ARKANSAS 2009 ANNUAL REPORT

Prepared Pursuant to Section 319(h) of the Federal Clean Water Act

Arkansas Natural Resources Commission
January 31, 2010

NOTES FROM THE DIRECTOR

The Arkansas Natural Resources Commission (ANRC) is once again proud to provide this 2009 Annual Report for the Arkansas Nonpoint Source Pollution Management Program. As with 2008, many will remember 2009 as yet another turbulent weather year. Increased events of flooding and subsequently the wettest year on record for Arkansas has created yet further natural resource and economic hardship for citizens and especially our agricultural industries. The nation continues to experience major economic challenges with health care garnering most of the headlines. The environment was also a hot topic with issues such as "Cap and Trade" and "Global Warming". Although these and other issues can be polarizing, the Commission still aimed to carry out its purpose of managing and protecting our water and land resources for the health, safety, and economic benefit of the State of Arkansas.

Items to keep in mind while reviewing this report:

- There were no nonpoint source-related streams added to the 2008 list of impaired water bodies compared to the 2006 list. The 2010 list has not been released as of this date.
- The weather events of 2008 and 2009 have and will continue to adversely affect the lives of many Arkansans. Agricultural communities and urban residents alike will face further challenges in the endeavor to implement conservation and water quality practices and programs with limited economic resources and constraints.
- As evident in the past two years landowner participation is likely to further decline while material prices continue to increase. The ability to "capture" local match towards 319 projects is less than it ever has been.
- The Arkansas and Oklahoma lawsuit is still ongoing.
- The Illinois River Watershed Based Plan (WBP) is being developed, but with a TMDL imperative, it may render the WBP as a secondary tool.

The ANRC and the NPS Management Program have worked diligently to form and continually grow partnerships. The partnerships with the Environmental Protection Agency, other Federal and State Agencies, nonprofit organizations, local watershed groups and our local Conservation Districts across the state are the backbone of the NPS Management Program. The unselfishness and commitment of these partners are the strength of this program. Your dedication to and ongoing participation in the NPS program is appreciated. Together we will be successful in improving water quality in this State for generations to come. At this time, I am proud to present the 2009 Arkansas NPS Management report for your review.

Sincerely,

J. Randy Young, P.E.
Executive Director

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SPECIAL SECTION: 2009 WEATHER EVENTS AND THE NPS MANAGEMENT PROGRAM

Weather has once again played an important role in Arkansas in 2009. January and early February saw ice storms in the northern parts of the State that damaged trees and caused extensive power outages. The tornado season began in March and by the end of the year 45 tornadoes had been recorded. Typically Arkansas averages 25 to 30 officially verified tornadoes per year. Although not classified as tornadoes, straight line winds tore through Clay County on April 9th at 103 miles per hour. Three other incidents of straight line winds occurred in Desha, Pope, and Jefferson Counties, all were recorded over 90 miles per hour. Arkansas also saw 2.75 inches of baseball size hail in late June and was noted as the National Weather Service as the wettest year and most rain in one single month since 1893. Weather has drastically affected the State and it has also affected the NPS Management Program, creating delays with some project and the need to extend others. The following pages of this report are dedicated to illustrating how weather can change the perspective of this program.

Tornadoes

Arkansas's tornado season had a late start this year. The first recorded tornado was on April 9th. Throughout 2009 there were a total of 45 tornadoes with 3 fatalities and 46 injuries. This number of tornadoes is above average for a year; however it was greatly decreased from 2008, thankfully. The table below lists the locations, dates, watersheds affected, and distances traveled of tornadoes in select areas around the state.

Town(s)	Date	Affected 8 digit Watershed(s)	Distance on ground
Ink, Mena	April 9th	Lower Little, Ouachita Headwaters	14.84 miles
Arkansas Post, Modoc	July 30th	Bayou Macon, Big Creek	26.94 miles
Hydrick	July 30th	L'Anguille	4.53 miles
Lisbon, Shumaker	October 29th	Lower Ouachita	25.52 miles
Brewster, Pine Bluff	October 29th	Bayou Bartholomew	2.57 miles

Table 1. Select areas affected by tornadoes during 2009.

When a tornado is on the ground, especially for several miles it can drastically alter the landscape. The movement of soil, removal of root systems, and heavy rains from tornado systems can increase the loss of soil and create unfavorable conditions when runoff and flooding occurs. The pictures below were taken in Arkansas County. This tornado was rated an EF2 and occurred on July 30th. This altered landscape can become vulnerable to heavy rains and soil loss. When heavy rains and flooding events occur, non point pollution can exponentially increase.

Tornado, near Mena in Polk County

Tornado damage 5 miles south of Tichnor, AR

Rain and Flooding

In 2009 Arkansas saw record rainfall events. If we look back to 2008, we saw three sites that reported over 80 inches for the year. This year we saw 18 sites that were over 80 inches. Two of the 18 sites reached 90 inches and one in Grant County had 100.05 inches for the year. As we know, when a flood occurs soil is lost from undeveloped land, construction sites, streambanks, and roads. Runoff can also be increased from impervious surfaces and cause major damage in storm events. There were many flooding events this year and the saturated areas of the state only increased the chance of soil loss and movement. Below is a table of several sites around the state and the record rainfall they received.

Rainfall in 2009				
Site	**Amount**	**Average Amount**	**+ / -**	**% of Average**
Harrison (NC AR)	61.23”	45.20”	+16.03	135%
Jonesboro (NE AR)	75.95”	46.18”	+29.77	164%
Fort Smith (WC AR)	56.46”	43.87”	+12.59	129%
Little Rock (C AR)	81.79”	50.93”	+30.86	161%
Texarkana (SW AR)	78.09”	47.38”	+30.71	165%
El Dorado (SC AR)	73.10”	54.11”	+18.99	135%
Pine Bluff (SE AR)	78.02”	52.48”	+25.54	149%

Table 2[1]

Flooding, Near Bryant in Saline County

Brief look at 2009 Weather by month

Below is a brief description of the weather events and conditions by each month of 2009.

January
The month of January saw 2.60 inches of precipitation, which was 1.01 inches short of the average for the month. Ice covered most of the northern half of the state on the 26th - 28th and damaged many trees and power lines from the weight of the ice (see image 1 below).

February & March
February received 2.16 inches of precipitation and was 1.17 inches short of the monthly average. It was also the warmest February on record since 2005. March saw 4.63 inches of precipitation and was still 0.25 inches short of the average.

April
April had 11 recorded tornadoes with seven taking place on the ninth. There was 5.33 inches of precipitation recorded in Central, east and northeast Arkansas for the month. The 103 mph straight line winds were recorded on the ninth in Clay County and Polk County recorded 3 inches of baseball sized hail on the same day. These events occurred in a month when most row crop agricultural producers are preparing fields and establishing BMPs.

May
The precipitation totals for May in Central Arkansas were 13.06 inches. This was 8.01 inches over the average for May. Records indicate this was the wettest May since 1893. May also recorded 9 tornadoes that caused damage to southern and central portions of the state. Once again these events occurred when row crop agricultural producers were tying to prepare and plant fields and completed implementation of prescribed BMPs.

June
June was one of the drier months with only 3.08 inches or rain and was the tenth warmest June on record. June had one tornado that affected Conway County.

July
The month of July saw a total of 11.65 inches of rain in the Central and southeast areas of the State. It was the third wettest July on record and the coolest July since 1968. Precipitation was 8.34 inches over the average amount for Central Arkansas. There were eight recorded tornadoes in the last two days of July. July is at the heart of the growing season. The flooding of fields and crops during this time of the year was detrimental to most agricultural producers.

August & September
Saw the coolest temperatures since 2004 and recorded 2.75 inches of precipitation. September saw 2.73 inches of precipitation above normal and Central Arkansas had a total of 6.44 inches of rain. In these months not only rain hurt agricultural crop but the cool temperatures began stunting plants. When plant growth is stunted low or reduced yields are the resulting affects. There were no recorded tornadoes in either month.

October
October had the highest total precipitation for the year with 16.56 inches of rain. This was a little more than 12 inches above normal. October accounted for 20% of the total precipitation for the year in the Central, east and south east areas of the State. The 9th of October saw 3.91 inches, which was the 4th wettest day in October on record, and the 29th saw the 2nd wettest day on record with 5.05 inches. There were 15 tornadoes in the State during the month of October.

November

The ninth driest November on record occurred this year with only 1.20 inches of rain in Central Arkansas.

December

The month of December was another record setting month. In a span of two days, the 23rd and 24th, there was a total of 9.52 inches in the Little Rock area. These two days were the second and third wettest days on record for the month of December. December finished the year with 12.33 inches of precipitation.

Overall, this year has been the wettest year since 1882. The Little Rock area received a total of 81.79 inches of precipitation (see table 2).

2009 Weather events in Arkansas				
Month	**Precipitation**	**Average Precipitation**	**Tornadoes**	**Average Temperature**
January	2.60”	3.61”	0	40.5
February	2.16”	3.33”	0	49.0
March	4.63”	4.88”	0	54.8
April	5.33”	5.47”	11	61.9
May	13.06”	5.05”	9	69.7
June	3.08”	3.95”	1	81.2
July	11.65”	3.31”	8	79.0
August	2.75”	2.93”	0	79.1
September	6.44”	3.71”	0	73.8
October	16.56”	4.25”	15	59.4
November	1.20”	5.73”	0	55.4
December	12.33”	4.71”	1	40.2

Table 3. 2009 month by month breakdown of rainfall amounts for Central Arkansas

Rains and flooding also contributed greatly to flood stages being reached of many central and eastern Arkansas Rivers. There were top ten crests measured on the Spring, Little Red, Saline, and Ouachita Rivers. Many of the rivers in central and eastern Arkansas experienced moderate flooding for prolonged periods. When rivers are at these stages for prolonged periods they can cause the surrounding lands to become saturated due to the lack of drainage. Many crops were unable to be planted and harvested due to the large amounts of precipitation and surrounding rivers that were over the flood stage this year.

