

*Oklahoma Nonpoint Source Program*

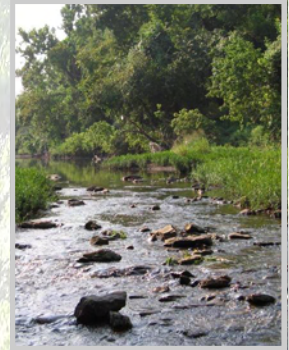
***Annual  
Report***

**2009**

**Oklahoma Conservation Commission**

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**Nonpoint Source (NPS)  
Pollution washes off the  
landscape and into lakes and  
streams.**

**The most prevalent nonpoint  
source (NPS) pollutants in  
Oklahoma are bacteria,  
sediment, and nutrients.**

**The Oklahoma Conservation  
Commission (OCC) uses  
education and implementation  
of best management practices  
to prevent or minimize  
origination and delivery of NPS  
pollutants to water bodies.**

Cover photo:  
Buffalo Creek in Harper County (Eldon Merklin)

*Oklahoma Conservation Commission Water Quality Division's Mission :*  
*To conserve and improve the water resources*  
*of the State of Oklahoma through*  
*assessment, planning, education, and implementation.*



The USEPA provided partial funding for all activities discussed in this report.  
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# NPS Partners

Oklahoma's NPS Program is a collaborative effort of federal, state, and local agencies as well as the citizens of the State of Oklahoma. Among the most significant of partners in OCC's program efforts are the 87 Conservation Districts across the state which serve as an invaluable resource for contact with landowners who partner to implement water quality programs at the local level.

The following is a list of the many partners who contribute to Oklahoma's NPS Program:

## State Partners include:

Indian Nations Council of Governments  
Oklahoma Association of Conservation Districts  
Oklahoma Corporation Commission  
Oklahoma Department of Agriculture, Food and Forestry  
Oklahoma Department of Environmental Quality  
Oklahoma Department of Wildlife Conservation  
Oklahoma Energy Resources Board  
Oklahoma Groundwater Protection Council  
Oklahoma Office of the Secretary of the Environment  
Oklahoma Scenic Rivers Commission  
Oklahoma Water Resources Board  
Oklahoma State University  
University of Oklahoma

## Federal Partners include:

U.S. Environmental Protection Agency  
U.S. Army Corps of Engineers  
U.S. Department of Agriculture / Natural Resources Conservation Service / Farm Services Agency  
U.S. Geological Survey  
U.S. Federal Emergency Management Agency

## Other Important Partners:

City of Oklahoma City  
City of Tulsa  
Oklahoma Association of Conservation Districts

## Common sources of NPS pollution in Oklahoma:

- **Bacteria and nutrients from livestock waste and domestic animal waste**
- **Fertilizers and pesticides from agricultural lands and residential areas**
- **Sediment from construction sites, croplands, pasture, silviculture, roads, and eroding stream banks**
- **Oil, grease, and toxic chemical from urban runoff and energy production**
- **Salt from irrigation or oil and gas production and acid drainage from abandoned mines**

# Letter from the Water Quality Director

Dear Oklahoman,

As Oklahoma's lead technical agency for nonpoint source pollution, the Oklahoma Conservation Commission's (OCC) Water Quality Division works with partners across the state to protect waters from runoff-driven pollution. The Division has statewide water quality monitoring, education, and implementation projects that protect our streams, rivers, lakes, and wetlands. The program is successful because of the wonderful working relationship with our 87 conservation districts, NRCS, and the citizens of Oklahoma. The Division is funded largely through the Environmental Protection Agency's Clean Water Act Section 319 Nonpoint Source Pollution Program and 104 (b)(3) Wetlands Program. These federal funds are matched by the state through the Conservation Infrastructure Revolving Fund, local landowners, and other state and local partners.

In the 2009 NPS Annual Report, you will find information about the OCC's WQ monitoring, education, and implementation programs, and you'll learn how these programs are working to keep the water clean in Oklahoma.

## **Notable 2009 Program Activities:**

### **MONITORING**

- Monitored over 147 stream sites through the Rotating Basin Monitoring Program. OCC monitors 245 fixed stream sites and 250 probabilistic sites across the state every five years through the Rotating Basin Program. In doing so, the program:
  - o□ Conducted over 500 macroinvertebrate and 211 fish collections (2008 and 2009), and
  - o□ Collected over 4,000 water samples for analysis from over 295 sites (2008 and 2009).
- Analyzed stream data for the *2010 Integrated Report*, an assessment that summarizes waterbody impairments and is required by the USEPA to help track progress in Clean Water Programs.
- The Wetlands Program completed digitizing statewide coverage of the US Fish and Wildlife Service Wetland Inventory maps. Previously only available on paper, these inventory maps are a critical component to estimating wetland gains and losses, information that is critical to ensuring that the state can qualify for the maximum amount of wetland federal dollars.

