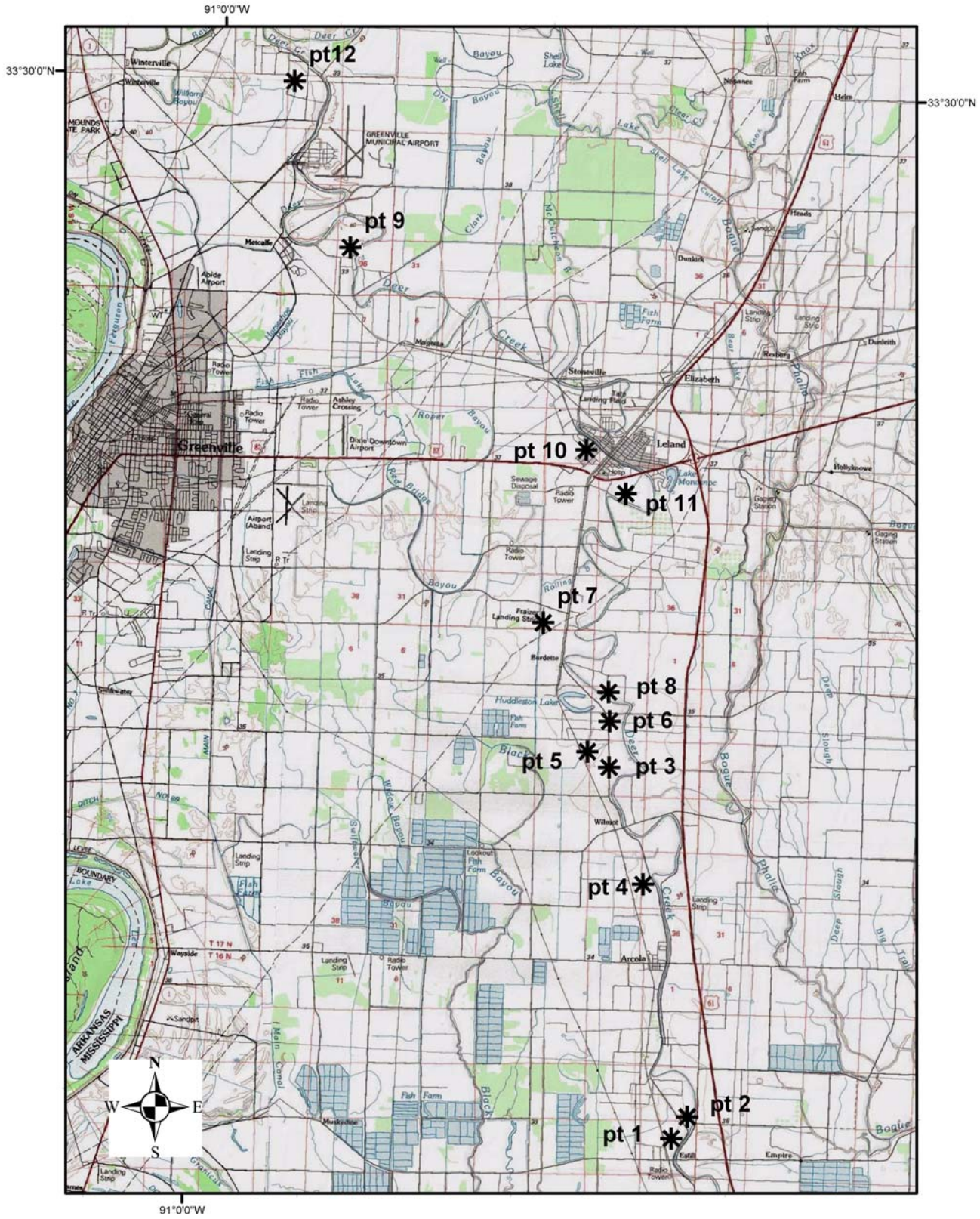

Figure 2.3. Locations of problems listed in Table 2.6.

3.0 WATERSHED IMPLEMENTATION PLAN

There are two underlying management principles of this WIP: ecosystem-based management and adaptive management. The goals and objectives of this plan reflect these principles. Each of these management principles is briefly described below, followed by watershed management actions that are planned for the near future to work toward the vision for Deer Creek. Goals related to other existing or potential concerns in this watershed will be addressed in future implementation plans.

3.1 Ecosystem-Based Management

Deer Creek and its watershed represent the ecosystem management unit. Although Deer Creek is typically considered the ecosystem, a stream and its watershed cannot be divorced. Land use and land cover activities in the watershed and surrounding areas directly or indirectly affect Deer Creek (e.g., there are fields located outside the Deer Creek watershed boundary that have drains that discharge to the creek). Sediment and nutrient loadings from the lands along Deer Creek drive many stream processes, including both desirable and undesirable changes in the stream. The ecosystem, however, is characterized not only by its environmental attributes, but also by its socioeconomic attributes. Humans are part of, not apart from, aquatic ecosystems. Watershed management is fundamentally a social activity (Thornton and Creager 2001; Thornton and Laurin 2005).

The benefits that accrue from reduced sediment and nutrient loadings to Deer Creek are not just associated with the stream in terms of increased water clarity, reduced sedimentation and loss of volume, reduced algal blooms, a more productive sport fishery, and greater recreational and aesthetic values. The agricultural community also benefits from reduced sediment and nutrient loadings. For example, Pimentel et al. (1995) estimated that each ton of sediment lost was worth about $6.75 per year to the farmer ($5.00 per ton for lost nutrients, and $1.75 per ton for lost soil and water capacity). Delta farmers are losing 1.4 to 2.8 tons of sediment per acre per year in the Delta. For a 1,000-acre farm, this results in an economic loss of $9,450 to $16,200 per year through soil erosion.

3.2 Adaptive Management Process

In addition to ecosystem-based management, an adaptive management process is being used for watershed management associated with Deer Creek. Adaptive management is "learning by doing" and has become the recommended approach for ecosystem and natural resources management, including watershed management (Christensen et al. 1996; Holling 1978; Jackson et al. 2001). Adaptive management has helped shift management from the concept that there is a "balance of nature" to a more realistic concept that ecosystems are dynamic, non-equilibrium systems. The environment is continually changing – climate, development, agricultural practices, demographics, and societal values. Adaptive management is the only feasible approach for moving toward sustainable water resources (Coleman 1998).

Adaptive management, or learning by doing, means that periodic assessments must be made to determine if results-based criteria (e.g., decreased pesticides in fish) are being attained and if the stream is moving toward the desired vision for Deer Creek. The schedule for these periodic assessments and revision of the watershed management plan is discussed in Section 5. The rotating basin approach used by MDEQ is part of this periodic assessment process.

3.3 Management Actions

The goals for this watershed implementation plan stem from the stated mission to improve the quality of life for people who live near and visit Deer Creek through effective stewardship. In fulfilling this mission, the following goals are set for this implementation plan:

- Ensure Deer Creek attains water quality standards to protect human health and designated uses;
- Restore instream and riparian habitat in Deer Creek and its watershed; and
- Improve and manage Deer Creek and its watershed so it contributes to an improved quality of life (health, jobs, economy, education, recreation, aesthetics, and spirituality) for all who experience it.

Planned management actions for achieving these goals fall within six general categories, discussed below:

1. Health Hazards;
2. Erosion and Sedimentation;
3. Pollutants (in water, sediment, fish, and plants);
4. Water Quantity;
5. Recreational Opportunities; and
6. Socioeconomic Development.

For each category, there is a general introduction followed by a table(s) that provides information on the specific management action, its objective(s) and benefit(s), participants involved in implementing the management activity, their role and responsibility, the schedule, and estimated budget. Note that values shown for load reductions, number of management practices to be installed, and costs are planning estimates and subject to change.