ANRC is the lead agency responsible for the statewide agriculture program within the NPS Management Program. There were many agriculture producers affected by the weather events of 2009. Pastures suffered soil loss, fences were washed away from flooding, and many crops were lost or heavily damaged. Losses have been estimated around $300 million for agriculture producers. Many crops this year were planted late, which led to a late harvest. There were many crops that were forsaken and left in fields due to the rains and flooding. Tornadoes once again affected lives and property losses. Conservation practices have been affected and maintaining these practices have taken a back seat to picking up the pieces after a natural disaster. The landowners and conservation districts are the backbone of this program. Without them it would be very difficult to get anything on the ground. The record rain that we have seen this year has also affected monitoring and the monitoring stations. Some stations sustained damage due to high waters and consequently lost some data.

There are projects that ANRC has done or is currently doing to combat some of these weather issues. The ice storm that occurred in late January destroyed many trees in the northern part of the state. Straight line winds and tornadoes have also damaged many trees around the state (see image 1 &2). The Arkansas Association of Conservation Districts and other partners saw a need to help these landowners restore these damaged areas, so a tree seedling project was initiated. Overall, there were 101,591 seedlings distributed to forty-two conservation districts. These seedlings will help catch future runoff pollutants and will be critical for some of these weather damaged areas. There have been many pipe drops implemented around the state in the past few years. With all the flooding that has occurred this year and last, these pipe drops have slowed much of the flood waters down and allowed sediment, associated with flooding, to settle and not get into streams and rivers. If the pipe drop had not been in place there could have been major gully erosion occurring on many saturated fields and pastures. The streambank restoration and protection projects, which are finished or ongoing, are also doing a great job in combating the large amounts of rain the state has seen. The West Fork of the White River restoration, Arkansas Game and Fish Commission protection and stabilization, and Sager Creek Urban restoration projects are all helping reduce erosion that normally would have been great during flood events. ANRC continues to be encouraged with the success of many projects that hold up during these record breaking weather years.

Image 1 Trees damaged in Sharp County

Image 2 Trees damaged from tornado

ANRC will continue to encourage the implementation of not only ecologically sustainable, but economically viable conservation practices to improve water quality. Nonpoint source pollution will still be reduced and controlled, but given the weather events this past year, a reduction in impaired water bodies is not likely. In fact, more water bodies could become impaired due to these weather events.

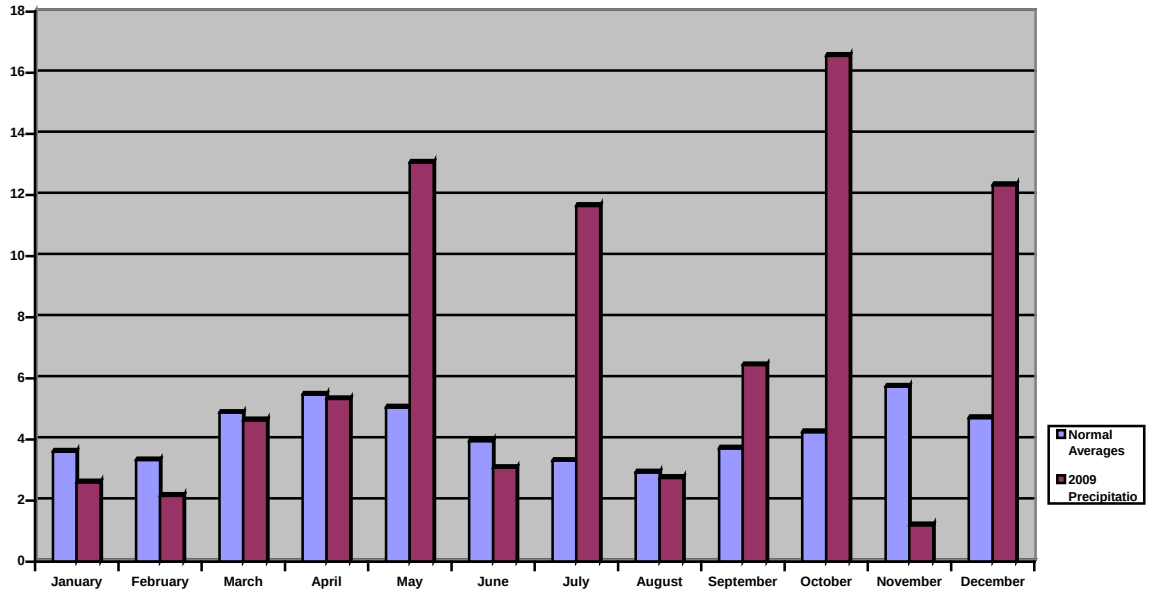


Figure 2 Rainfall totals by month at Little Rock, AR showing average and 2009 totals

[1]National Weather Service, http://www.srh.noaa.gov/lzk/?n=2009.htm

Pictures above:

Tornado Picture from http://www.epk.com/2009/04/tornado-kills-3-in-mena-ak/

Flooding Picture from http://arkansasmatters.com/mymedia/view.php?id=55492

Tornado Damage at White River Refuge from http://images.google.com/imgres?imgurl=http://www.srh.noaa.gov/images/lzk/images2/storm073009a.jpg&imgrefurl=http://www.srh.noaa.gov/lzk/%3Fn%3Drain0709c1.htm&usg=__F7GBKyN9Mrebpzk1kmFHJqVzWlE=&h=244&w=325&sz=48&hl=en&start=5&um=1&tbnid=QUsgg2KrnXefFM:&tbnh=89&tbnw=118&prev=/images%3Fq%3DWhite%2BRiver%2BRefuge%2Btornado%2Bpictures%26hl%3Den%26sa%3DX%26um%3D1

2009 Program Highlights

Arkansas' Nonpoint Source Pollution (NPS) Management Program faced another year of challenges during 2009 yet continued to expand Arkansas' capacity to manage and reduce nonpoint source pollution. Statewide projects addressed nonpoint source pollution problems in the areas of agriculture, Silviculture, urban streams, and recreation while continuing extensive assessment and monitoring projects. A few of the program highlights are described below.

Benefits of Water Control Structures

Water control structures, better known as drop pipes, are edge-of-field erosion control structures and are widely used to control gully erosion along ditches and streams. The structures are designed to regulate the flow of water as it drains from the field. The reduced flow allows for suspended sediment particles to settle back onto the field and not be transported into adjacent streams. The structure is placed in a low drainage outlet of the field and consists of an earthen dam, the inlet drainage structure (pipe), and a spillway system. Properly designed water control structures will allow for regulation of water levels for agricultural and wildlife use while maintaining the ability to release and dewater the area at a safe level. Drop pipes provide long term erosion protection as the average life expectancy for this practice is ten years.

Erosion along edge of field

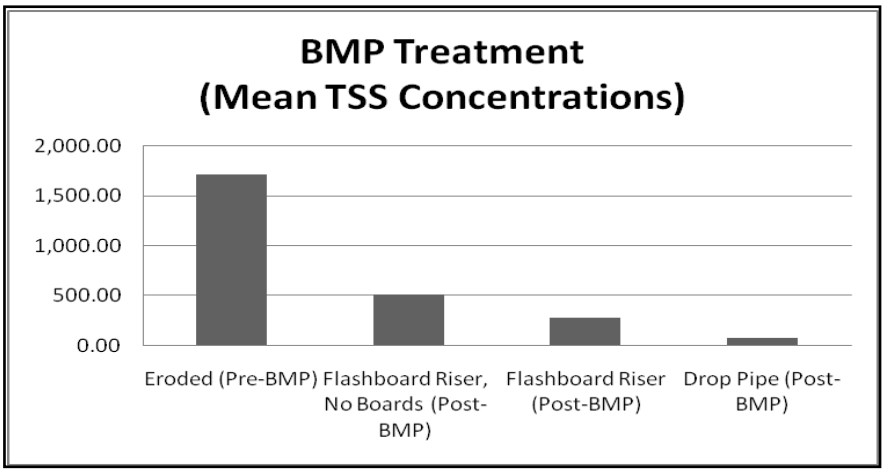
Drop Pipe installed at field edge

Project (07-1300) Monitoring the Effectiveness of BMP at Reducing Total Suspended Solids in Agricultural Runoff sought to monitor the water quality effects of implemented water control structures or drop pipes in agricultural runoff. A water analysis report provided an interpretation of the effectiveness of implemented structures. Project staff selected specific locations where landowners had agreed to install the specified best management practice and participate in the analysis of water quality. Water quality samples were collected and analyzed before BMP implementation and after BMP implementation. Depth integrated grab samples were collected during periods of runoff

Edge of Field Drain Pipe

from agricultural fields with project staff collecting a sufficient number of samples to effectively evaluate the effectiveness of the installed BMP. Statistical comparison of TSS concentrations in before and after water quality samples provided the data necessary to make the interpretation of the effectiveness of BMP implementation.

Results from project data show a significant reduction in TSS in the post BMP water quality samples. The chart below is taken from a recent report by the project staff.



Currently there are a number of projects underway to demonstrate the benefits of water control structures and other erosion control practices and encourage the installation of these practices. The current projects implementing water control structure best management practices are:

- **05-1500 Drew County Erosion Control Project** resulted in a reduction of 260 tons of sediment entering streams annually.
- **06-1200 Drew County Erosion Control Project Phase II** resulted in a reduction of 73,485 tons of sediment entering streams annually.
- **06-1300 Arkansas County Erosion Control Project** resulted in a reduction of 37,000 tons of sediment entering streams annually.
- **06-1400 Lake Conway Point Remove Erosion Control Project** resulted in a reduction of 230 tons of sediment entering streams annually.
- **06-1500 Arkansas County Erosion Control Project Phase II** resulted in a reduction of 46,812 tons of sediment entering stream annually.
- **06-1600 Crittenden County Erosion Control Project** is just getting underway and will reduce sediment from entering streams in the St. Francis River Watershed.
- **06-1700 Cross County Erosion Control Project** is just getting underway and will reduce sediment from entering streams in the L'Anguille River Watershed.