### **EDUCATION**

- Through the nationally recognized Blue Thumb Education Program, volunteers monitor 105 streams sites across the state each month. Twenty-two new stream sites were added in 2009.
- Currently, a total of 36 counties across the state are participating in Blue Thumb stream monitoring.
- Blue Thumb held seven stream monitoring trainings during 2009, training over 100 citizens about water quality and NPS pollution.
- Blue Thumb was recognized with an Environmental Excellence award from the Keep Oklahoma Beautiful Foundation in December 2009.
- Over 11,000 volunteer hours were logged from education and stream monitoring events in 2009.

### **IMPLEMENTATION**

Our field staff established the following practices in targeted areas this year:

- Installed over 45,391 feet (8.6 miles) of riparian area exclusion fencing to protect sensitive areas around streams and rivers from erosion and NPS runoff.
- Protected 947 acres of riparian area by offering exclusion incentive payments to landowners.
- Constructed over 26 waste storage feeding facilities or cake-out facilities to improve animal waste handling and storage.
- Replaced 47 improperly functioning rural septic systems.
- Installed 115 watering tanks and 10 ponds, and drilled over 25 wells to supply alternative water to livestock fenced out of creek or to encourage more uniform pasture utilization.
- Installed over 124,809 feet of cross-fencing to reduce over grassing and sediment runoff.
- The Carbon Program signed up over 9,600 acres in the North Canadian River Watershed carbon pilot program, further encouraging cooperators to convert to no-till farming, protect riparian areas, and convert marginal cropland to grass.

**Planning** and **educating** to address nonpoint source pollution problems are the backbone of our program and are critical to its success. Long-term water quality **monitoring** is essential to help prioritize the program and evaluate its effectiveness. **Implementation** is the area of the program where we demonstrate that cooperative, targeted, voluntary efforts can successfully address nonpoint source pollution problems in a timely, cost-effective manner.

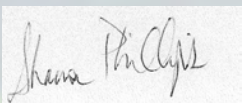
Beginning in 1998, the program made the decision to intensively focus efforts in a few priority areas each year and to continue working in those areas to achieve success. Water quality problems that began with settlement can't necessarily be solved with a 3 year program. We've continued along those lines for more than a decade and are seeing proven results of the State's efforts. Our current implementation projects focusing in the North Canadian, Illinois, Spavinaw, and Honey Creek (Grand Lake) watersheds continue to make significant progress addressing problems in those priority watersheds. As an example, from 2008-2009, the North Canadian River 319 Project saw unprecedented cooperation from the local agricultural community in supporting the installation of best management practices (BMPs) to address bacteria, turbidity, and dissolved oxygen problems in the river and Lake Overholser. Most notably, the most popular practices, conversion to no-till farming and riparian area protection are the practices that will most significantly improve water quality. As of December 2009, a total of 10,497 acres of conventional tillage farming have been converted to no-till farming. Additionally, 39,130 feet of riparian fencing (about 7.43 miles), has been installed to protect at least 391 riparian acres. In addition, the Honey Creek, Spavinaw Creek, and Illinois River Priority Watershed Projects have continued to show success, as evidenced by the number of BMPs installed within the past year. A comprehensive chart showing the number of completed BMPs from January 2009 through December 2009 can be found on page 22.

The Spavinaw Creek, Honey Creek, and Illinois River Watershed 319 Projects have been installing BMPs since 2003 in northeastern Oklahoma. The practices completed under the partnership between the Conservation Districts, the OCC, and NRCS in the last 6 years include: 846 acres or approximately 75 miles of riparian area protected, 1369 acres of pasture planting and 480,399 feet (more than 90 miles) of cross fencing installed to reduce overgrazing and runoff of soil, bacteria, and nutrients. In addition, since 2003, at least 140,814 tons of poultry litter has been moved out of the watersheds. Overall, \$6.28 million dollars have been spent to install these best management practices since 2003 - with landowners providing \$2.4 million dollars of those funds. Installation of these types of practices in portions of these watersheds has resulted in at least a 60% reduction in nutrient loading from those areas of the watersheds, and in some cases, delistings from Oklahoma's 303(d) list of impaired waterbodies.

Since its inception in 2007, the Conservation Reserve Enhancement Program (CREP) has enrolled 252 acres for riparian area exclusion and 1,281 additional acres are pending contract. The CREP program planted over 2,500 bare root seedlings along stream banks. As with any new program, CREP has been slow to establish itself, but with 2009 it is building steam. In the last 3 months of the program, it doubled its contracted acres and the number of new potential cooperators continues to increase. I expect 2010 may bring another at least doubling of the program size as word of mouth spreads and neighbors convince neighbors to participate.