3.3.1 Health Hazards

The concerns raised by the stakeholders that have been categorized as health hazards include failing septic systems, direct discharge of untreated sewage into Deer Creek, E. coli and other pathogens, and West Nile virus and other mosquito problems. There are two management actions planned that address the sewage-related health issues:

- A survey of Deer Creek to identify locations of failing septic systems and direct sewage discharge pipes, and
- Repair of failing septic systems.

Each of these management actions is briefly discussed below and then highlighted in Tables 3.1 and 3.2. In addition, a Sewage Summit to inform municipal and county officials, installers, and residents about decentralized and onsite sewage treatment systems is planned as an education and outreach action to address sewage-related health issues. The Sewage Summit is described in detail in Section 4.0.

1. Deer Creek Survey

An important first step for most restoration work in the Deer Creek watershed is determining specific sites in need of restoration. An initial survey has been conducted (see Section 2.3). A more detailed survey is warranted before implementation of restoration practices.

This survey will encompass the entire length of Deer Creek. An initial review of the watershed will be made using aerial photographs flown within the last 2 years and information gathered during the March 2006 survey and from stakeholders. From this initial review, locations will be identified for confirmation and in-depth investigation during the detailed survey. Lastly, two survey teams will be put together to characterize Deer Creek from Lake Bolivar to Rolling Fork. The survey teams will employ USEPA Rapid Bioassessment Protocols, Natural Steam Channel Design procedures, or similar hydraulic/physical habitat protocols for the survey. Teams will characterize stream bank erosion and fishery habitat and record GPS coordinates. They will also record GPS coordinates of all inflows to Deer Creek, that could be possible sources of nutrients, organic material, and/or pathogens. Conditions will also be documented with photographs. The teams will prepare survey reports to be used to plan restoration activities in Deer Creek (Table 3.1).

2. Fix Failing Septic Systems and Direct Discharges

Aerial photography will be used to identify locations of potentially failing septic systems. These locations will then be evaluated on the ground to determine their status. When failing systems are identified, MSDH will provide landowners with information on repair options. MSDH will follow up to ensure that failing systems are replaced or repaired (Table 3.2). Assuming daily per capita loads of 50 gallons/person/day carbonaceous biochemical oxygen demand (CBOD), 10 gallons/person/day total nitrogen, 3.5 gallons/person/day total phosphorus, and 12×10^8 fecal coliforms/person/day from the failed systems (USEPA 1980), and that each system serves two people, fixing one failing septic system would be estimated to result in the reduction of approximately 80 lbs per year of oxygen demand, 16 pounds/year of nitrogen, 5 pounds/year of phosphorus, and 9×10^{11} fecal coliforms/year. This is consistent with TMDL recommendations for reducing organic matter loading to Deer Creek (Table 2.4).

3.3.2 Erosion and Sedimentation

Erosion in Deer Creek and on the adjacent lands can lead to sedimentation in Deer Creek. Erosion and sedimentation affect both the aquatic and riparian (stream bank) habitat associated with the creek. Four management actions are planned to address erosion and sedimentation:

1. Fixing head-cuts and failed culverts,
2. Bank stabilization,
3. Aquatic weed control training,
4. Implementation of agricultural BMPs,
5. A Deer Creek survey.

These actions address the goals of Deer Creek by attaining water quality standards and achieving designated uses, restoring instream and riparian habitat, and improving quality of life. The Deer Creek survey was described in Section 3.3.1. The other management actions are briefly discussed below and highlighted in Tables 3.3 through 3.6, located at the end of Section 3.0.

1. Fix Head-Cuts and Failed Culverts

There are drainage canals in crop fields adjacent to Deer Creek that drain to the creek and are currently subject to head-cutting. Erosion of head-cuts can be a significant source of sediment that could end up in Deer Creek. Section 319 grants can be prepared to fund part of the cost of fixing head-cuts identified during the survey (Section 3.3.1).

Some culverts in the Deer Creek watershed have collapsed and now serve as impediments to, rather than conduits for, flow under field roads. These culverts need to be removed and replaced. These failed culverts can result in downstream erosion, bank instability, and increased upstream sedimentation. Section 319 grants can be prepared to fund part of the replacement of failed culverts identified during the survey (Section 3.3.1). Activities associated with this management action are highlighted in Table 3.3.

2. Bank Stabilization

Sedimentation in Deer Creek can arise both from soil erosion in the watershed and bank erosion in the stream. Bank instabilities contribute not only to water quality degradation, but also

to loss of habitat for aquatic organisms. Bank stabilization is required both for habitat and water quality improvement. Section 319 and NRCS Wildlife Habitat Improvement Program (WHIP) are candidates for proposals to fund bank stabilization efforts at sites identified during the survey (Section 3.3.1). Activities associated with this management action are highlighted in Table 3.4.

3. Aquatic Weed Control Training

Aquatic weeds often occur in Deer Creek at locations subject to sedimentation. Once aquatic weeds become established, they can further impede flow and promote sedimentation. They are generally considered undesirable in those areas of Deer Creek that flow through communities. Not all aquatic plants are weeds, and some aquatic plants provide habitat for fish and other aquatic organisms. However, these communities lack the expertise to know what plants are undesirable (weeds) and how to control or get rid of them. Therefore, it would be beneficial to provide training on this subject to community leaders and employees. Activities associated with this management action are highlighted in Table 3.5.

4. Implementation of Agricultural BMPs

The sediment TMDL completed for Deer Creek indicated that reductions in sediment load from the watershed were not needed. However, a number of farms operating adjacent to Deer Creek recognize that they are experiencing significant soil loss from their fields, and some of this eroded material is deposited in Deer Creek. Potential sites for BMPs such as water control structures, seasonal residue management, buffer zones, land forming, and tree planting will be identified during the Deer Creek survey and by local land owners. Implementation of these and/or other BMPs will address erosion and sediment transport from individual fields to Deer Creek. In addition, sediment BMPs will reduce organic material and pesticide runoff and loading to Deer Creek from these fields. Activities associated with this management action are highlighted in Table 3.6.

3.3.3 Pollutants

The primary pollutants of concern in Deer Creek are nutrients, organic material, and pesticides. Nutrients and organic material are suspected of contributing to low DO conditions in Deer Creek. Potential sources of nutrients and organic material to Deer Creek include untreated sewage and fertilizers in field runoff and drain effluent.

In the past, pesticides have been measured in Deer Creek fish at levels above those considered safe for human consumption. Some data collected in the Delta suggest that pesticide levels in fish are declining, however, there is no recent data from Deer Creek to confirm that pesticide levels are declining and/or have reached safe levels, in the Deer Creek sport fish population. In addition, there is concern that pesticides stored in Deer Creek sediments may act as a source for continued fish contamination. Again, no recent data are available characterizing pesticide levels in Deer Creek sediments.

Three management actions are planned to address these concerns:

1. A Deer Creek fish tissue survey,
2. A Deer Creek sediment pesticide survey, and
3. Implementation of agricultural BMPs.

These actions address the goals of Deer Creek attaining water quality standards and achieving designated uses, restoring instream and riparian habitat, and improving quality of life. Reducing sewage and organic material loading was discussed in Section 3.3.1. Implementation of agricultural BMPs for reducing sediment, nutrients, and pesticides was described in Section 3.3.2. The other management actions are briefly discussed below and highlighted in Tables 3.7 and 3.8, located at the end of Section 3.0.

1. Deer Creek Fish Tissue Survey

Carp, buffalo, gar, and large catfish in Deer Creek are included in the Delta fish consumption advisory for DDT and toxaphene. There is interest in obtaining a more complete picture of the levels of DDT and toxaphene in Deer Creek game fish prior to providing increased fishing access to, or promoting fishing in, Deer Creek. Therefore, a fish tissue sampling survey is planned.