Days Creek Success Story

The ultimate goal of the Nonpoint Source Program is to put projects in place that successfully address water quality problems in such a way that the result and outcome of the investment is the removal of a specific impaired water body from the 303(d) list. A project in the Days Creek Watershed resulted in just such a success story.

A review of monitoring data from Days Creek, a tributary to the Sulphur River in Southwest Arkansas, resulted in the Creek being placed on the state's 303(d) list of impaired waterbodies. Elevated turbidity levels caused an 11-mile segment of Days Creek to not support its aquatic life designation. Excess sedimentation from unpaved roads, construction, and agricultural activities had taken a toll on the water quality within the Creek resulting in impairment.

The Miller County Conservation District initiated **Project (04-107)** and worked with the Arkansas Natural Resource Commission and local landowners to address the problems with soil erosion in the watershed. Through this project the Conservation District and landowners implemented a variety of BMPs to address the sedimentation problem associated with agricultural activities. The District purchased a no-till drill and made it available for farmers to use. A number of farmers took advantage of the opportunity to use the no-till drill. The no-till practice reduces sediment loading as the soil is not disturbed while residue from the previous crop slows down the velocity of runoff allowing infiltration of moisture into the soil thus creating a nurturing environment for the growing crop.

Young No-Till Soybeans Thrive in Crop Residue

The Conservation District encouraged the use of additional BMPs such as conservation cover and cover crops.

Monitoring data revealed a significant reduction in turbidity over the next three years. A 42 percent decrease in turbidity between 2004 and 2007 resulted in the 11-mile segment of Days Creek being removed from the state's 303(d) list of impaired waters in 2008.

This project reflects a great return on the investment of 319 funds in the Days Creek Watershed and highlights the willingness of Conservation Districts, ANRC, and local landowners to work together to achieve water quality improvement.

2009 Illustrative Projects

This section describes projects that illustrate the Arkansas NPS Programs' efforts to seek projects that address water quality problems in areas that are generally not perceived as water quality issues and require somewhat of a different approach.

Linking Other Natural Resource Concerns with Water Quality

Erosion is a natural process that has been greatly accelerated by our land use practices. An increase in the use of public lands for recreation has created an impact on public lands. Unmanaged trails and off highway vehicles can damage wetlands and riparian areas, induce serious soil erosion, and spread invasive weeds.

Phosphorus in runoff water from land fertilized with animal manure or bio-solids creates a nonpoint source pollution problem with a surplus of soluble phosphorus entering streams and creating a favorable environment for algae and other nuisance growth.

Urban streets and roads are potential sources for significant sedimentation of streams. Many road ditches are eroding at a fast pace and creating gully erosion along paved and unpaved roads.

Discussed below are some of the projects that are improving water quality through addressing other natural resource concerns.

Assessment of Recreational Lands

Project (06-700) Assessment of Off Highway Vehicles in the Cove Creek Watershed was managed by the Watershed Conservation Resource Center and coordinated with the US Forest Service, the Arkansas Game and Fish Commission, and the City of Fort Smith. An increase in the use of public lands for recreation has created a number of impacts that can negatively effect the environment. Public land managers have a growing need to understand potential impacts of recreational land use and strategies for minimizing these impacts.

OHV Trails - Source of Erosion

The goal of this project was to decrease soil erosion resulting from user created OHV trails ultimately reducing the sediment load from runoff into Lee Creek. To reach this goal, the project leaders recommended and installed Best Management

Practices for trail construction and performed restoration on areas already impacted. An assessment and inventory of the project area provided background information to support the project activities and added to the body of information that exists in regard to multi-use trail systems and OHV recreational use.

The project sought to answer the following questions:

What soil disturbances result from OHV use? The increase in recreational OHV use can initiate and produce severe erosion, damage forests, and injure wetlands and riparian areas. Project managers and the Forest Service conducted an inventory of approximately 70 miles of OHV trails and 25 miles of unpaved roads. The inventory allowed the project team to identify trails that would benefit from BMP implementation and trails that would benefit only from closure.

How does this compare to other land uses? Recreational land use often leads to trespassing and aggressive use of land without regard to areas sensitive to damage i.e. bare soil, stream banks, and stream crossings.

What management strategies are effective for promoting soil conservation on public lands? It became evident that it would be necessary to develop a trail management plan that encourages the use of a designated trail system by OHV enthusiasts. The trail network would have to be a maintained system that minimizes water quality impacts while maximizing OHV opportunities for all levels of riders. Decommissioned trails would be closed using gates and signage.

Can restoration be successfully and practically accomplished in high use recreation areas? Continued success will hinge on continued outreach to help users gain an appreciation for the potential impacts that OHV use may have on public and private lands.

Utilizing Water Treatment Residuals to Reduce Phosphorus Runoff from Bio-solids

Project (07-200) seeks to demonstrate the efficacy, cost-effectiveness, practicality, and sustainability of treating bio-solids (sewage sludge) with water treatment residuals (alum sludge). Phosphorous is a problem because it is the element limiting the amount of primary productivity in fresh water systems. Recent studies have shown that 80-90% of phosphorous runoff from pastures fertilized with animal manure or bio-solids is dissolved reactive phosphorous which is the form that is most readily available for algae uptake.

The Arkansas General Assembly of Arkansas passed the Arkansas Soil Nutrient Application and Poultry Litter Utilization Act which states "*It shall be a violation of this subchapter to apply designated nutrients to soils or associated crops within a nutrient surplus area unless the nutrient application is done in compliance with a nutrient management plan approved by the Arkansas Natural Resources Commission or at a protective rate established by the commission*". Once a protective rate was established, some of the municipalities in the nutrient surplus area of the state felt it was too restrictive for land application and not place their bio-solids in landfills. These by products have no toxic properties and the project group

decided to evaluate the effects of alum sludge or waste water residuals in reducing phosphorous runoff from land treated with bio-solids. Preliminary evaluations indicated that sewage sludge and alum sludge could be combined to form an environmentally friendly fertilizer.

Research goals for this project are to:

Determine optimum dosage rates for both liquid and dewatered alum sludge

Determine the limits of soluble phosphorous reduction

Determine the effects on forage production

Evaluate potential savings to infrastructure

The project involves conducting both rainfall simulations and field scale monitoring. This was done by constructing three watersheds in hydrologically isolated areas. Flumes and automatic samplers were installed. Baseline water quality conditions were established with background sampling being performed.

Rainfall simulation was performed on the area using various mixtures and rates to determine the "optimum" rate to be used for field monitoring.

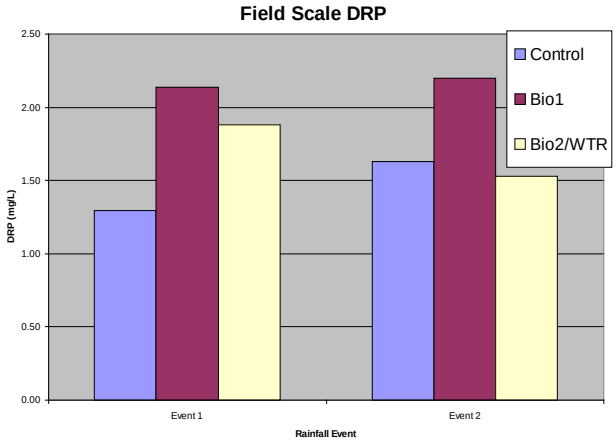
Data gathered from the rainfall simulation determined the optimum application rate as ~15% WTR by weight. The table below shows data from different applications and mixtures:

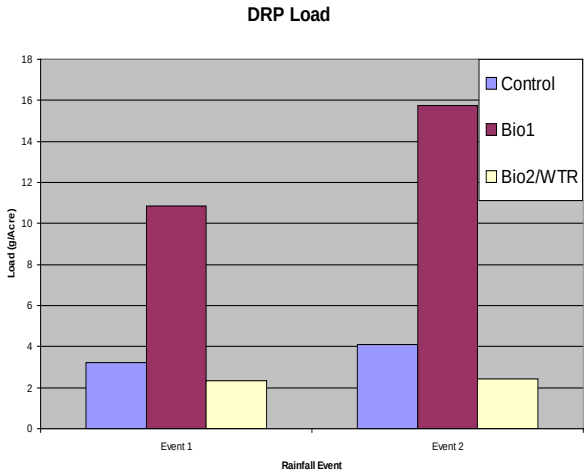
P, Al, Fe content of treatments ($mg\ kg^{-1}$)

Treatment	Soluble P	Total P	Total Al	Total Fe
Biosolid Cake	1983	ADL	16298	ADL
Liquid Biosolid	4616	21258	8945	9437
Biosolid Cake + 15% Al-WTR (premixed ~3 weeks before app.)	155	19755	ADL	ADL
Biosolid Cake + 30% Al-WTR (premixed ~3 weeks before app.)	128	13917	ADL	ADL
Biosolid Cake + 15% Al-WTR (premixed 1 day before app.)	76	20675	ADL	ADL
Biosolid Cake + 15% Liquid Al-WTR	84	22030	46424	ADL
Liquid Biosolid + 15% Liquid Al-WTR	96	24438	44113	13698

*ADL – Above Detection Limits

During the field scale monitoring bio-solids alone were applied to one watershed. Bio-solids and the "optimum" rate of alum sludge were applied to the second watershed. The third watershed received no application of any substance. During generated rainfall events, the group measured the volume of runoff, took runoff samples for analysis, and periodically evaluated forage growth. Data from two rainfall events generated the following information:





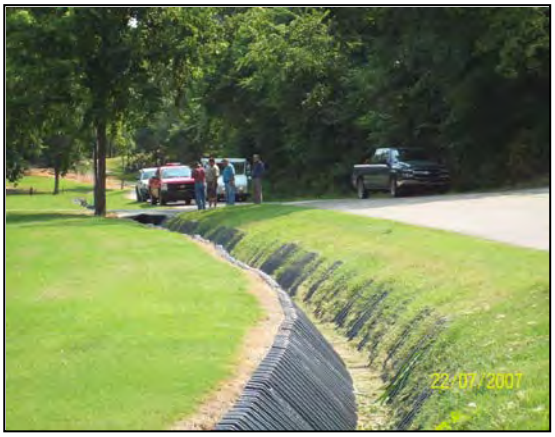
Data collection is ongoing and this project will be considered successful if it demonstrates that water treatment residuals or alum sludge can reduce phosphorous runoff from bio-solids applications by fifty percent or more.