These programs have shown that not only are voluntary programs effective at installing best management conservation practices, but they can also significantly improve water quality in a reasonable time frame. The limiting factor is not willingness of landowners to participate in the solution, but rather the availability of funding for these cost share programs. The state must match a percentage of the USEPA funding for these projects that protect Oklahoma's water and stimulate Oklahoma's economy to continue. Please take the opportunity to review this information and contact us with any additional questions you may have about our programs.

Sincerely,  
Shanon Phillips, Oklahoma Conservation Commission Water Quality Director



**Our agency does not regulate. Instead, we work through education and demonstration to encourage landowners, such as farmers and ranchers, to adopt improved methods of caring for their land by implementing best management practices. With our help, farmers, ranchers, and other Oklahomans are improving their land and protecting water quality in Oklahoma.**

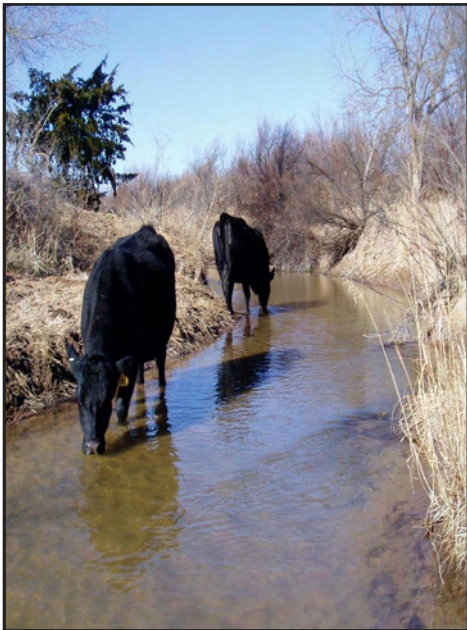
# Oklahoma's Nonpoint Source Program

Oklahoma's Nonpoint Source (NPS) Pollution Management Program is a combination of federal, state, and local agency programs. The NPS Program is authorized federally by Section 319(h) of the Clean Water Act, which requires states to develop an assessment report that identifies NPS problems and a Management Program that develops and implements objectives for addressing them. The program is largely funded via 319 federal monies, state legislative appropriations, and many private landowners who voluntarily participate in the cost-share programs. These cost-share implementation projects install conservation (best management) practices on private land to protect the state's water.



By statute, the Oklahoma Conservation Commission (OCC) serves as the technical lead agency of Oklahoma's NPS Program and is responsible for developing, promoting, and implementing efforts to reduce NPS pollution and thereby restore support of the designated beneficial uses of affected waterbodies. The state follows an organized process to identify threats and impairments to water resources and determine causes, extent, and sources of the problems. The NPS Program is nonregulatory, using planning, implementation, monitoring, and education to reduce pollution to help waters meet water quality standards. The following is a reporting of the highlights of Oklahoma's NPS program for 2009.

**Oklahoma's NPS Program is non-regulatory, employing program areas of planning, implementation, monitoring, and education to reduce NPS pollution.**



Nonpoint source pollution refers to pollution from diffuse sources that in themselves are minor, but when they are summed together from an entire region or area, become significant. In general, NPS pollution does not result from a discharge at a specific location (such as a pipe) but results from land runoff, percolation, precipitation, or atmospheric deposition. **The most common nonpoint source pollutants in Oklahoma are bacteria, nutrients, fertilizers, pesticides, sediment, oil, and salt.** Common sources of NPS pollution include agriculture (cropland, livestock, and poultry) and, forestry, mining, recreational boating, urban runoff, construction, leaking septic systems, physical changes to stream channels, habitat degradation, and negligent or uninformed household management practices.

The pollutants degrade aquatic systems by altering the physical and chemical quality of the water, and can result in drastic biological effects. The NPS problem can be intensified when natural buffering systems are adversely modified.