2. Sediment Pesticide Survey

Deer Creek sediments are a potential source of pesticides for fish tissue contamination in the system. Ensuring the human health safety of the Deer Creek fishery requires evaluation of potential sources of contamination. This action addresses the fishable (including fish consumption) designated use for Deer Creek and the suitability of the habitat to produce fish that are safe to eat.

3.3.4 Water Quantity

Maintaining a minimum flow in Deer Creek can improve water quality and fish habitat, and enhance the aesthetics of the creek. Currently parts of Deer Creek are dry during late summer (August). Determining the minimum flow for Deer Creek is the current planned management action for this category. This management action is described in detail below and highlighted in Table 3.9.

1. Establish Minimum Stream Flow

Deer Creek is part of the state's water supplies available for out-of-stream beneficial use (e.g., irrigation). Water withdrawals for beneficial use should be managed under the regulations established by MDEQ. There are currently several active permits for water withdrawals from Deer Creek. A minimum flow needs to be established for Deer Creek to provide both for permitted withdrawals and aquatic life support.

3.3.5 Recreational Opportunities

Providing opportunities for recreation associated with Deer Creek can improve quality of life in the communities and area around the creek. Many stakeholders believe that increasing flow in Deer Creek (or maintaining a minimum flow) is the first step in increasing recreational opportunities associated with the creek. Stakeholders are also interested in developing or improving fisheries for catfish, crappie, bass, and bream in Deer Creek to increase recreational opportunities. Planned management actions for increasing recreational opportunities include:

1. Developing walking trails along Deer Creek in Metcalfe, Rolling Fork, Hollandale, and Leland;
2. Developing boat ramps on Deer Creek in Hollandale and Metcalfe;
3. Developing information for a driving/cycling tour of local historical sites and/or a float tour of Deer Creek; and
4. Establishing minimum stream flow for Deer Creek (see Table 3.9).

The issue of increasing flow in Deer Creek was discussed in detail in Section 3.3.4. The remaining management actions are discussed below and highlighted in Tables 3.10 through 3.12.

1. Develop Walking Trails Along Deer Creek

The towns of Metcalfe, Rolling Fork, Hollandale, and Leland are interested in developing walking nature trails along Deer Creek in their communities. Several of these communities currently own property along Deer Creek on which trails could be developed. The details of this management action are highlighted in Table 3.10.

2. Develop Boat Ramps on Deer Creek

No developed access currently exists on Deer Creek. The towns of Metcalfe and Hollandale are interested in developing public access (i.e., boat ramp) to Deer Creek in their communities. Having two public access points will make it easier to canoe/float Deer Creek, and provide additional opportunities for recreation on Deer Creek. The details of these projects are highlighted in Table 3.11.

3. Develop Information for Self-Guided Tours of the Area

The land surrounding Deer Creek has many historical sites (e.g., plantations, Indian mounds) whose history is significant not only to the state of Mississippi, but also to the nation. Information on these sites can be obtained from area historians and organizations such as the Delta State History Department, Vicksburg Military Park, and the Corps of Engineers, and compiled into a document to be used for self-guided driving/cycling tours of the Deer Creek area. Markers would be installed at sites of interest. The Mississippi River Trail for Cyclists

covers ten states from Lake Itasca, Minnesota, to the Gulf of Mexico in Louisiana. The Mississippi River Trail enters Mississippi from Helena, Arkansas, on Highway 49, and travels close to the river. In Washington County, cyclists travel on Highway 1 to Lake Washington and onto Mayersville where the Mississippi River Trail follows the levee almost to Eagle Lake. Detours from the trail to Deer Creek and associated communities could be promoted in these self-guided tour documents.

A document could also be produced highlighting historical and natural sites encountered when boating Deer Creek. This document could include information about Deer Creek fisheries, access, float characteristics, and other information useful to boaters and anglers, as well as information about the historical significance of Deer Creek. Brochures for drivers, cyclists, boaters, and anglers would provide additional recreational opportunities in the area. The details of this management action are highlighted in Table 3.12.

3.3.6 Socioeconomic Development

The Mississippi Delta is classified as economically depressed. Management actions planned along Deer Creek will improve quality of life and potentially create sustainable jobs in the area. Improving the water quality and aesthetics of Deer Creek and reducing health risks associated with the creek improves the quality of life along Deer Creek. Increasing recreation opportunities along Deer Creek also improves the quality of life in the area, but in addition, has the potential to create sustainable recreation associated jobs (e.g., tour service, canoe shuttle, boat and tackle shop). Agri-tourism has already taken root near Rolling Fork, with a fall Pumpkin Patch and Corn Maze in conjunction with the Great Delta Bear Affair held in the fall. All of the planned management actions have the potential to contribute to socioeconomic development along Deer Creek.

Table 3.1. Deer Creek survey.

Management Action	Deer Creek survey		
Objective	• Identify sources of nutrients, organic material, pathogens, and locations in need of erosion control, fish habitat restoration, and culvert repair or replacement		
Performance Measures	• GPS locations and prioritization of nutrient, pathogen, and sediment sources • GPS locations and prioritization of failed culverts and head-cuts • GPS locations and prioritization of failing, eroding banks and degraded riparian areas		
Benefits	• Identification of appropriate restoration practices such as agricultural BMPs, culvert repairs, septic system repairs, snagging and clearing, and bank stabilization • Priority ranking for restoration and BMP practices		
Participant	**Activity**	**Schedule**	**Budget**
MDEQ	Review aerial photography from Lake Bolivar to Rolling Fork to identify areas of concern	March 2008	$10,000
	Technical assistance with planning and conducting survey	March – June 2008	$10,000
	Put together and train two survey teams	June 2008	$5,000
	Stream survey	August 2008	$15,000
	Prepare and submit survey reports	November 2008	$12,000

Table 3.2. Repair failing septic systems and eliminate direct discharges.

Management Action	Fix failing septic systems and eliminate direct discharges		
Objectives	• Eliminate 100% of failing septic systems and direct sewage discharges to Deer Creek • Reduce organic matter loads to upper Deer Creek by 40%		
Performance Measures	• Biannual inspections of onsite wastewater treatment systems • Eliminate 100% of untreated sewage discharges • 40% reduction in organic matter loads • 10% reduction in nutrient loads • 75% reduction in pathogens in Deer Creek		
Benefits	• Addresses pathogen, organic material, and nutrient load reductions set forth in TMDLs • Addresses concerns about health hazards		
Participant	**Activity**	**Schedule**	**Budget**
Mississippi State Department of Health	Evaluate aerial photography from 2002 for evidence of failing septic systems	March 2008	$10,000
	Confirm failing systems identified from aerial photography	October 2008	$15,000
	Provide landowners with information on repair options	December 2008	$5,000
	Follow up to ensure systems are repaired	October 2009	$10,000
MDEQ	Sewage Summit	May 2008	$15,000

Table 3.3. Fix head-cuts and failed culverts.

Management Action	Fix head-cuts and failed culverts		
Objectives	• Reduce sediment, organic matter, and nutrient loads to Deer Creek • Conserve soil on area crop fields		
Performance Measures	• 40% reduction in sediment loads to Deer Creek • 30% reduction in organic matter loads to Deer Creek • 20% reduction in nutrient loads to Deer Creek		
Benefits	• Erosion control • Improvement of fishery habitat • Water quality improvement		
Participant	**Activity**	**Schedule**	**Budget**
MDEQ	As part of Deer Creek survey, investigate/confirm failed culverts contributing to erosion issues and areas of head-cutting to determine cause (see Table 3.1)	August 2008	(See Table 3.1)
TBD	Develop and submit grant proposal for funding to fix failed culverts	October – December 2008	$8,000
TBD	Work with US Department of Agriculture Natural Resources Conservation Service or county engineers offices to design and install replacement culverts under field or county roads	June – August 2009	$750,000
TBD	Administer funds and document change in erosion and sediment loading to Deer Creek following installation/repair of culverts and BMPs	September 2009 – September 2012	$30,000 per year

Table 3.4. Deer Creek bank stabilization.