Demonstration of New Ditch Lining Technology

Project (07-300) The City of Harrisburg, sitting on Crowley's Ridge in East Central Arkansas, experiences severe gully erosion along road ditches. This gully erosion affects the L'Anguille River and its tributaries. The City of Harrisburg initiated a project to demonstrate new ditch lining technology for controlling gully erosion associated with road ditches. A typical one hundred foot long eroding road ditch or gully can introduce 40 tons or more of soil directly into the stream system. Paved and unpaved road ditches dump tons of soil each year into the streams and tributaries of the L'Anguille River. Project sponsors sought to stabilize 1,875 linear feet of highly erosive ditches in the City of Harrisburg by using new technology and demonstrate the success to area road managers and others as these problems are common to all city and county road departments.

The demonstration ditches were stabilized using a new "smart ditch" stabilization system which is manufactured in corrugated sections of high density plastic formed in predetermined shapes and sizes. The product is not only effective but is also easily installed. Installation can be accomplished using locally owned equipment and maintenance personnel. This makes the method attractive to communities facing limited budgets and finding it difficult to design and contract road ditch protection. The project uses both "SmartDitch" technology and rock application to stabilize ditches and gullies.

The photos above indicate how the sections of corrugated plastic ditch lining fit into existing ditches.



Before and after photos show the significant improvement in the condition of the ditch once the "SmartDitch" technology has been installed.

The outlet section of the ditch is stabilized with rock resulting in improved water quality as runoff reaches the stream.

The group plans to conduct two demonstration field days to share project results with surrounding mayors, county judges, and city and county maintenance personnel.

Working to Restore Impaired Streams

Project (07-400) West Fork White River – Stream Restoration Project

The West Fork White River watershed is a major tributary of Beaver Lake which is the primary drinking source for over 300,000 people in Northwest Arkansas. The watershed includes steep stony land covered with hardwoods, city drainage from several cities, cattle operations, and poultry houses. To address water quality problems in this area the Watershed Conservation Resource Center, Beaver Water District, and the Arkansas Game & Fish Commission worked together to implement a natural channel design restoration of approximately 1200 linear feet of stream on the West Fork White River. Landowners were given an opportunity to participate in a conservation easement program to donate their easement value as a matching contribution to the project. The restoration of the reach will help to meet multiple local and regional objectives relating to stream channel instability, water quality, and habitat. The restoration will produce load reductions in both phosphorous and sediment.

Severely eroding streambank prior to restoration (Top). The bottom photo typifies the condition of the entire site after restoration.

Using conservation practices such as grade stabilization structures, rock veins, bank benches, and re-establishment of riparian zones with a channel designed to function as a stable reach, the restoration will reduce sediment loadings from accelerated streambank erosion.

The objectives of the project include:

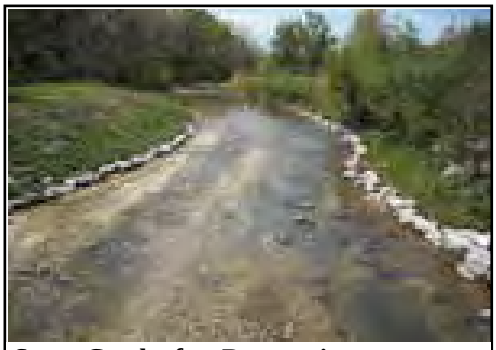
1. Restore priority reach and reduce sediment loadings
2. Develop a site specific restoration plan including a design that addresses streambank instability in a priority section of the river with landowner and local objectives, maximum sediment reduction, and habitat restoration.
3. A riparian corridor conservation easement program to landowners participating in the restoration and secure easements made available.
4. Restore damaged and destroyed riparian zone, protect existing riparian area , and increase aquatic habitat in the watershed
5. Educate landowners and the public on the use of natural channel design

Project (07-900) Sager Creek Urban Stream Restoration - Sager Creek runs through the middle of Siloam Springs surrounded by the downtown area of the city. The Creek has been a prominent feature of the town since it was founded in 1880. The Sager Creek watershed is approximately 23 square miles and land-use in the watershed is mostly agricultural. Pasture and hayland uses along with the urban and suburban land uses account for most of the runoff in the watershed. Only about 5% of the watershed is forested. Sager Creek is a tributary of Flint Creek and the Illinois River. All three streams are located on Oklahoma's 303(d) list for nutrients and pathogens. Sager Creek is specifically listed for nitrate and pathogens.

Sager Creek before Restoration

Since a large portion of Sager Creek runs through the developing areas of Siloam Springs, the City has encroached on the stream and significantly reduced the amount of riparian buffers along the stream. This lack of riparian protection along with the elevated nutrient levels, large amounts of impervious area, and a series of three dams have caused elevated water temperatures creating favorable conditions for algae blooms to create nuisance conditions in the downtown area.

The goal of this project was to restore the natural hydrology stream channel geomorphology and habitat to the reach of Sager Creek in downtown Siloam Springs. Approximately 1920 feet of steam bank was planned for stabilization using bioengineering techniques. The restoration resulted in improved aquatic habitat, temperature reduction and reduced algae, improved aesthetics, and a reduction in sediment and nutrient loading.



Sager Creek after Restoration

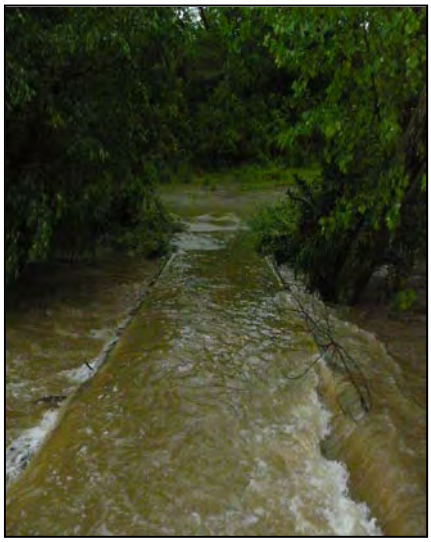
The most downstream dam, located next to the library, was removed. All accumulated sediments and gravel that had built up over time were also removed. Once the dam and sediments were successfully removed the stream banks were stabilized and reshaped using recommended bioengineering techniques to replace the aging concrete and stone revetments along the banks. The stream channel was then restored to a more natural state using step pools and boulder clusters. The entire riparian area along the restored area was treated with live plantings and native seeding. The result was an eye pleasing, healthy stream in its natural state for visitors in Siloam Springs to enjoy.

Dam on Sager Creek before Restoration

The project's success can be attributed to the dedicated efforts of the City of Siloam Springs, the Sager Creek Advisory Commission, and numerous volunteers. Demolition work was completed using City employees and riparian plantings done by a group of local volunteers and parks and recreation employees. Continued cooperation of these groups will allow for the remainder of Sager Creek to be restored and protected in the future.

Sager Creek after Dam Removal

Lessons Learned



The annual project review was held for FFY 2009 in September and project holders and NPS partners met to review projects and discuss lessons learned. The project review is a valuable tool for project holders to present lessons learned and discover benefit from each other's experiences. As project leaders interact with potential project participants, project partners and agencies, as well as stakeholders, they learn valuable lessons involving how weather, economic conditions, and human nature can alter the course of a project. The lessons learned section provides valuable information for groups who want to submit work plans and pursue a project. Taking the advice of and learning from others' experiences can help a new project make significant progress.

Project results indicate Crowley's Ridge, not just agriculture, source of NPS pollution in Cache River

The Cache River and Bayou DeView watersheds have undergone significant alteration in the past 50 years due to land conversion from forested wetlands to agriculture cropland. Numerous ditches have been cut and drainage channels straightened to improve drainage of the hydric soils that are characteristic of the area. Hydrology in the Cache River Watershed is complex and influenced by the manmade channel modifications and alterations that dot the landscape. Straight-line agricultural ditches contrast sharply with natural channel morphology. A modified channel will eventually go through a process of adjustments in an attempt to achieve a natural and stable state. The process might involve a pattern of aggradations, downcutting, undercutting, sloughing of the banks, and flood plain deposition. The readjustment process can result in significant erosion. Coupled with the extremely unstable soils in the Crowley's Ridge area, degradation of the channels within themselves proves to be a tremendous contributor of sediment downstream. This knowledge indicated an immediate need to produce a priority ranking of sub-watersheds in the Cache River Watershed based on severity of contribution of sediment from critical streambank erosion sites directly into the Cache River mainstream.

Channelization and Ditch Maintenance

The photo to the left shows significant bank erosion along Crowley's Ridge.