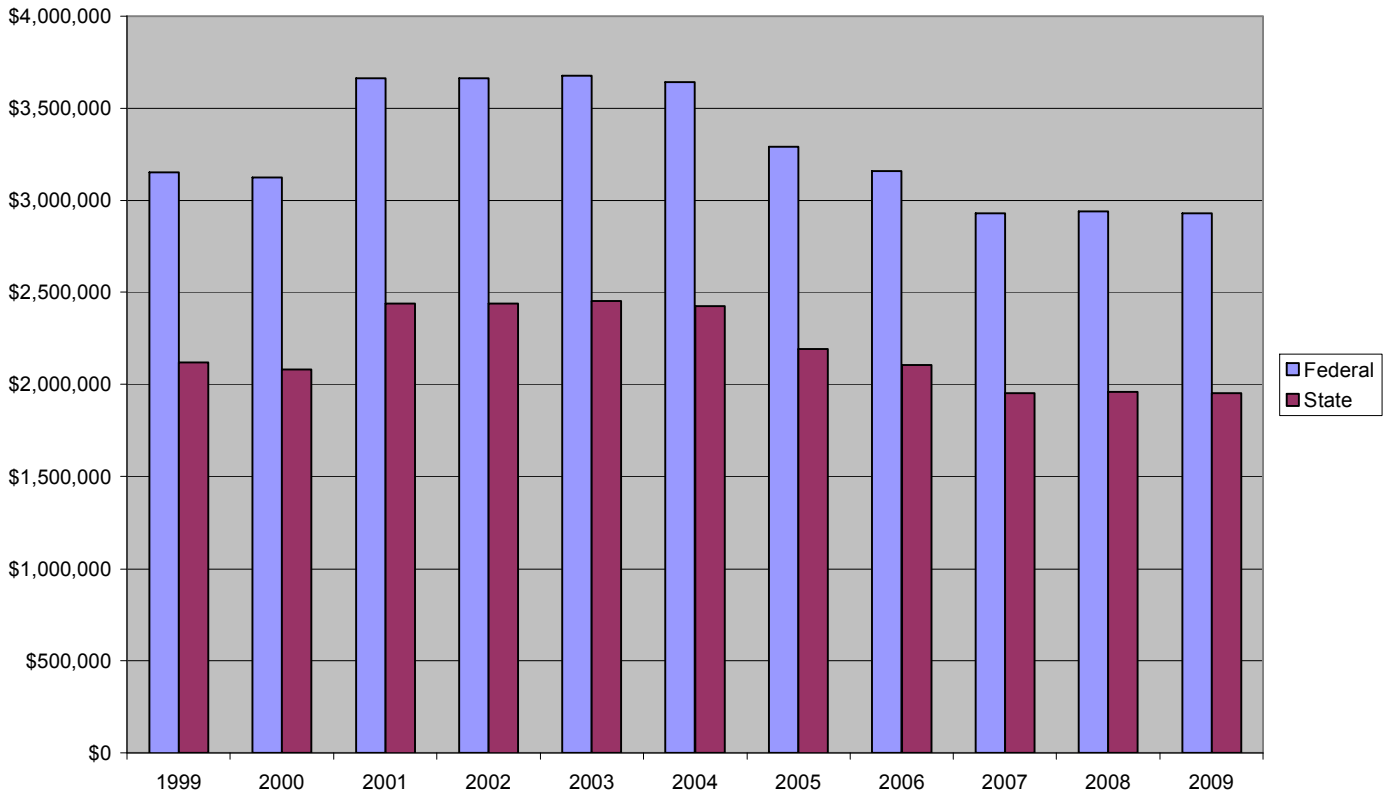
***NPS pollution occurs when rainfall, snowmelt, or irrigation runs over land or through the ground, picks up pollutants, and deposits them into rivers and lakes or introduces them into groundwater.***

# Planning

## Oklahoma NPS Management Program Funding

Funding for the NPS Program comes from the U. S. Environmental Protection Agency and the Oklahoma State legislature. During FY2009, the EPA provided \$2,928,900 and Oklahoma contributed \$1,952,600. *Cost share funds from participating landowners comprise a significant contribution to NPS Program funding not reflected in the chart below.*