Management Action	Deer Creek bank stabilization		
Objectives	• Reduce sediment load in Deer Creek • Improve aquatic and riparian habitat		
Performance Measure	• 100% of eroding banks stabilized		
Benefits	• Water quality and clarity improvement • Improved aquatic and riparian habitat		
Participant	**Activity**	**Schedule**	**Budget**
MDEQ	Investigate/confirm areas of bank erosion to determine cause during Deer Creek survey (see Table 3.1)	August 2008	See Table 3.1
TBD	Develop and submit grant proposal for funding to stabilize banks, including maintenance	October – December 2008	$10,000
TBD	Install bank stabilization BMPs	June – October 2009	$800,000
TBD	Administer funds and document change in erosion and sediment loading to Deer Creek following installation of BMPs	October 2008 – September 2012	See Table 3.3
Landowners	Maintain bank stabilization BMPs	October 2009 on	TBD

Table 3.5. Aquatic weed control training.

Management Action	Aquatic weed control training		
Objective	• Reduce aquatic weed coverage in Deer Creek where it flows through communities		
Performance Measures	• Minimum of two communities requesting training • Minimum of four people trained • 95% reduction of aquatic weed coverage		
Benefits	• Improved public image of Deer Creek • Improved aquatic habitat		
Participant	**Activity**	**Schedule**	**Budget**
Mississippi Bureau of Plant Industry, Mississippi State University Cooperative Extension Service	Investigate/confirm communities where aquatic weeds occur in Deer Creek	Summer 2009	$7,500
	Contact communities for interest in controlling aquatic weeds	Fall 2009	$3,000
	Develop training program for weed control	Fall 2009	$12,000
	Find funding for training	Winter 2010	$5,000
	Present training program	Winter 2010	$7,500
	Implement aquatic weed control programs in interested communities	Spring/Summer 2010	$12,000
	Monitor reduction in weed coverage	Summer 2010 – Fall 2015	$4,000/year

Table 3.6. Implement agricultural BMPs.

Management Action	Implement agricultural BMPs		
Objectives	• Provide a 40% reduction in organic material load to Deer Creek by reducing organic matter and nutrient loads from agricultural land uses • 40% reduction in sediment load to Deer Creek		
Performance Measures	• Organic material load to Deer Creek reduced by 40% within 5 years of full implementation • Deer Creek achieves dissolved oxygen water quality standard within 5 years of full implementation		
Benefits	• Improved fishery habitat (by improving DO and reducing sediment load and sedimentation) and riparian habitat • Bank stabilization, and erosion reduced in the stream		
Participant	**Activity**	**Schedule**	**Budget**
US Department of Agriculture – Natural Resources Conservation Service, Mississippi Soil and Water Conservation Commission, MDEQ	Identify and prioritize area sources contributing organic matter and nutrients to Deer Creek	Spring 2009	$10,000
	Contact landowners and determine receptiveness to implementing BMPs	Summer 2009	$10,000
	Prepare Environmental Quality Incentives Program (EQIP), Section 319, or similar proposals	Fall 2009	$15,000
	Implement BMPs	Spring 2010	$800,000
	Monitor success of BMPs in reducing organic matter and nutrient loads to Deer Creek	Fall 2010 to Fall 2015	See Tables 3.1 and 3.3

Table 3.7. Fish tissue survey of Deer Creek.

Management Action	Fish tissue sampling survey		
Objective	• Collect representative samples of fish species by size at 20 popular fishing sites along Deer Creek during 2008 and analyze them for DDT and toxaphene levels		
Performance Measures	• Survey quantifies pesticide levels in target fish at target locations • Fish collection and analysis meets quality assurance/quality control requirements specified in survey plan • Submittal of summary report and fact sheet to Deer Creek Watershed Association		
Benefit	• A more complete picture of the levels of DDT and toxaphene in Deer Creek game fish prior to providing increased fishing access to, or promoting fishing in, Deer Creek		
Participant	**Activity**	**Schedule**	**Budget**
MDEQ	Design and plan fish tissue survey	March – July 2008	$10,000
	Collect fish tissue samples	August 2008	$15,000
	Analyze fish tissue samples	September 2008 – March 2009	$12,000
	Provide summary report and fact sheet to Deer Creek Watershed Association	June 2009	$20,000

Table 3.8. Deer Creek sediment pesticide survey.

Management Action	Sediment pesticide survey		
Objective	• Characterize pesticide concentrations in Deer Creek sediments		
Performance Measures	• Survey is conducted according to sampling plan and data quality objectives • Survey report is submitted, quantifying pesticide concentrations and bioavailability • Survey report answers questions listed in "Benefits"		
Benefits	• Will answer the questions, "Do Deer Creek sediments act as a source for continuing DDT and toxaphene bioaccumulation in fish?" and "Will disturbing sediment through snagging, clearing, dredging, culvert replacement, and bank stabilization increase exposure of the aquatic community to DDT and toxaphene?" • Source identification		
Participant	**Activity**	**Schedule**	**Budget**
MDEQ	Design and plan survey	March – July 2008	$15,000
	Conduct survey	August 2008	$20,000
	Analysis of samples	September 2008 – March 2009	$20,000
	Prepare and submit survey report	3 months after analysis results are available	$25,000
	Prepare and submit fact sheet	1 month after survey report is submitted	$10,000

Table 3.9. Establish minimum flow for Deer Creek.

Management Action	Establish minimum flow for Deer Creek		
Objective	• Quantify flow need to support out-of-stream water usage and instream biota		
Performance Measure	• Minimum flow set by 2011		
Benefits	• Protection of assimilative capacity for sediment and nutrient loading • Allows permitted use of Deer Creek water for irrigation withdrawals • Protection and/or improvement of fishery habitat • Increase recreational opportunities		
Participant	**Activity**	**Schedule**	**Budget**
MDEQ	Monitor Deer Creek flows.	2008 – 2011	TBD
	Establish minimum flow based on flow and water quality monitoring.	2012	
	Monitor, permit, and regulate water withdrawals from Deer Creek.	2012	

Table 3.10. Develop community walking trails along Deer Creek.

Management Action	Develop walking trails along Deer Creek in towns		
Objective	• Develop 3 miles of walking trails along Deer Creek in two communities		
Performance Measures	• 75 people using walking trails per week • $400 in revenue per month associated with walking trails		
Benefits	• Increase recreational opportunities associated with Deer Creek • Improved quality of life in communities		
Participant	**Activity**	**Schedule**	**Budget**
Mississippi Department of Wildlife, Fisheries, and Parks; Mississippi Development Authority	Identify and contact two communities with potential to develop walking trails along Deer Creek	Summer 2008	$10,000
	Estimate the effort and cost associated with developing and maintaining trails	Fall 2008	$15,000
	Apply for funds to construct walking trails	Winter 2008 – 2009	$10,000
	Construct walking trails	2009 – 2010	TBD
	Monitor and document trail use	2010 on	TBD

Table 3.11. Develop boat ramps along Deer Creek.

Management Action	Boat ramps on Deer Creek		
Objectives	• Identify access points and possible boat ramp upgrades • Develop boat ramp on Deer Creek		
Performance Measures	• 10 people per week using boat ramps • $500 in revenue per month associated with boat ramp use		
Benefits	• Increase recreational opportunities associated with Deer Creek • Improve quality of life in area		
Participant	**Activity**	**Schedule**	**Budget**
Mississippi Department of Wildlife, Fisheries, and Parks	Identify access points for Deer Creek and possible areas to upgrade access	2010	TBD
	Design boat ramp and solicit funds	2010	TBD
	Construct boat ramp	2011	TBD
	Monitor use	2012	TBD

Table 3.12. Develop self-guided tours of the Deer Creek area.