Project (06-400) Sediment Assessment: The Cache River Watershed of Arkansas followed a one year project in the watershed that conducted multiple investigations within the watershed including water quality, biological sample collection and analysis and channel cross-section measurement and analysis. The short term project generated a set of baseline data and provided the development of a watershed framework assessment. However, with the short duration of the project no flow regime or water quality trends could be established for statistical predictions. **Project 06-400** proposed to identify, rank and prioritize critical stream bank erosion sites using an on-the-ground assessment and from data collected from continuous monitoring stations. The project evaluated the main contributors of sediment from critical stream bank areas within the sub-watersheds.

Headcutting along Crowley's Ridge

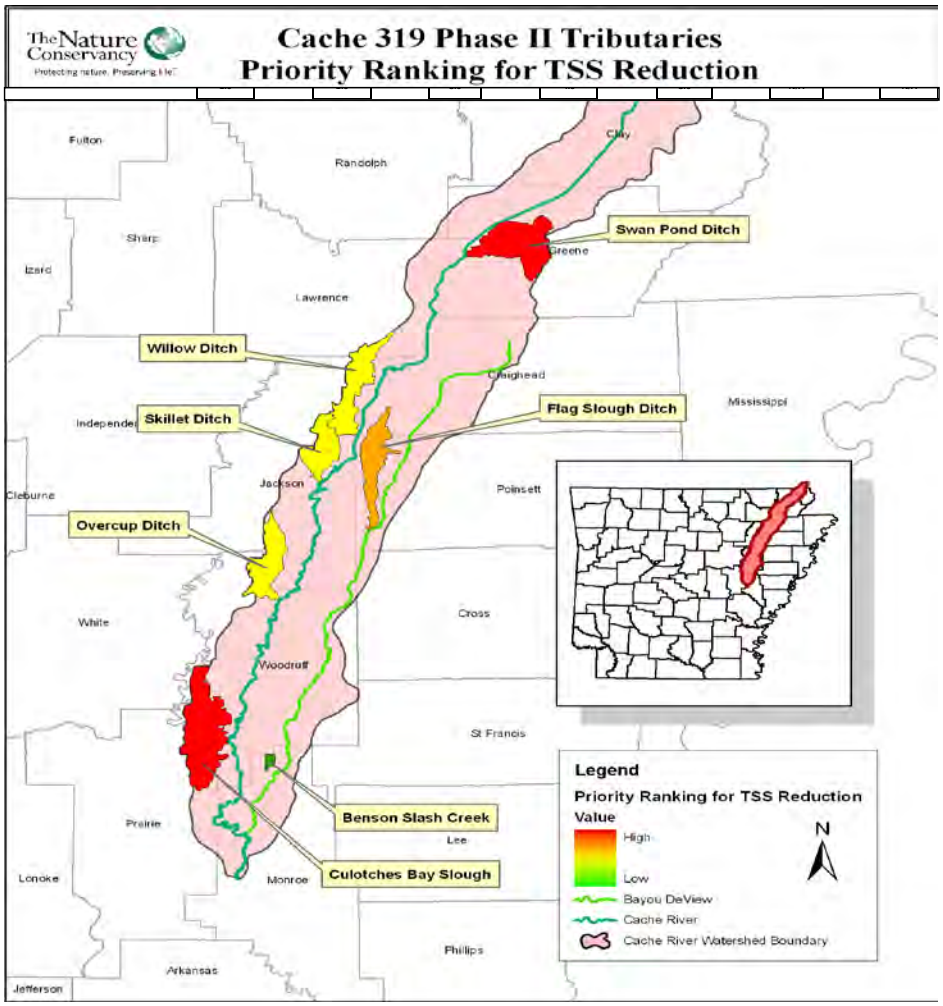
Seven continuous monitoring stations placed at selected localities representative of various hydro-geomorphic zones collected data for a three year period to establish relationships and trends. Recorded data determined the magnitude and duration of high and low flow regimes, and total suspended sediment flux with associated flow.

Bank assessments were done using Rosgen's Bank Erosion Hazard Index. A GIS erosion model using the Universal Soil Loss Equation was also used to predict overland sediment.

Tributaries were ranked and prioritized. Scoring criteria 1 and 2 were measured data from the samplers and compared to the allowable TSS levels based on TMDL. Criteria 3 is estimated annual yield, TSS*Avg. weekly flow*52 wks a year/ sp. Mi drainage area and 4 the Erosion Model.

Ranking Results

Ranking Metric	Swan Pond Ditch		Culotches Bay		Flag Slough		Overcup Ditch		Benson Slash Creek		Skillet Ditch		Willow Ditch	
	Measure	Score	Measure	Score	Measure	Score	Measure	Score	Measure	Score	Measure	Score	Measure	Score
Percent exceeding water quality standard for TSS for Base Flow Conditions	71%	4.0	92%	7.0	91%	6.0	86%	5.0	32%	1.0	59%	3.0	43%	2.0
Percent exceeding water quality standard for TSS for Storm Flow Conditions	100%	5.0	100%	5.0	64%	3.0	74%	4.0	46%	1.0	61%	2.0	100%	5.0
Estimated Total Annual Yield (tons/mi^2)	439.36	4	190.64	3	112.49	2	68.35	1	539.77	5	---		---	
Ecosystem Services Assessment Tool (ESAT)	High	3	Low	1	Medium	2	Low	1	Low	1	Medium	2	Medium	2
		Total Score		Total Score		Total Score		Total Score		Total Score		Total Score		Total Score
		16.0		16.0		13.0		11.0		8.0		7.0		9.0
		Rank		Rank		Rank		Rank		Rank		Rank		
		1.0		1.0		3.0		4.0		5.0		N/A		N/A



Project results have shown that while all the streams assessed exceeded water quality standards, the streams exceed water quality standards both during storm events and during base flow. Two streams had a higher yield during base flow than during storm events. The data will help nonpoint source managers target high sediment yield areas for treatment. The next steps will be to target projects in those priority areas. Now that the main stream bank sediment delivery sources from the tributaries to the Cache River have been ranked and prioritized, best management strategies to address those areas can be developed. By placing BMPs in priority locations, there will be a reduction from sediment sources when the BMPS are implemented.

Continue Educating Forest Landowners about Protecting and Improving Water Quality

Arkansas Silviculture NPS Project

The Arkansas Forestry Commission's commitment to maintain the reputation that forests generate clean water brought about the **Arkansas Silvicultural NPS Project (05-300)** to conduct a statewide assessment of forest best management practices and provide educational materials and training for landowners, loggers, and foresters.

The project used existing Arkansas Forestry District divisions to set the base for potential sites to be located and then statistically selected for monitoring of the use of forest best management practices to protect water quality. A total of 3,478 logging operations were identified and 267 of those sites were chosen for assessment. The ownership of the selected sites varied with 14 sites being federally owned, 174 sites were industry owned, 78 sites were privately owned and 6 sites were under state ownership. The major best management practice categories assessed were roads, harvesting, regeneration, and streamside management zones. The assessment data illustrated the best management practice implementation scores from each site and results confirm that streamside management zones score significantly lower, and sites privately owned sites generally score lower than sites under other types of ownership. Despite obstacles with personnel change, equipment malfunctions, sample size issues in some districts, and landowner issues, the project provided an enlightening assessment of water quality issues in the forestry industry and provided needed education and training.

In response to the information provided by the assessment, the project initiated training for foresters, loggers, landowners, and "in-house" training for all county rangers and county foresters. As a result 1,348 loggers were trained in 43 best management practice programs, 1,062 private landowners were trained in 12 programs, and all county rangers and county foresters received training.

Project 05-300 spawned **Project 08-700 Forestry BMP Survey** in which 3,339 logging operations were identified with 274 sites being assessed. This project enables, through aerial reconnaissance, conduction of a statistical random sample of harvest operations within a one year time-since-operation age class. Without biennial assessments, a true statistical estimate would not be possible. The statewide BMP assessment will begin in April 2010.

This past year project managers conducted three technical trainings for loggers and foresters with 101 participants. There were also three non-technical BMP trainings held with 175 landowners in attendance. Two courtesy exams based on AFC BMP guidelines, brochures, and fact sheets were given. Eleven loggers and 6 AFC employees participated in the exams.

Continuing education for the forestry community is necessary to continue a successful rate of BMP implementation. Statewide assessments provide valuable information to help make decisions on the direction of training efforts.

Utilize Arkansas Association of Conservation Districts to Promote New Programs

Water quality is a priority concern for the Conservation Districts of Arkansas. Districts work directly with landowners to address natural resource problems, such as erosion, relating to water quality. The Districts work with numerous partners to achieve the goals and objectives of the landowners and the districts. The Arkansas Association of Conservation Districts is made up of all the districts throughout the state and the Association is always on alert looking for ways to help the Districts meet their objectives through special projects.

Project (06-152) Tree Seedling Project is an example of how partnerships can accomplish great things in a short amount of time. The state of Arkansas has experienced devastating weather events over the course of the last two years. Severe floods in 2008 and devastating ice storms in 2009 destroyed widespread forested areas and damaged riparian corridors. The AACD recognized the need to help landowners restore these damaged and destroyed areas.

The AACD worked with the Arkansas Forestry Commission and arranged for Districts throughout the state to distribute over 100,000 tree seedlings as part of the Global Warming Commission recommendations from the Governor. This project became the perfect opportunity to help landowners restore much of the area damaged by floods and ice. Forty two Conservation Districts participated in the project and helped generate knowledge and interest in the project through local advertising in their respective counties. The Arkansas Forestry Commission delivered the seedlings to coolers throughout the state and Conservation Districts received seedlings from the coolers. Landowners picked up seedlings from the District office in their county. Each office kept records of number of trees picked up by each landowner and the land type where the trees were to be planted. Trees were planted in storm damaged areas, damaged private forests and general forestation.

Through this project 101,591 seedlings were distributed to be planted on approximately 1,167 acres. Conservation tree planting is one of the oldest forest stewardship practices and protects soil from erosion. The BMP efficiency of tree planting is approximately fifty percent thus preventing almost half of runoff pollutants from reaching streams.