## Oklahoma Nonpoint Source Program Funding



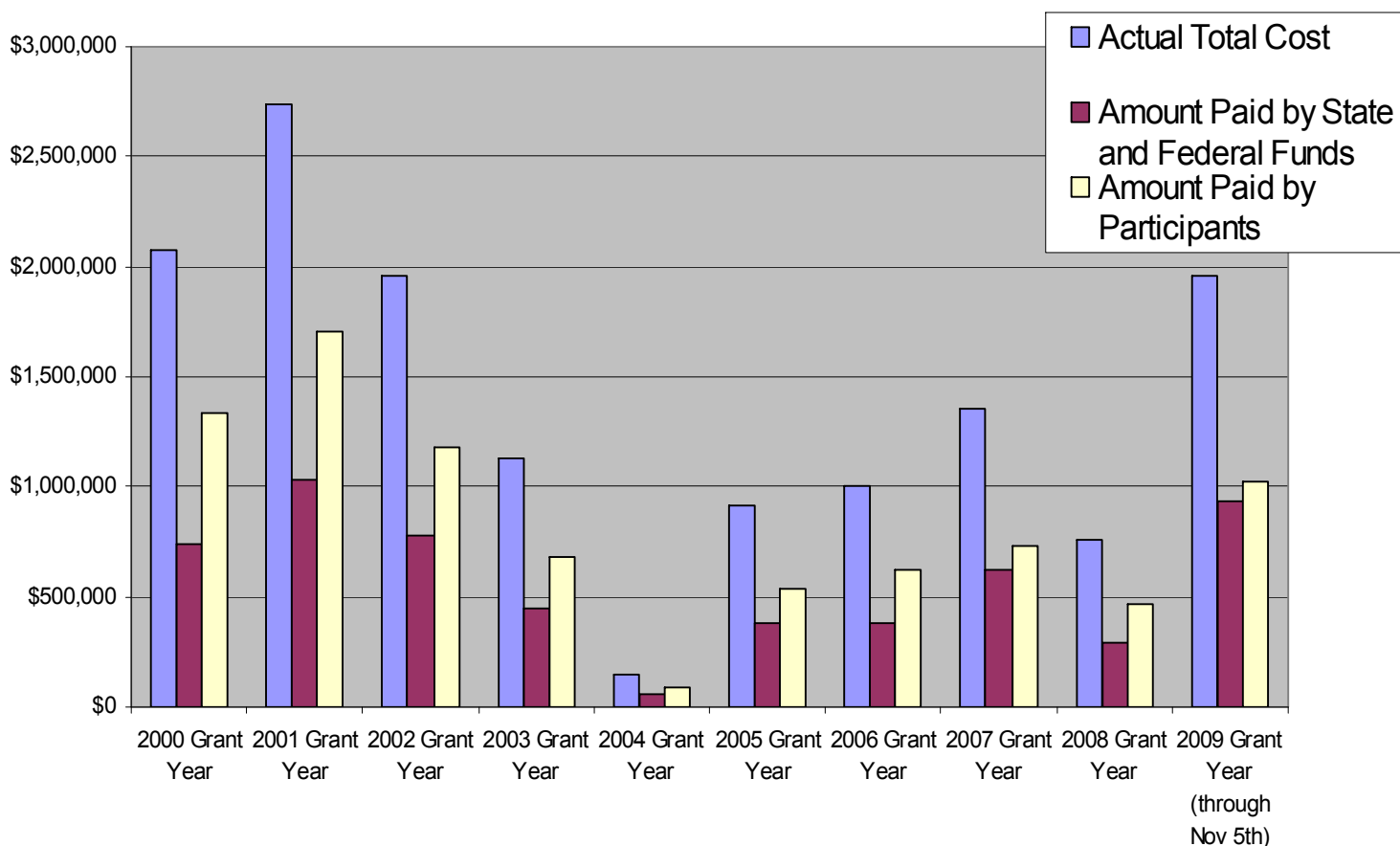
Oklahoma NPS Program Funding						
	1999	2000	2001	2002	2003	2004
<b>Federal</b>	\$3,152,800	\$3,123,600	\$3,661,800	\$3,661,800	\$3,677,000	\$3,639,800
<b>State</b>	\$2,118,972	\$2,082,400	\$2,441,200	\$2,441,200	\$2,451,333	\$2,426,533
<b>Total</b>	\$5,271,772	\$5,206,000	\$6,103,000	\$6,103,000	\$6,128,333	\$6,066,333
	2005	2006	2007	2008	2009	
<b>Federal</b>	\$3,290,300	\$3,158,200	\$2,928,900	\$2,938,000	\$2,928,900	
<b>State</b>	\$2,193,533	\$2,105,467	\$1,952,600	\$1,958,667	\$1,952,600	
<b>Total</b>	\$5,483,833	\$5,263,667	\$4,881,500	\$4,881,500	\$4,881,500	

# Planning

## Oklahoma's Locally-Led Conservation Cost Share Program Funding

An important part of the project planning is deciding which BMPs to cost-share with landowners and at what percentage. In the 2008 grant year, the cost-share program provided \$295,875 in incentive payments to the landowners and landowners contributed over \$464,481 for a total of \$760,356. In the 2009 grant year, this cost-share program provided \$935,741 in incentive payments to landowners to voluntarily apply water and soil conservation practices on their land. In turn, landowners contributed over \$1,026,000 of their own money for a total of **\$1,961,741 spent protecting water quality through the cost-share program.**

### Oklahoma Locally Led Cost-share Program Funding



## Watershed Project Planning

Watershed Based Plans (WBPs) detail all aspects of a proposed project, including goals, partners, staff, budget, and timelines. The WBP is a blueprint for determining where and how best management practices will be focused in a watershed. A well organized plan is vital to developing and implementing a successful watershed project that will result in improved water quality. Watersheds for which plans were submitted in FY2008 to EPA Region 6 include: Grand Lake, Lake Thunderbird, and Turkey Creek. In 2009, the OCC composed portions of the Wister Lake/Poteau River Watershed Based Plan and portions of the Illinois River Watershed Based Plan.