Management Action	Develop information for self-guided tours of the area		
Objective	• Develop self-guided driving/cycling tour and/or boating pamphlets highlighting sites in Deer Creek area		
Performance Measures	• 50 pamphlets per week distributed • $500 in revenue per month associated with self-guided tours		
Benefits	• Increase recreational use opportunities associated with Deer Creek • Improve quality of life in area • Raise awareness of significance of the area		
Participant	**Activity**	**Schedule**	**Budget**
Mississippi Department of Archives and History, Division of Tourism	Conduct research on historical and cultural significance of Deer Creek	2010	TBD
	Document location, access, and context of historical and cultural sites along Deer Creek	2011	TBD
	Request funds to prepare brochures and to purchase and erect historical/cultural markers	2012	TBD
	Prepare brochures, erect markers, and distribute brochures through Division of Tourism and local businesses	2013 on	TBD

4.0 EDUCATION STRATEGY

Education and outreach are important elements of watershed restoration, and assist with achievement of the implementation plan goals (see Section 3.1) by increasing public awareness and interest. The goal of community education along the Deer Creek corridor is to develop an atmosphere that promotes sustained, long-term restoration, stewardship, and protection of Deer Creek natural resources. In addition to the numerous state and federal agency education efforts currently ongoing at the county level, the following additional education and outreach actions are planned to benefit the Deer Creek corridor and are described below:

1. Washington County Sewage Summit,
2. Deer Creek signage project
3. Deer Creek Clean-Up Days,
4. Deer Creek essay contest,
5. Deer Creek Christmas float contest,
6. Deer Creek website,
7. Newsletter,
8. Media coverage,
9. Hire a watershed coordinator,
10. Establish a Deer Creek environmental education coordinator or education and outreach committee, and
11. Establish and populate a Deer Creek information repository.

4.1 Washington County Sewage Summit

Many property owners are unaware of requirements instituted by MSDH, MDEQ, and counties regulating the installation, inspection, and maintenance of onsite wastewater treatment systems (septic and decentralized wastewater treatment systems). Many property owners are also unaware of the new technologies for treatment available to them as well as funding sources available for cost-share on the purchase and installation of onsite systems. This Summit will inform property owners, local and state officials, and others about onsite, decentralized wastewater treatment systems and these options (Table 4.1; all tables included at the end of the section).

4.2 Deer Creek Signage Project

Signs along Deer Creek will increase awareness of improvements on Deer Creek and its importance to local communities and their quality of life. Details of this management action are highlighted in Table 4.2.

4.3 Deer Creek Clean-Up Days

Metcalfe, Leland, Arcola, Hollandale, Anguilla, and Rolling Fork held Clean-Up Days during 2007 to encourage volunteers to clean up Deer Creek. This activity removed trash in the creek and from its banks, improved Deer Creek's public image, contributed to a sense of community pride, and helped improve aquatic habitat. This action addressed all three of the plan goals: attaining water quality standards, improving instream habitat, and improving quality of life by improving aesthetics and reducing health hazards. This will be an annual event. Details of this management action are highlighted in Table 4.3.

4.4 Deer Creek Essay Contest

In 2007, the DCWA sponsored an essay contest in Deer Creek community schools with a prize of a $500 scholarship. The essay subject was "Why is Deer Creek Important?" This contest increased awareness of the positive aspects of Deer Creek in the schools and the community at large. This will be an annual event to maintain interest in Deer Creek and the associated work to address stakeholders concerns (Table 4.4).

4.5 Deer Creek Christmas Float Contest

In 2007 the DCWA sponsored a Christmas float contest among the Deer Creek community schools with a prize of $500 to the winning school. The 2007 float theme was "Conservation Keeps Us Afloat on Deer Creek." The DCWA provided participating schools with $200 to help with the purchase of float construction materials. The floats were floated on Deer Creek. The contest and floats increased awareness of Deer Creek in the Deer Creek communities. This will be an annual event, to maintain interest in Deer Creek and the associated restoration work (Table 4.5).

4.6 Deer Creek Watershed Association Website

A website could provide a convenient way to get information out to stakeholders, agencies, and other organizations interested in Deer Creek restoration (Table 4.6).

4.7 Deer Creek Watershed Association Newsletter

This newsletter will serve as a vehicle to keep stakeholders informed about ongoing and planned Deer Creek restoration work (Table 4.7).

4.8 Media Coverage

News stories about restoration work on Deer Creek have been and will continue to be released to local TV and radio programs (e.g., Listen to the Eagle, Delta Day Break, Look Around Mississippi, and Delta Traveler), and local print media (e.g., Delta Magazine, Life in the Delta, Mississippi Outdoors, newspapers, newsletters). These news stories will address stakeholder concerns by increasing awareness of positive aspects of Deer Creek, and opportunities for community involvement (Table 4.8).

4.9 Watershed Coordinator

DCWA will work with various agencies and organizations to create a Watershed Coordinator position. This Watershed Coordinator will act as a liaison among the watershed communities and the agencies and groups active in the Deer Creek watershed. This was a need identified by stakeholders. The Watershed Coordinator will also promote research on the historical significance of Deer Creek, educating the public, and improving Deer Creek's public image. This action addresses all three of the plan goals. Details of this management action are highlighted in Table 4.9. Potential sources of funding to support the Watershed Coordinator include the National Fish and Wildlife Foundation, Entergy, MDEQ, USEPA, a Congressional earmark, and location individuals and businesses.

4.10 Environmental Education Coordinator

Stakeholders believe that establishing an environmental education coordinator would contribute significantly to education and outreach activities in the Deer Creek area. However, they believe that this action should be undertaken only after a watershed coordinator has been hired and established. Until an education coordinator can be hired, education and outreach activities will be coordinated by an Education Outreach Committee formed of representatives of agencies involved in restoration work in the Deer Creek area and teachers from the schools along Deer Creek. The education coordinator/committee will serve as a liaison and resource for the agencies and groups involved in education and outreach in the Deer Creek communities. This action will address stakeholder concerns related to educating the public about Deer Creek, its importance to the local communities, and the environmental concerns related to the creek. A potential funding source for this action is the National Fish and Wildlife Foundation. Table 4.10 summarizes the details of creating the Education Outreach Committee. Activities associated with hiring or appointing an environmental education coordinator will be outlined in later updates of the Deer Creek WIP.

4.11 Deer Creek Information Repository

Having a single location/source for information about Deer Creek and the ongoing restoration work in the watershed will increase the efficiency and effectiveness of education and outreach activities. This is a need that was identified by stakeholders. This action addresses concerns related to educating the public about Deer Creek, the importance of Deer Creek to the community, and the environmental concerns related to Deer Creek. The information available from this repository will assist in actions that address all three plan goals. See Table 4.11 for details of this management action.

Table 4.1. Sewage Summit.

Management Action	Sewage Summit		
Objective	• Increase public awareness of onsite and decentralized wastewater treatment for individual homes, camps, and housing clusters in the Delta		
Performance Measures	• Participation by more than 100 attendees representing at least three Delta counties • Follow-up by 15 participants to vendors or county or state agencies for additional information		
Benefits	• Increase awareness of maintenance requirements for onsite wastewater treatment systems • Reduce number of direct discharges and failed septic systems		
Participant	**Activity**	**Schedule**	**Budget**
MDEQ	Host the summit and provide information on regulatory requirements for point source discharges	May 2008	$12,020.00
Mississippi State Department of Health	Provide information on human health regulatory requirements for onsite and decentralized wastewater treatment systems		
Washington County	Discuss engineering requirements and inspections of wastewater treatment systems		
Alabama Onsite Wastewater Treatment Board	Discuss various types of septic and decentralized wastewater treatment systems, along with costs, maintenance needs, and installation		
MDEQ State Revolving Fund, Delta Regional Authority, Washington County, Fannie Mae, Delta Regional Commission	Discuss funding options available to homeowners, communities, and businesses to pay for wastewater treatment systems		
USEPA Region IV, Gulf Alliance	Provide financial support through Section 319 or similar funds to sponsor the Summit		

Table 4.2. Deer Creek signage.