Program Expenditures

The Arkansas Nonpoint Source Program allocates most of its Clean Water Act 319(h) funds to partners willing to carry out projects that best meet the goals and milestones of the Arkansas Nonpoint Source Program. Project awardees provide sufficient match in non-federal funds to complete the projects.

In FFY 2009, ANRC and project partners spent approximately $6.5 million dollars to reduce and prevent nonpoint source pollution in Arkansas. This included $3.3 million in federal Clean Water Act Section 319 funds which were matched by $3.2 million in non-federal funds.

Figure 3 shows how federal funds disbursed for projects were allocated among monitoring, planning, outreach, and implementation projects. Monitoring expenditures increased from 17% of federal dollars in FFY 2008 to 25% on FFY 2009. Planning expenditures decreased to 9% in FFY 2009 while outreach expenditures remained steady at 3%. Implementation expenditures reflected a small decrease in FFY 2009 with funds spent at 64%. Implementation projects still by far account for the greatest share of the total project budget.

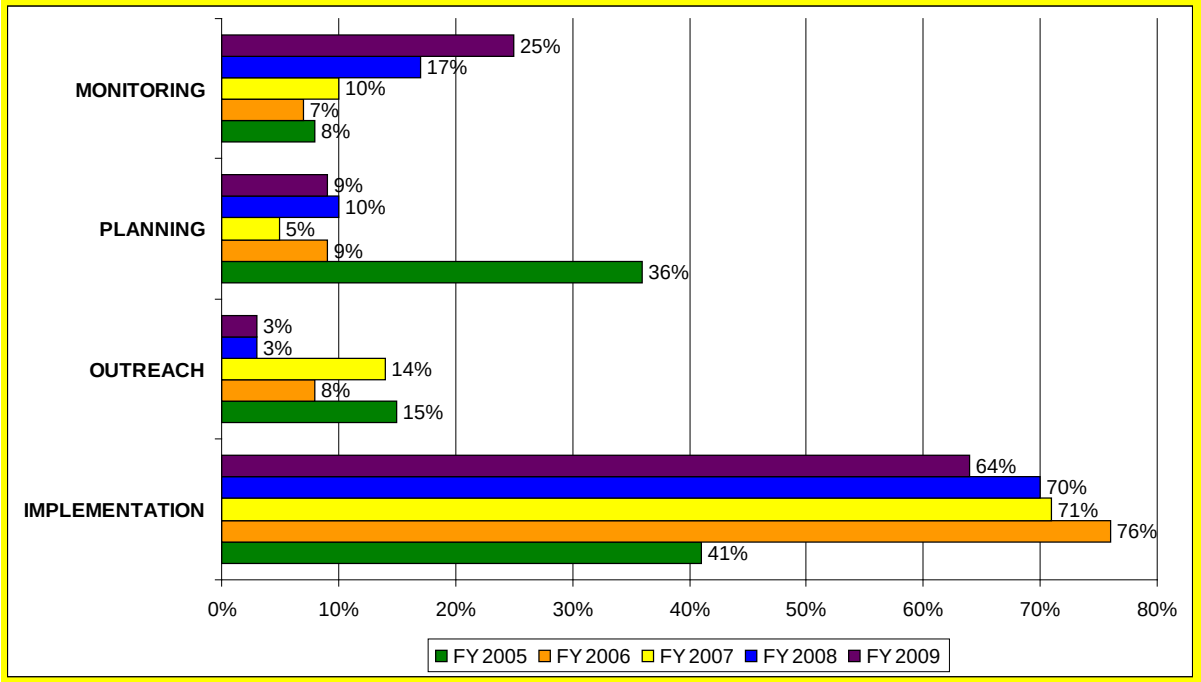


Figure 3: Percentage Federal Expenditures by Function, FFY 2005 - FFY 2009

BMP Implementation & Load Reductions

Estimated Load Reductions

Data were collected for all implemented BMPs for each 319(h) project using a standardized BMP reporting form. The BMP type and affected land area were entered in either the Region 5 or STEPL load estimation models. Depending on the model used and the type of BMP, several additional parameters (e.g. cover management factor, land use data, and animal population) may be required to complete the calculation. The models estimate annual pounds per year of nitrogen and phosphorus removed from water bodies as well as the annual tons per year of sediment removed.

Table 1: Load Reductions by Project, FFY 2009 and Life of Project

	Nitrogen Reduced (lbs/yr)		Phosphorus Reduced (lbs/yr)		Sediment Reduced (tons/yr)	
Project #	FY 09	Project Life	FY 09	Project Life	FY 09	Project Life
04-101	116	1,731	58	864	64	929
04-103	58	582	29	873	24	236
04-105	357	1,506	179	754	145	625
04-106	402	3,023	201	1,511	253	1,885
04-107	49	428	24	214	22	189
04-112	18	407	9	203	8	170
04-113	57	4398	29	531	26	286
04-181	300	300	151	151	153	153
04-182	204	204	102	102	78	78
04-183	808	808	403	403	526	526
04-184	128	128	64	64	62	62
05-101	498	2,030	249	1,015	249	1,011
05-102	432	1,411	216	705	256	841
05-103	194	721	97	361	93	345

	Nitrogen Reduced (lbs/yr)		Phosphorus Reduced (lbs/yr)		Sediment Reduced (tons/yr)	
Project #	FY 09	Project Life	FY 09	Project Life	FY 09	Project Life
05-104	887	2,474	443	1,236	438	1,234
05-1500					260	260
06-200	1,341	12,308	669	6,149	717	5,865
06-500					992	3,557
06-600					53	110
06-800	83	449	42	224	45	236
06-1200					73,485	73,485
06-1300					37,000	37,000
06-1400					230	230
06-1500					46,812	46,812
07-400			400	400	1,400	1,400
07-800					229	454
07-900	21	21	8	8	13	13
08-500	5,352	5,352	2,674	2,674	2,857	2,857
TOTAL	**11,305**		**6,047**		**166,490**	

Monitoring Projects

Monitoring is needed to evaluate runoff conditions before best management practices are put in place and to evaluate the effectiveness of those practices once they have been installed. The Arkansas Natural Resources Commission's monitoring supplements but does not duplicate ADEQ monitoring. The Arkansas NPS Program relies on ADEQ monitoring data and its assessment of the waters of the state to identify priority watersheds. Watersheds requiring a TMDL are automatically considered priority watersheds. A variety of monitoring projects in the 2009 program collected data before, during, and after stream restoration projects and installation of soil erosion practices. Below is a list of monitoring projects in the nonpoint source program for 2009:

2009 NPS Monitoring Projects

Monitoring Projects	Project #
Ballard Creek Monitoring	04-180
Monitoring and Evaluation - West Fork of the White River	06-1000
Strawberry River Sub Watersheds Monitoring	07-1000
Monitoring for Effectiveness of BMPS in Reducing TSS in Ag Runoff	07-1300
Illinois River Monitoring	08-110
Kings River Monitoring	08-111
Osage Creek Monitoring	08-112
West Fork White River	08-113
White River Monitoring	08-114
Bayou Bartholomew	08-115
L'Anguille River Monitoring	08-116
Saline River Monitoring	08-117

Galla Creek Monitoring	08-118
Illinois River Volunteer Monitoring	08-400
Upper White River Monitoring	09-500
Illinois River Monitoring	09-600
L'Anguille River Monitoring	09-800
Bayou Bartholomew Monitoring	09-900
Galla Creek Monitoring	09-1000
Kings River Monitoring	09-1100

The U.S. Geological Survey, U.S. Army Corps of Engineers, some water districts, and other entities also maintain monitoring stations in selected water bodies across the state.

The very unusual weather pattern in 2009 wreaked havoc on the monitoring projects this past year. Excessively high rainfall amounts caused damage to equipment and often times made roads and access to sites virtually impassable. However, the dedication of the monitoring project managers provided good water quality data for samples taken during base flow and during storm events.

Total loads indicate a slight increase over last year however, with total load being dependent on annual discharge volume; an increase is not surprising as annual discharge was higher in 2009 than in previous years.

Results of monitoring in the L'Anguille River saw an increase in concentrations for all parameters over last year at site L-1. Site L-2 saw concentrations increase for TKN and NH3 while TP, TSS, and NTU decreased from last year.

Monitoring in the Upper Saline confirmed an overall decrease from last year on all parameters except NH3 which stayed the same.

Monitoring summaries at site BB-1 in Bayou Bartholomew yielded a decrease in concentrations from all parameters except for turbidity. Site BB-2 saw concentrations increase in all parameters except for TSS.

Assessment Projects

The Arkansas NPS Program includes assessments prior to approving implementation projects. The assessment list contains hands on data collection for projects that involve stream bank restoration and best management practice implementation to reduce sedimentation. The table below lists current assessment projects. These assessments will provide data from sub-watersheds to target implementation projects in the areas of greatest sediment loads.

NPS Assessment Projects

Project #	Assessment
06-400	Sediment Assessment – the Cache River Watershed of AR
06-700	Assessment of OHV Trail in Cove Creek Watershed
08-700	Silvicultural Statewide Assessment

The objectives of the ***Sediment Assessment: The Cache River Watershed of Arkansas (06-400)*** project were to install continuous monitoring stations to characterize sediment flux and flow regime at each site, document bank stability conditions upstream from each site, and identify, rank, and prioritize major sources of suspended sediment for each site. Data from this assessment will help the group perform stream restoration on a high priority stream bank identified in the assessment.

Assessment of OHV Trails in Cove Creek Watershed (06-700) provided an assessment of erosion problems created on public land by the recreational use of off highway vehicles. The study looked at how much damage recreational use is doing, what types of BMPs will help control erosion, and management strategies necessary to achieve restoration and protection of these areas.