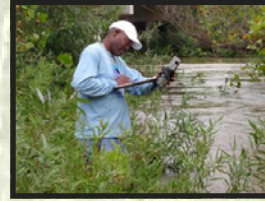
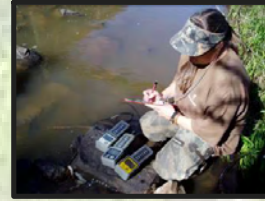
# Monitoring

Oklahoma's NPS monitoring program is a significant and collaborative effort between multiple federal, state, and local agencies. As the state's NPS technical lead, the OCC conducts much of this effort, having developed an extensive and unique monitoring program primarily focused on determining the extent, nature, and probable sources of NPS pollution through ambient and diagnostic monitoring activities. Oklahoma's NPS Program monitoring efforts help focus NPS Program planning, education, and implementation in areas where they can be most effective and are absolutely crucial in gauging their success over time.

**During 2008 and 2009, OCC staff collected more than 3,987 water samples for analysis of conventional pollutants at over 294 sites.** Biologists completed approximately 211 fish collections (below) with concurrent aquatic habitat assessments and collected nearly 400 invertebrate samples. A more complete description of the sampling by project will follow. All OCC monitoring is conducted following methods and sampling plans established in EPA approved Quality Assurance Project Plans (QAPPs).

## Use of Monitoring Data

Nonpoint source monitoring data is used for many purposes including use support assessments for Oklahoma's Integrated Report, general project reporting, trend analysis, watershed targeting, TMDL development, and effectiveness monitoring. Oklahoma's ambient water quality monitoring programs analyze available water quality data every two years as required by the Clean Water Act. Streams that are not meeting Oklahoma water quality standards are placed on the 303(d) List of Impaired Waters and remain there until collected data show a stream meets the standards. While watershed projects last from 2 to 5 years, it can take up to 10 years before significant improvements in water quality are statistically evident by monitoring and perhaps even longer to totally restore attainment of beneficial uses.



## Integrated Report

Per Clean Water Act requirements, Oklahoma assesses its surface waters for beneficial use attainment and compiles results into the state's Integrated Report. This report is generated biannually and is a compilation of assessments resulting from data gathered through state, federal, tribal, and local agencies.

Much of the data assessed for the report is derived from OCC's Rotating Basin Program and OWRB's Beneficial Use Monitoring Program (BUMP). During the 2007/2008 reporting cycle, 4,064 waterbodies were assessed, including 32,349 miles of rivers and streams. For more detail, the reader is referenced to the report in its entirety found at the following URL:

[http://www.deq.state.ok.us/wqdnw/305b\\_303d/2008\\_integrated\\_report\\_entire\\_document.pdf](http://www.deq.state.ok.us/wqdnw/305b_303d/2008_integrated_report_entire_document.pdf)

In 2009, the OCC provided ODEQ with assessment results for the 2010 Integrated Report based on data collected from 2004-2009.








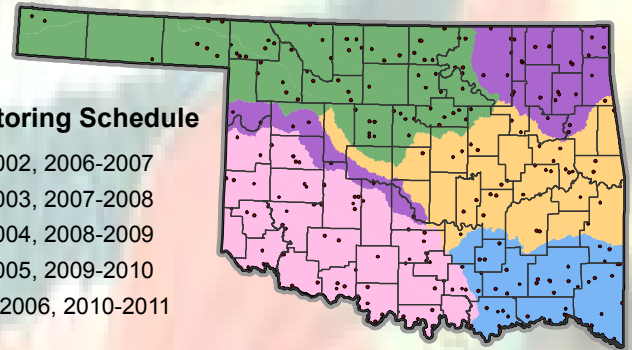
# Rotating Basin Fixed and Probabilistic Monitoring Program

Through OCC's Rotating Basin Monitoring Program (RBMP), routine water quality (physical and chemical), instream habitat, and biological (fish and benthic macroinvertebrates) data are collected in support of EPA mandates to assess state waters regarding their support of water quality standards. It serves a dualistic role in fulfilling NPS Program requirements for the NPS Assessment Report as all data are analyzed and submitted biannually to the ODEQ for compilation in the state's Integrated Report. Data from the RBMP continue to comprise a significant contribution in initial and continuing assessment of state streams.