Management Action	Deer Creek signage		
Objective	• Install ten signs along Deer Creek where it flows through communities, with at least one sign per community		
Performance Measures	• Signs installed • Two comments/questions per week related to activities on Deer Creek		
Benefit	• Will increase awareness about improvements on Deer Creek and its importance to local quality of life		
Participant	**Activity**	**Schedule**	**Budget**
Deer Creek Watershed Association	Contacting communities about where to install signs	Done	$0
	Soliciting funds for signs and installation from Mississippi's Partners for Fish and Wildlife program and for help designing the Deer Creek signs	Done	$0
US Fish and Wildlife Service – Fish and Wildlife Partners Program	Make signs	Done	$18,000
	Install signs	Done	

Table 4.3. Deer Creek Clean-Up Days.

Management Action	Deer Creek Clean-Up Days in Metcalfe, Leland, Arcola, Hollandale, Anguilla, and Rolling Fork		
Objectives	• Remove all chemical containers • Remove 90% of trash associated with incorporated areas along Deer Creek • Remove 70% of trash from unincorporated areas along Deer Creek		
Performance Measure	• See objectives above		
Benefits	• Reduce health hazards • Improve instream habitat • Improve public image of Deer Creek		
Participant	**Activity**	**Schedule**	**Budget**
Natural Resources Conservation Commission Resource Conservation & Development, MDEQ, Washington County Board of Supervisors	Solicit sponsors for the Clean-Up Day in each community, as well as for the unincorporated areas	Annually	TBD
	Transportation of volunteers		
	Identify leaders for volunteer groups		
	Assign volunteer groups to areas of Deer Creek		
	Provide refreshments/food for volunteers		
	Advertisement of Clean-Up Day		
	Promote media coverage		
	Entertainment for volunteers		
	Solicit prizes for volunteer accomplishments (e.g., most trash collected)		
	Develop volunteer guidelines (e.g., adults only, wearing protective gear to remove chemical containers)		
	Provide equipment for volunteers (e.g., trash bags/containers, gloves, sunscreen, hats)		
	Transportation and disposal of collected trash		

Table 4.4. Deer Creek essay contest.

Management Action	Essay contest among Deer Creek schools on the subject of Deer Creek		
Objectives	• Annual contest with scholarship prize • Participation of all Deer Creek schools • Minimum of two essays submitted per school • Local media coverage of contest and winner		
Performance Measures	• At least eight schools participating • At least two essays from each school • At least one news story about contest and winner		
Benefits	• Increased local interest in Deer Creek and its positive aspects • Increased local awareness of the potential and existing contributions Deer Creek makes to quality of life • Increased local interest in and awareness of restoration and improvement work ongoing and planned for Deer Creek		
Participant	**Activity**	**Schedule**	**Budget**
DCWA	Raise prize money	January - October	TBD
DCWA	Advertise for essay submittals (including contest rules)	October	
DCWA	Arrange for essay judges	September - October	
DCWA	Collect essays	November 30	
Volunteers	Judge essays	December	
DCWA	Announce contest winner	December	
DCWA	Submit press releases about contest and winner to local news media	December	
DCWA	Transfer of prize money to selected college/university	January	

Table 4.5. Deer Creek float contest.

Management Action	Float contest among Deer Creek schools on subject related to Deer Creek		
Objectives	• Annual contest with school prize • Participation of all Deer Creek schools • Local media coverage of contest and winner		
Performance Measures	• At least five schools participating • At least one news story about contest and winner		
Benefits	• Increased local interest in Deer Creek and its positive aspects • Increased local awareness of the potential and existing contributions Deer Creek makes to quality of life • Increased local interest in and awareness of restoration and improvement work ongoing and planned for Deer Creek		
Participant	**Activity**	**Schedule**	**Budget**
DCWA	Raise prize money	January – October	TBD
DCWA	Advertise float contest, including contest rules	October	
DCWA	Transfer money for float materials to participating schools	October	
DCWA	Arrange for float judges	September – October	
DCWA	Due date for floats	November 30	
Volunteers	Judge floats	December	
DCWA	Announce contest winner	December	
DCWA	Submit press releases about contest and winner to local news media	December	
DCWA	Transfer prize money to winning school	December	

Table 4.6. Deer Creek website.

Management Action	Create and maintain website for public access to information about Deer Creek and the associated planned and ongoing work		
Objectives	• Create Deer Creek website • Provide at least quarterly updates of information on website • Maintain website for at least five years		
Performance Measures	• Website up • 30 website hits per month • Quarterly updates		
Benefits	• Increased local interest in and awareness of restoration and improvement work ongoing and planned for Deer Creek • Easy point of access for information useful for education and outreach activities		
Participant	**Activity**	**Schedule**	**Budget**
	Gather information about Deer Creek and Deer Creek projects	TBD	TBD
	Select service/person to design, develop, and maintain website	TBD	
	Website design and development (including testing and modification)	TBD	
	Update information on website	Quarterly	
	Website maintenance (including problem solving, updating information, and upgrading programming as required)	TBD	

Table 4.7. Deer Creek Watershed Association newsletter.

Management Action	Publish a newsletter about Deer Creek and Deer Creek projects and activities		
Objective	• Publish (annual/semi-annual/quarterly) Deer Creek newsletter for at least 5 years		
Performance Measures	• At least two issues published per year • At least 250 copies produced • At least 250 copies mailed/requested/picked up/distributed		
Benefit	• Increased local interest in and awareness of restoration and improvement work ongoing and planned for Deer Creek		
Participant	**Activity**	**Schedule**	**Budget**
	Select service/person(s) to design and publish newsletter	TBD	TBD
	Select service/person(s) to create and maintain distribution/mailing list	TBD	
	Select service/person(s) to gather information for newsletter issues, write articles for newsletters, and manage/edit newsletters	TBD	
	Newsletter design	TBD	
	Newsletter publication (including layout design and production)	TBD	
	Newsletter distribution	TBD	
	Confirm/update distribution/mailing list	Annually	

Table 4.8. Media coverage.

Management Action	Media coverage of Deer Creek and Deer Creek projects and activities		
Objective	• Publication/or airing of at least two news stories on Deer Creek and/or Deer Creek projects and/or activities per year, in addition to media coverage of contests		
Performance Measures	• At least two articles published • At least two stories aired • At least 500 people reached (receiving published material or watching/hearing stories aired)		
Benefit	• Increased local interest in and awareness of restoration and improvement work ongoing and planned for Deer Creek		
Participant	**Activity**	**Schedule**	**Budget**
	Write and send out press releases and/or call media	TBD	TBD
	Write and submit articles	TBD	
	Arrange interviews	TBD	

Table 4.9. Watershed Coordinator.

Management Action	Watershed Coordinator		
Objective	• Create a Watershed Coordinator position for Deer Creek		
Performance Measures	• Watershed Coordinator hired • Coordination procedures developed, implemented, and tracked		
Benefit	• Watershed Coordinator will act as a liaison among the watershed communities and the agencies and groups active in the Deer Creek watershed, including education and outreach, research of the historical significance of Deer Creek, educating the public, and improving Deer Creek's public image		
Participant	**Activity**	**Schedule**	**Budget**
Deer Creek Watershed Association	Put together a committee to work with agencies and nonprofit organizations in creating the Watershed Coordinator position	2008	TBD
Deer Creek Watershed Association Executive Committee	Develop a position description including expectations and objectives	2008	
	Develop terms for the position including salary, length of time, terms for dismissal, evaluation criteria, evaluation schedule, evaluation procedures, and terms for hiring (e.g., majority vote)	2008	
	Acquire funding for the Watershed Coordinator salary and maintenance of an office	2009	
	Locate and outfit an office for the Watershed Coordinator	2010	
	Advertise and interview applicants for the Watershed Coordinator position	2010	
	Hire the Watershed Coordinator	TBD	

Table 4.10. Environmental Education Coordinator.