The ***Silvicultural Statewide Assessment Project (08-700)*** completed a state wide assessment to evaluate the use of best management practices in Silvicultural activities. Aerial assessments were done at 274 sites involving 3,339 logging operations. Results from the assessment prompted the Arkansas Forestry Commission to conduct technical training for all foresters and loggers, and to provide nontechnical landowner education.

Implementation Projects

ADEQ defines waterbodies listed under category 5a as truly impaired and advises TMDL development or other corrective action for the listed parameter. Many of these watersheds are affected by a 319(h) funded project.

Priority watersheds are listed in the Arkansas 2005-2010 NPS Management Program Update. Each priority watershed has or had at least three 319(h) funded projects located within its boundaries. Summaries of implementation projects, categorized by watersheds, can be found below. Please note that some projects are in multiple watersheds, the project appears first in **bold** and in *italics* in each subsequent appearance.

TMDL Watersheds

*Also includes truly impaired (5a listed) waterbodies

Beouf

06-1200 Desha County Pipe Project - The Desha County Conservation District installed approximately 200 grade stabilization structures and 50 miles of pipe reducing tons of sediment from agricultural fields. This project produced a load reduction of 73, 485 tons of sediment per year.

07-1300 Pipe Projects Monitoring - This project monitored pipes installed for water control and erosion control for their effectiveness at reducing total suspended solids in agricultural runoff.

Bayou Macon

06-1200 – Desha County Pipe Project

07-1300 – Pipe Projects Monitoring

Bayou Bartholomew (NPS Priority)

06-1200 Desha County Pipe Project

07-1300 Pipe Projects Monitoring

08-115 Bayou Bartholomew Monitoring-The Ecological Conservation Organization will conduct water quality sampling, analysis, and develop a trend hypothesis for the Bayou Bartholomew Watershed by taking automated and grab samples.

08-300 SWAT Modeling-The University of Arkansas Extension Service will use the SWAT to model the Lake Conway Point Remove, Bayou Bartholomew, Beaver Reservoir, and

Illinois River Watersheds at the 12 digit HUC scale and rank the 12 digit HUCs based on their contribution to NPS pollution.

09-900 Bayou Bartholomew Monitoring – The Ecological Conservation Organization will conduct water quality sampling, analysis, and develop a trend hypothesis for the Bayou Bartholomew Watershed by taking automated and grab samples.

Cache*

06-400 Cache Phase II conducted investigations including water quality, biological samples, and channel cross-section analysis to generate baseline data and develop a watershed framework assessment.

Strawberry

07-1000 Strawberry River Monitoring The purpose of this project is to monitor the effectiveness of BMPs through water quality samples from two Strawberry River Watersheds.

08-500 Fulton County The Fulton County Conservation District will implement a voluntary program for landowners in the Strawberry sub watersheds for the application of necessary BMPs. The goals of this project will be to implement 150 farm plans to restore pasture lands, reduce sedimentation through no-till planting, and increase awareness through field days and demonstrations. Load reductions from this project are 5,352 pounds of nitrogen per year, 2,674 pounds of phosphorous per year and 2,857 tons of sediment per year.

Beaver Reservoir* (NPS Priority)

05-1000 Urban Hispanic Outreach Project - The goal of this project is tailoring pollution preventative educational materials to target the increasing Hispanic population in North West Arkansas to engage the Latino community into actively participating in addressing issues affecting water quality protection.

06-1000 West Fork White River Monitoring -This project established two water quality monitoring stations to accurately determine sediment and nutrient loading, determine effects of restoration project, and gain a better understanding of the chemical and physical dynamics of the watershed area.

07-200 UA Biosolids-The ARWC and the University of Arkansas are utilizing water treatment residuals to reduce phosphorus runoff from biosolids in the Upper White River and the Illinois River Watersheds. Reduction of phosphorus runoff by 50% and cost reduction compared to current practices will determine the success of the project.

07-400 WCRC West Fork of the White River Restoration-The Watershed Conservation Resource center will be restoring sections of the West fork of the White river to reduce sediment loads, improve water quality, enhance aquatic and terrestrial habitat, and increase awareness about natural channel design. Load reductions from this project for 2009 are 400 pounds of phosphorous per year and 1,400 tons of sediment per year.

07-600 UACDC LID-The University of Arkansas Community Design Center will be implementing LID methods and BMPs to restore water quality in the urban areas of Fayetteville, AR in the White and Illinois River Watersheds.

07-800 Arkansas Game & Fish Commission-The Arkansas Game and Fish Commission conducted restoration of unstable sections of the White River and its tributaries to improve water quality, enhance aquatic and terrestrial life, and increase awareness of natural channel design. Load reductions were 229 tons of sediment per year.

08-111 Kings River Monitoring-The Kinds River Watershed Partnership will conduct water quality sampling, analysis, and load determinations for nutrients and solids on the Kings River at the Highway 143 Bridge through automated and grab samples.

08-112 Osage Creek Monitoring-The Northwest Arkansas Conservation Authority and Nelson Engineering will conduct water quality sampling, analysis, and load determinations for nutrients and solids on Osage Creek near Elm Springs in the Illinois River Watershed.

08-113 West Fork-White River Monitoring-The City of Fayetteville and Nelson Engineering will conduct water quality sampling, analysis, and load determinations for nutrients and solids at the Washington County Road 195 Bridge on the West Fork of the White Rive by taking automated and grab samples.

08-114 White River Monitoring-The Beaver Water District and Nelson Engineering will conduct water quality sampling, analysis and load determinations for nutrients and solids at the Arkansas Highway 45 Bridge on the White River just above Beaver Lake by taking automated and grab samples.

08-200 Kings River Watershed Partnership Urban Stream Demo- The Kings River Watershed Partnership will be demonstrating BMPS for Urban Stream Corridor Restoration in the Mill Branch reach of the Kings River Watershed to reduce sediment, evaluate, effectiveness of BMPs, and increase awareness to the public.

08-300 SWAT Modeling

09-400 Northwest Arkansas Water Quality Trends

09-1100 Kings River Monitoring

09-1200 Clear Creek Riparian

L'Anguille* (NPS Priority)

06-113 L'Anguille Monitoring- This project's focus was continually monitoring water quality for sites in the L'Anguille River Watershed. The water samples were gathered, analyzed, and used to develop a trend hypothesis for this watershed.

07-117 L'Anguille Monitoring- The Ecological Conservation Organization conducted water quality sampling, analysis, and developed a trend hypothesis for the L'Anguille River Watershed by taking automated and grab samples.

07-1200 St. Francis County – The St. Francis County Conservation District worked with landowners to plan and design the restoration of a clogged drainage channel in the L'Anguille River Watershed.

06-1700 Cross County – The Cross County Conservation District will purchase and install pipes to assist landowners with erosion control and water quality improvement.

07-300 Smart Ditches – The City of Harrisburg initiated this project to demonstrate the practicality, cost, and effectiveness of controlling gully erosion along streets and roads using a newly developed thermoformed plastic ditch lining technology that can be easily installed using local people.

08-116 L'Anguille Monitoring-The Ecological Conservation Organization will conduct water quality sampling, analysis, and develop a trend hypothesis for the L'Anguille Watershed by taking automated and grab samples.

08-800 St. Francis & Lee County Larkin Creek Sediment Prevention Demonstration Project-This project involves the restoration of sediment clogged drainage lateral to Larkin Creek in the L'Anguille River Watershed. Landowners have taken the initiative to tax themselves to pay for a portion of the project and maintain it in the future.

09-300 Lower L'Anguille Cost Share Project – The St. Francis County Conservation District will provide cost share on a variety of erosion control practices to assist farmers with controlling erosion and improving water quality in the L'Anguille Watershed.

09-800 L'Anguille Monitoring - The Ecological Conservation Organization will conduct water quality sampling, analysis, and develop a trend hypothesis for the L'Anguille Watershed by taking automated and grab samples.

"Truly Impaired" Watersheds

Lower Ouachita-Smackover

05-300 Arkansas Forestry Commission Silviculture Project recognized the nature of silviculture activities and their direct impact on waters of the State of Arkansas. The project sought an ongoing assessment of silviculture use of best management practices to protect water quality.

Upper Saline (NPS Priority)

08-117 Saline River Monitoring-The Ecological Conservation Organization will conduct water quality sampling, analysis, and develop a trend hypothesis for the Upper Saline Watershed by taking automated and grab samples.

Bull Shoals Lake

04-183 Sediment Reduction – The Boone County Conservation District purchased a Litter Spreader to assist farmers with reducing sediment and proper nutrient use. Load reductions credited to this project are 808 pounds of nitrogen per year, 403 pounds of phosphorous per year, and 526 tons of sediment per year.

07-800 Arkansas Game & Fish Commission

North-Fork White

06-200 Fulton County Cost Share offers incentives to farmers to install best management practices involving cattle operations. Currently best management practices have been planned for 168 farms. Load reductions to date as a result of this project are 12,308 pounds of nitrogen per year, 6,149 pounds of phosphorous per year, and 5,865 tons of sediment per year.

07-800 Arkansas Game & Fish Commission

Current

04-181 Randolph County Drill- The Randolph County Conservation District's purchase of a no-till drill for landowners to use in the watersheds of Randolph County will reduce erosion and enhance water quality on runoff from pasture and croplands. Load reductions are 300 pounds of nitrogen per year, 151 pounds of phosphorous per year, and 153 tons of sediment per year.

Lake Conway-Point Remove (NPS Priority)

06-1400 Point Remove Project -Placed pipes on agricultural land to greatly reduce gulley and irrigation conveyance erosion.

07-1300 Pipe Projects Monitoring

08-300 SWAT Modeling

09-1000 Galla Creek Monitoring

Lower Arkansas-Maumelle

04-182 Jefferson County Litter Spreader – The Jefferson County Conservation District purchased a litter spreader for farmers to use. This project results in load reductions of 204 pounds of nitrogen per year, 102 pounds of phosphorous per year, and 78 tons of sediment per year.