*In 2009, the OCC water quality staff monitored 97 fixed sites and 50 probabilistic sites for a total of 147 stream sites monitored!*

## Rotating Basin Monitoring Schedule

	Year 1/6 2001-2002, 2006-2007
	Year 2/7 2002-2003, 2007-2008
	Year 3/8 2003-2004, 2008-2009
	Year 4/9 2004-2005, 2009-2010
	Year 5/10 2005-2006, 2010-2011



## Water Quality Parameters Assessed:

**In the Field:** dissolved oxygen, water temperature, pH, turbidity, conductivity, alkalinity, hardness, instantaneous discharge

**In the Laboratory:** Ammonia, Nitrate, Nitrite, total Kjeldahl nitrogen, ortho-phosphate, total phosphorus, chloride, sulfate, total dissolved solids



Through this program, all complete USGS eleven digit HUC watersheds across the state are monitored in a five year rotation. Each basin is monitored for a two-year period every five year cycle resulting in a total of **245** sites throughout the state. The RBMP is currently in its second five year cycle. During a five year cycle, sites are sampled every five weeks for two consecutive years. **Approximately 100 rotating basin and fifty probabilistic sites are assessed each year for water quality. In addition, each year approximately 50 of the fixed sites and 50 probabilistic sites will have the fish community and aquatic habitat assessed. In 2009, a total of 97 Rotating Basin sites were monitored, representing Basin Years 3 and 4.** The final report summarizing data for the second cycle of streams in the Grand/Neosho River Basin and the Upper Canadian River was submitted to EPA.

Also in 2009, OCC continued probabilistic monitoring to provide data necessary for extrapolation of stream assessments from a system to an aerial scale. Generated by EPA technical staff, fifty randomly chosen sites from the new basin year are visited once for collection of chemical, physical, and biological data. Data generated from this assessment allows for statistical representation of a basin's water quality based upon the sites monitored.

# Implementation Monitoring Program

Monitoring is a vital part of NPS projects implemented across the state. Data is needed to characterize pollutant loading from watershed sources and to prioritize areas for implementation to reduce pollution. Data is also vital to evaluate success of load reduction strategies and pollution abatement measures. Calculating loading for tracking water quality changes and for use in developing total maximum daily load allocations (TMDLs) is best accomplished through the use of automated water samplers. OCC has developed unique methods for deploying and maintaining autosamplers that have proven vital in documenting the effects of implementation in the short timespans dictated by national NPS Program requirements.



Automated water sampler

In 2009, the OCC maintained autosamplers at 18 sites. This year, staff completed a one year study in cooperation with ODEQ to supply watershed scale water quality and flow data for completion of the Lake Thunderbird TMDL. The TMDL monitoring was completed in April of 2009 and maintenance of five of the autosamplers was discontinued. In 2010, two of these will be relocated to a low impact development in Norman for our Lake Thunderbird Project.

### 13 Total Active Continuous Flow Automated Water Samplers:

- 4 in the Illinois River Watershed
- 3 in the North Canadian River Watershed
- 2 in the Spavinaw (Beaty) Watershed
- 2 in the Honey Creek Watershed
- 2 in the Saline Creek Watershed (control)

Currently, autosamplers are used to collect continuous flow-weighted composite samples. Because autosamplers provide continuous data, they can be used to show statistical significance in water quality changes, such as those resulting from success of implementation projects, within a shorter period of time. Pre-implementation data will be compared to the post-implementation data collected to determine if implementation and education efforts have improved water resources in the project area.



## Oklahoma Conservation Commission Monitoring Program

	Rotating Basin Monitoring Program 2008	Rotating Basin Monitoring Program 2009	Implementation Monitoring 2008	Implementation Monitoring 2009
<b>Stream Monitoring Sites</b>	140	157	21	20
<b>Water Quality Samples</b>	1090	1057	976	864
<b>Fish Collections</b>	77	124	3	7
<b>Macroinvertebrate Collections</b>	248	267	10	10

# Education

## Blue Thumb Program

The Blue Thumb Program is a water quality environmental education program that teaches citizens about reducing NPS pollution. The Blue Thumb program is best described as a “train-the-trainers” program, in which volunteers are encouraged to spread the information they learn to educate their local community. Blue Thumb volunteers participate in public education, groundwater screening, and stream monitoring. In addition to its general role as an education program, Blue Thumb directs and implements public education and outreach in priority watersheds.



### Blue Thumb 2009 Fast Facts:

- **22 new stream monitoring sites were added to the 83 streams sites from 2008**
- **A total of 105 stream sites are now monitored by Blue Thumb every month**
- **A record 11,017 volunteer hours were logged this year**



**In FY 2009, seven new volunteer water-monitoring trainings (e.g., right and below) were held to initiate 105 new potential Blue Thumb volunteers.** In addition, six mini-academies were held for 76 High School and University students.

In 2009, the Blue Thumb staff created Environmental workshops for volunteers who want to work primarily in an educational capacity. Two Environmental Education workshops were also held with 16 participants.