Management Action	Environmental Education Coordinator		
Objective	• Create a Deer Creek Education and Outreach Committee to coordinate, track, evaluate and report on education and outreach activities associated with Deer Creek		
Performance Measures	• At least four committee members selected • At least three committee meetings per year • Committee annual report to DCWA on activities		
Benefits	• Provide a resource for those involved in education and outreach activities associated with Deer Creek • Ensure planned education and outreach activities occur to maintain public interest and awareness of Deer Creek, its issues, and the work being done to resolve those issues		
Participant	**Activity**	**Schedule**	**Budget**
	Develop committee rules (including committee structure, how members are selected/elected, length of term, conditions of membership) and responsibilities	TBD	TBD
	Select/elect committee members	TBD	
	Schedule and hold regular meetings	TBD	
	Write up meeting minutes and provide to newsletter staff	TBD	
	Write up annual report and provide to DCWA and newsletter staff	TBD	
	Define requirements and responsibilities of Environmental Education Coordinator position	TBD	

Table 4.11. Information repository.

Management Action	Establish information repository		
Objective	• Establish a location to house information regarding Deer Creek and the restoration work being conducted to improve it		
Performance Measure	• Library collection established and accessible		
Benefit	• Having a single location/source for information about Deer Creek and the ongoing restoration work in the watershed will simplify education and outreach		
Participant	**Activity**	**Schedule**	**Budget**
	Contact communities to determine if one of the community libraries would be willing to house information regarding Deer Creek	2008	TBD
	Develop a grant to fund the Deer Creek clearinghouse	2009	
	Work with the community library to set up the repository	March 2010	

5.0 EVALUATION

5.1 Monitoring

An important element of watershed management is monitoring of appropriate indicators to determine if the activities implemented have had the desired effect. MDEQ collects water quality data from Deer Creek near Hollandale, Mississippi. Data from this program will be useful for identifying changes in water quality resulting from management activities upstream of Hollandale. Table 5.1 is a summary of the monitoring methods and indicators planned related to the management actions (described in Chapter 3) and the education and outreach activities (described in Chapter 4).

5.2 Assessment of Progress

Implementation milestones and schedules have been developed for the management actions and education and outreach activities described in this plan. This information is summarized in Table 5.2 for use in tracking and evaluating implementation of this plan. For implementation to be considered successful, all activity milestones must be met on time.

The Implementation Team will meet quarterly to review progress on achieving the milestones and make needed adjustments to the schedule. Each Team member serves as the chair for one of the major management categories, such as health hazards, erosion and sediment, etc. There is a subcommittee associated with each of these categories to ensure that the planned management actions are implemented.

5.2.1 Evaluation of Management Actions and Education/Outreach Activities

Specific management action goals and/or expectations are described in Chapter 3. Specific goals and/or expectations for education and outreach activities are described in Chapter 4. If the activity goals are not met, the causes behind the failure to meet the goals will be determined. In addition, the plan activities will be evaluated with regard to information and knowledge about Deer Creek and its watershed that has been gained since the existing plan was developed, as well as any relevant physical changes in the watershed or changes in policy

affecting Deer Creek. Implementation of the activities will be reevaluated in light of all of this information on a quarterly basis, as discussed above.

5.3 Evaluation of Plan

Specific management action schedules toward achieving the vision for Deer Creek and its environs are described in Chapters 3 and 4 and summarized in Table 5.2. If the schedules are not being met, the causes behind the failure to meet the goals will be determined, and actions will be taken.

Table 5.1. Monitoring activities.

Action	Performance Measure	Monitoring Activity	Responsibility	Schedule
Deer Creek Survey	Submittal of two survey reports	Track project	MDEQ	2008
Repair of Failed Septic Systems and Elimination of Direct Discharges	Elimination of raw sewage discharge to Deer Creek	Biannual inspection	MSDH	July and September of each year, starting in 2008
Repair Head-Cuts and Failed Culverts	Reduce organic matter loads by 30% Reduce sediment load by 40% Reduce nutrient loads by 20%	1. Pre-implementation sediment load estimation at each culvert site 2. Post-implementation monitoring	Washington County Soil and Water Conservation Districts	1. 2008 2. 2013
Bank Stabilization	100% of eroding banks stabilized	1. Pre-implementation sediment load estimation 2. Post-implementation monitoring	Washington County Soil and Water Conservation Districts	1. 2008 2. 2012
Aquatic Weed Control Training	Minimum of two communities requesting training	Log requests	Mississippi Bureau of Plant Industry	2009
	Minimum of four people trained	Sign-up and/or "certification"		2009
	95% reduction aquatic weed coverage	Weed extent monitoring – on the ground or aerial photography or satellite images		2009 – 2015
Implement In-Field Sediment BMPs	Reduce organic material, nutrient, and sediment loads by 40%	1. Pre-implementation sediment load estimation at each site 2. Post-implementation monitoring	Washington County Soil and Water Conservation Districts	1. 2008 2. 2010 – 2015
Deer Creek Fish Tissue Pesticide Survey	Survey quantifies pesticide levels in target fish at target locations	Review of plan by qualified professional	MDEQ	July 2008
	Fish collection and analysis meet QA/QC requirements specified in plan	QA/QC review of sampling and analysis	MDEQ	September 2008 – March 2009
	Submittal of summary report and fact sheet to DCWA	Track project	MDEQ	2009
Deer Creek Sediment Pesticide Survey	Sample collection and analysis meet QA/QC requirements specified in plan	QA/QC review of sampling and analysis	MDEQ	July 2008 – March 2009
	Submittal of summary report	Track project	MDEQ	2008 – 2009
	Survey report answers questions about whether sediments are a source of fish tissue pesticide contamination, and the effects of disturbing contaminated sediments	Review of survey report	MDEQ	2009
Establish Minimum Flow for Deer Creek	Minimum flow set by 2012	Track project	MDEQ	2012
Walking Trails Along Deer Creek	75 people per week using trails	Self-reporting station	MDWFP	2010 on
	$400 revenue per month associated with trails	TBD		

Table 5.1. Continued.

Action	Performance Measure	Monitoring Activity	Responsibility	Schedule
Boat Ramps on Deer Creek	10 people per week using boat ramps	Self-reporting station	MDWFP	2012 on
	$500 revenue per month associated with boat ramp use	TBD		
Self-Guided Tours of Deer Creek Area	50 pamphlets per week distributed	Track printing and distribution	Mississippi Dept. of Archives and History – Division of Tourism	2010 – 2013
	$500 revenue per week associated with pamphlets	TBD	TBD	TBD
Sewage Summit	Participation	Participant sign-in	MDEQ, MSDH	February 2008
	Participant follow-up information request	Track sewage-related information requests to agencies and vendors		February – December 2008
Deer Creek Signage	Installation of specified number of signs on schedule	Track project	DCWA	Done
	Two comments/questions per week about Deer Creek	DCWA Annual Survey		Annual
Annual Deer Creek Clean-Up Day	At least 75 attendees	Attendee sign-in/ sign release forms	DCWA	Annual
	Amount/weight of trash collected	Track trash amount		
Essay Contest	At least eight schools participating	Track	DCWA	Annual
	At least two essays from each school	Track		
	At least one news story	Track		
Float Contest	Number of schools participating	Track	DCWA	Annual
	Number of news stories	Track		
Website	Website up	Track project	DCWA	Quarterly
	30 website hits per month	Counter on website	Manager	
Newsletter	At least two issues published per year	Track project	TBD	Quarterly
	At least 250 copies produced	Track printing	TBD	
	At least 250 copies produced	Track distribution	TBD	
Media Coverage	At least two articles published	Track	TBD	TBD
	At least two stories aired	Track	TBD	TBD
	Audience size – minimum 500	Get info from media	TBD	TBD
Deer Creek Watershed Coordinator	Watershed Coordinator hired	Track project	DCWA	2008 – 2010
	Coordination procedures developed and implemented	Track project		
Environmental Education Coordinator	Committee creation	Track project	DCWA	TBD
	At least three meetings per year	Meeting minutes	Committee	TBD
	Annual report	Log receipt of report	DCWA	TBD
Deer Creek Information Repository	Information added to repository at least quarterly	Track repository deposits	TBD	2010 on
	Number of people accessing information from repository	User sign-in sheets	TBD	
	At least two education and outreach activities per year	Track projects	TBD	

Table 5.2. Summary of management action milestones and schedules.