07-1100 Jefferson County- The Jefferson County Conservation District is purchasing pipe for the landowners of the Lower Arkansas-Maumelle and Lower Arkansas watersheds. The installation of these pipe structures should save around 60,000 tons/year of soil.

07-1300 Pipes Projects Monitoring

Other Watersheds

Illinois (NPS Priority)

04-180 Ballard Creek Monitoring-This project focuses on water sampling, analysis, and annual pollutant load calculations at the Washington County Road 76 Bridge on Ballard Creek. The Illinois River Watershed Partnership and the Arkansas Watershed Resource Center water quality lab will oversee this continuing water monitoring project.

05-1000 Urban Hispanic Outreach

05-1100 Urban Low Impact BMPs-The University of Arkansas goal for this project was to demonstrate LID methods and technologies in urban areas of the Illinois and White River watersheds, educate the public of these methods, and reduce NPS pollution.

07-900 Sager Creek Urban Stream Restoration

07-1400 IRWP Management Plan

08-400 Illinois River Volunteer Monitoring

08-110 Illinois River Monitoring

09-600 Illinois River Monitoring

Lower Little (NPS Priority)

05-300 Arkansas Forestry Commission Silviculture Project

Poteau (NPS Priority)

05-300 Arkansas Forestry Commission Silviculture Project

Lower St. Francis

06-1600 Crittenden County-The Crittenden Conservation District will purchase and install pipes to assist landowners with erosion control and water quality improvement.

Lower White

06-1200 Desha County

06-1300 and 06-1500 Arkansas County-The Arkansas County Conservation District will purchase and install pipe to reduce erosion and sediment loss in the White River, Bayou Meto, and Lower Arkansas Watersheds for the landowners of Arkansas County. These projects will provide a load reduction of 83,812 tons of sediment per year.

07-1300 Pipe Projects Monitoring

Lower Arkansas

06-1200 Desha County

06-1300 Arkansas County

06-1500 Arkansas County

07-1100 Jefferson County

07-1300 Pipe Projects Monitoring

Bayou Meto

06-1300 Arkansas County

06-1500 Arkansas County

07-1300 Pipe Projects Monitoring

Ouachita Headwaters

06-1100 Polk County Cooperative Extension Service-Leaders chose to implement individual BMPs on a number of farms to reach a large audience of producers. Selecting only two farms to implement these practices required more cost-share match than the farmers could provide, removing this limitation aids in the success of the project.

Middle White

06-800 Stone County Cost Share provided a cost-share incentive for land users to improve pasture conditions and reduce erosion from poor stands on steep slopes.

Eleven Point

09-700 Eleven Point Cost Share-The Randolph County Conservation District will purchase fencing equipment and provide cost share for installation of conservation practices to assist landowners with pasture improvement and reducing erosion resulting in water quality improvement.

Upper White

09-500 Upper White River Monitoring

Robert S. Kerr Reservoir

06-700 Off Highway Vehicles Trails Assessment – This project assessed soil disturbances caused by off highway recreational vehicles and made recommendations for best management practices to be adopted to reduce soil erosion from public lands.

Dardanelle Reservoir

04-184 Johnson County Erosion Control- The Johnson County Conservation District purchased a no-till drill to assist landowners with erosion control on pastures and cropland. Load reductions in this project area are 128 pounds of nitrogen per year, 64 pounds of phosphorous per year, and 62 tons of sediment per year.

Mountain Fork

06-1100 Polk County Cooperative Extension Service

New NPS Listings on 2008 303(d) List

There were no new NPS listings on the 2008 303(d) list. The list will be updated again in 2010.

The following water bodies were added in 2008 in the ADEQ's Integrated Water Quality Monitoring and Assessment Report and while the source is listed as unknown could be impacted by nonpoint sources:

Fourche Creek, Reach -022, was listed as not meeting standards for drinking water. The cause for designation was listed as siltation and turbidity.

East Fork Cadron Creek, Reach -002, was listed as not meeting standards for aquatic life. The cause for designation was listed as siltation and turbidity.

Muddy Fork Illinois River, Reach -025, was listed as not meeting standards for aquatic life and primary contact with the causes for designation being pathogens and total phosphorous.

Osage Creek, Reach -030 and Reach -930, were listed as not meeting standards for aquatic life and primary contact with causes for designation being pathogens and total phosphorous.

Spring Creek, Reach -931, was listed as not meeting standards for aquatic life and primary contact with causes for designation being pathogens and total phosphorous.

Appendix B: The 2009 Accomplishments toward the 2005-2010 NPS Management Program Plan

The entirety of the Arkansas 2009 Annual Report is the documentation of the progress made toward achieving the NPS Management Program Plan. While the main focus of work done is in the field of agriculture, this program has made contributions toward silviculture, surface erosion, and household and business activities. Objectives listed below are milestones where progress occurred. *In Progress* status are those areas in which current work is ongoing, and *Accomplished* are areas where it is felt the milestone is in attainment.

Objective	Milestone Description	Status
	Agriculture	
4.1	Continue to encourage and provide technical assistance for the development of conservation plans, nutrient management plans and comprehensive nutrient management plans as well as implementation of BMPs through wide-ranging education and outreach programs.	In Progress
4.5	Identify additional sources of funding for projects that demonstrate systems approaches that enable farmers to achieve multiple goals (e.g., conserve water supply and protect water quality while achieving profitability goals).	In Progress
4.6.	Improve the availability and access to information on agricultural and other land uses at the watershed and sub-watershed levels in order to better target implementation projects. While maintaining mandated confidentiality, make available information on the types, extent and distribution of land uses, BMPs in use, riparian buffers and total acres enrolled in conservation programs.	Accomplished
4.7	Seek additional sources of funding to increase and improve the effectiveness of technical assistance to agricultural producers in planning resource management and with the implementation of BMPs, with special emphasis on nutrient surplus areas.	In Progress
4.8	Coordinate conservation planning to take full advantage of cost-share programs for riparian habitat improvement, Wetland Reserve Program (WRP), Conservation Reserve Program (CRP), the Wetland and Riparian Zone Tax Credit Program (through ANRC), and other programs.	In Progress
4.9	Encourage plans for alternative irrigation water supply and supplemental stream augmentation, including off-stream storage of surplus flows	Accomplished

4.10	Continue to focus on BMP implementation to improve conservation practices for erosion control, sediment retention, irrigation management and nutrient management on row crop and animal agriculture and farm forests. As appropriate, direct technical assistance to landowners in targeted watersheds giving emphasis to developing new conservation plans and areas that connect established riparian corridors.	In Progress
4.11	Continue to provide and improve extensive education and training to promote BMP implementation (e.g., risk management, demonstrations to acquaint landowners with the conservation practices most effective in reducing runoff, sediment detachment and transport, including but not limited to no-till, conservation-till, ridge-till, pipe drop outlets, riparian zone management, and wetland restoration).	Accomplished
4.12	Continue to encourage landowners to establish riparian buffer strips, grass drainage ways, stabilize stream banks, and restore riparian areas.	Accomplished
4.13	Continue to provide technical assistance and make available financial assistance to agricultural operations where cost-share is a component of approved 319(h) implementation projects.	In Progress
4.15	Identify nutrient deficit areas more precisely to facilitate export of surplus poultry litter and develop a system for tracking where surplus litter is utilized. Continue to research and develop programs to remove surplus poultry litter from nutrient surplus areas.	Accomplished
4.16	Work with major integrators and farm workers as well as landowners to encourage input from and cooperation with nutrient management planning and implementation.	Accomplished
4.17	Promote nutrient planning for farms that are below the threshold for classification as a Confined Animal Feeding Operation with dry manure.	Accomplished
4.18	Expand education for poultry producers with a special focus on the role that the producer plays in the "Big Picture" of nonpoint source pollution management (e.g., the relationship between biological processes and agricultural production processes as they relate to water quality).	In Progress
4.19	Provide educational and technical assistance to support full implementation of nutrient application rules promulgated by the ANRC.	Accomplished
4.20	Continue to promote positive relationships between state and federal agencies and agricultural producers in order to cultivate open communication in an environment of trust.	In Progress

Silviculture		
5.1	Continue to strengthen outreach and training programs in BMP implementation for landowners and loggers by: Developing additional mechanisms for delivering BMP implementation training targeted at private non-industrial landowners (e.g., educational workshops, expanded local partnerships in areas where there are high concentrations of private non-industrial landowners and increasing emphasis on woodland management in farm planning).	Accomplished
Surface Erosion		
	Instream Erosion:	
7.6	Seek new sources of funds and promote increased cooperation aimed at shifting focus from bank stabilization to reach restoration.	In Progress
7.7	Develop and implement a watershed based assessment protocol and BMPs for stream bank erosion, including guidelines for riparian buffer widths for construction, as funds allow.	In Progress
7.8	Prioritize stream reaches and sites for restoration within priority watersheds, as funds allow.	In Progress
7.10	Promote tax credits, cost share and other incentive programs that are available for riparian zone and stream corridor restoration projects.	Accomplished
7.11	Improve coordination of existing data among cooperating entities	Accomplished
7.12	As funds allow, develop data and conduct analysis to fill information gaps...	In Progress
Household and Business Activities		
	Household & Small Business Chemicals and Fertilizers:	
8.5	Assess the impact of household and business use of fertilizers, pesticides and other common products that do not require permits but can affect water quality in order to more effectively target outreach and awareness programs aimed at increasing use of BMPs, as resources allow.	Accomplished
8.9	Hazardous waste and pesticide container collection programs aimed at agricultural producers will be encouraged to promote to and accept containers from households and businesses as well.	Accomplished