Action	Milestones	Schedule
Deer Creek Survey	Review aerial photography to identify areas of concern	March 2008
	Technical assistance with planning and conducting survey	March – June 2008
	Put together and train two survey teams	June 2008
	Stream survey	August 2008
	Prepare survey reports	November 2008
Repair of Failed Septic Systems and Elimination of Direct Discharges	Evaluate aerial photography from 2002 for evidence of failing septic systems	March 2008
	Confirm failing systems identified from aerial photography	October 2008
	Provide landowners with information on repair options	December 2008
	Follow up to ensure systems are repaired	October 2009
	Sewage Summit	April 2008
Repair Head-Cuts and Failing Culverts	As part of Deer Creek survey, investigate/confirm areas of head-cutting to determine cause	August 2008
	Develop and submit grant proposal for funding to fix failed culverts causing head-cutting	October – December 2008
	Work with Natural Resources Conservation Commission or county engineers' offices to design and install replacement culverts under field or county roads	June – August 2009
	Administer funds and document change in erosion and sediment loading to Deer Creek following installation/repair of culverts and BMPs	September 2009 – September 2012
Bank Stabilization	Investigate/confirm areas of bank erosion to determine cause during Deer Creek survey	August 2008
	Develop and submit grant proposal for funding to stabilize banks, including maintenance	October – December 2008
	Install bank stabilization BMPs	June – October 2009
	Administer funds and document change in erosion and sediment loading to Deer Creek following installation of BMPs	October 2008 – September 2012
	Maintain bank stabilization BMPs	October 2009 on
Aquatic Weed Control Training	Investigate/confirm communities where aquatic weeds occur in Deer Creek	2009 – 2015
	Contact communities identified	
	Develop training program	
	Develop funding for training	
	Present training program	
Implement In-Field Sediment BMPs	Identify and prioritize area sources contributing organic matter and nutrients to Deer Creek	Spring 2009
	Contact landowners about installing BMPs	Summer 2009
	Prepare proposals for BMP funding	Fall 2009
	Implement BMPs	Spring 2010
	Monitor BMPs	Fall 2010 to Fall 2015
Deer Creek Fish Tissue Pesticide Survey	Design and plan fish tissue survey	March – July 2008
	Collect fish tissue samples	August 2008
	Analyze fish tissue samples	September 2008 – March 2009
	Provide summary report and fact sheet to DCWA	2009

Table 5.2. Continued.

Action	Milestones	Schedule
Deer Creek Sediment Pesticide Survey	Design and plan survey	March – July 2008
	Conduct survey	August 2008
	Analysis of samples	September 2008 – March 2009
	Prepare and submit survey report	2009
	Prepare and submit fact sheet	2009
Establish Minimum Flow for Deer Creek	Monitor Deer Creek flows	2008 – 2011
	Establish minimum flow based on flow and water quality monitoring	2012
	Monitor, permit, and regulate water withdrawals from Deer Creek	2012
Walking Trails along Deer Creek	Identify and contact two communities with potential to develop walking trails along Deer Creek	Summer 2008
	Estimate the effort and cost associated with developing and maintaining trails	Fall 2008
	Apply for funds to construct walking trails	Winter 2008 – 2009
	Construct walking trails	2009 – 2010
	Monitor and document trail use	2010 on
Boat Ramps on Deer Creek	Identify access points for Deer Creek and possible areas to upgrade access	2010
	Design boat ramp and solicit funds	2010
	Construct boat ramp	2011
	Monitor use	2012
Self-Guided Tours of Deer Creek Area	Conduct research on historical and cultural significance of Deer Creek	2010
	Document location, access, and context of historical and cultural sites along Deer Creek	2011
	Request funds to prepare brochures and to purchase and erect historical/cultural markers	2012
	Prepare brochures, erect markers, and distribute brochures through Division of Tourism and local businesses	2013 on
Sewage Summit	Sewage Summit	April/May 2008
Deer Creek Signage	Contact communities to determine where to install signs	Done
	Solicit funds for signs and installation from Mississippi Partners for Fish and Wildlife program	Done
	Make signs	Done
	Install signs	Done
Essay Contest	Raise prize money	January – October
	Advertise for essay submittals (including contest rules)	October
	Arrange for essay judges	September – October
	Collect essays	November 30
	Judge essays	December
	Announce contest winner	December
	Submit press releases about contest and winner to local news media	December
	Transfer of prize money to selected college/university	January

Table 5.2. Continued.

Action	Milestones	Schedule
Float Contest	Raise prize money	January – October
	Advertise float contest, including contest rules	October
	Transfer money for float materials to participating schools	October
	Arrange for float judges	September – October
	Due date for floats	November 30
	Judge floats	December
	Announce contest winner	December
	Submit press releases about contest winner to local news media	December
	Transfer prize money to winning school	December
Website	Gather information about Deer Creek and Deer Creek projects	TBD
	Select service/person to design, develop, and maintain website	TBD
	Website design and development (including testing and modification)	TBD
	Update information on website	TBD
	Website maintenance (including problem solving, updating information, and upgrading programming as required)	Quarterly
Newsletter	Select service/person(s) to design and publish newsletter	TBD
	Select service/person(s) to create and maintain distribution/mailing list	TBD
	Select service/person(s) to gather information for newsletter issues, write articles for newsletters, and manage/edit newsletters	TBD
	Newsletter design	TBD
	Newsletter publication (including layout design and production)	TBD
	Newsletter distribution	TBD
	Confirm/update distribution/mailing list	Annually
Media Coverage	Write and send out press releases and/or call media	TBD
	Write and submit articles	TBD
	Arrange interviews	TBD
Deer Creek Clean-Up Day	Organize Clean-Up Days	Annual
Deer Creek Watershed Coordinator	Put together committee to work with agencies and organizations in creating the watershed coordinator position	2008
	Develop position description, including expectations and objectives	2008
	Develop terms for the position, including salary, length of time, terms for dismissal, evaluation criteria, evaluation schedule, evaluation procedures, and terms for hiring (e.g., majority vote of committee)	2008
	Acquire funding for salary and maintenance of office	2009
	Locate and outfit office for watershed coordinator	2010
	Advertise and interview applicants for position	2010
	Hire watershed coordinator	TBD

Table 5.2. Continued.

Action	Milestones	Schedule
Environmental Education Coordinator	Develop committee rules (including committee structure, how members are selected/elected, length of term, conditions of membership) and responsibilities	TBD
	Select/elect committee members	TBD
	Schedule and hold regular meetings	TBD
	Write up meeting minutes and provide to newsletter staff	TBD
	Write up annual report and provide to DCWA and newsletter staff	TBD
	Define requirements and responsibilities of Environmental Education Coordinator position	TBD
Deer Creek Information Repository	Contact communities to determine if one of the community libraries would be willing to house information regarding Deer Creek	2008
	Develop grant to fund Deer Creek repository	2009
	Repository set up	March 2010

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