Chemical monitoring accounted for just over half of the total volunteer hours logged. The remainder of the volunteer hours were logged from participation in training, quality assurance sessions, educational events, fish and macroinvertebrate collections, and groundwater monitoring.

Volunteers also assist with the benthic macroinvertebrate collections and fish collections at their sites.

**From October 2008 through September 2009, volunteers and Blue Thumb Staff collected fish from 28 sites and macroinvertebrates from 143 sites.** Under the direction of Blue Thumb staff, volunteers compile and analyze their own data, producing a summary report for the stream.



Thirty-two counties had active Blue Thumb stream monitoring programs in 2009. In addition, 27 of these counties participated in other activities such as curb marking, natural resource days, or groundwater screening. In 2009, two groundwater screenings were conducted which tested over 60 groundwater well samples that were brought into local conservation district offices.

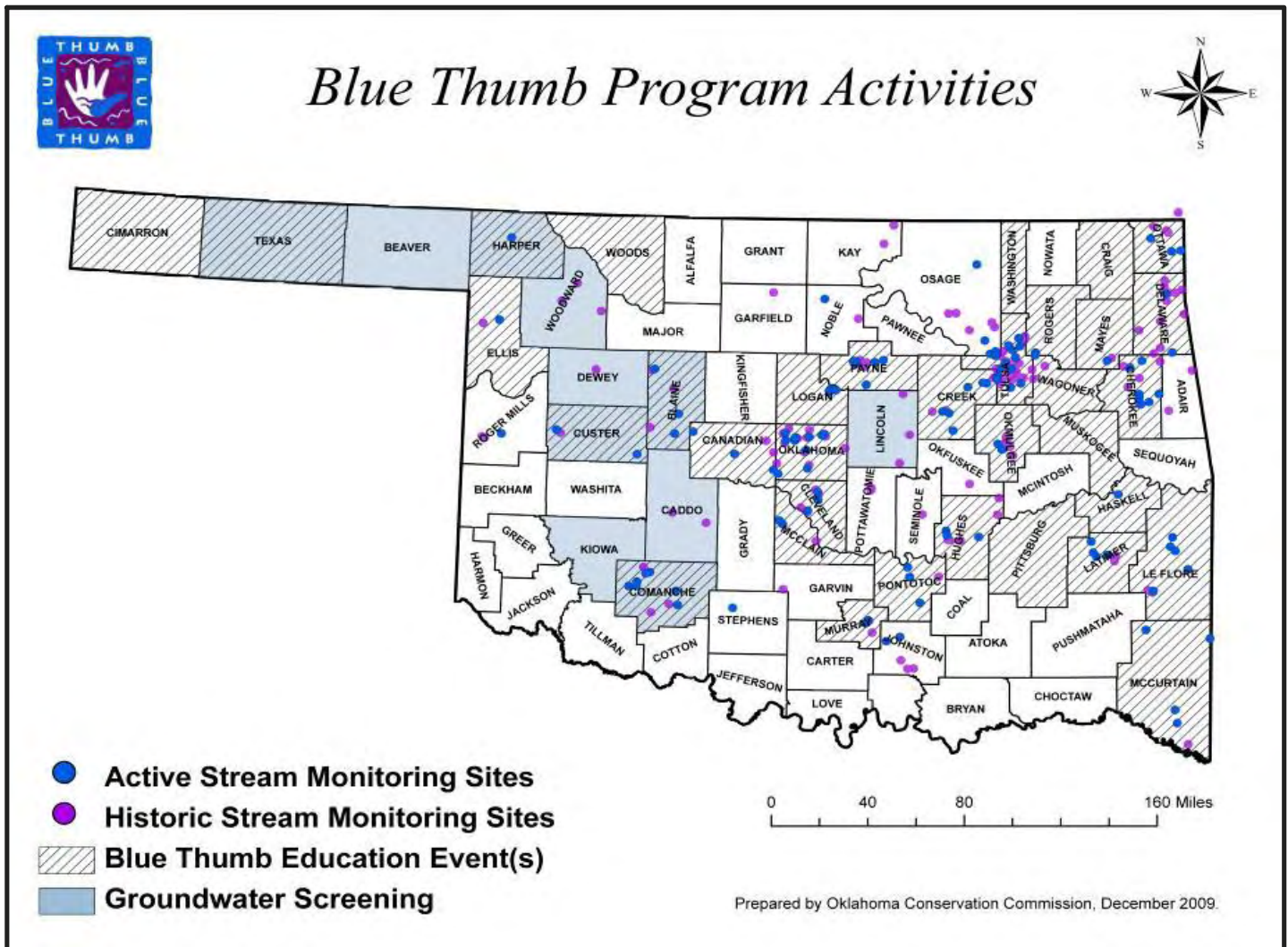


Volunteers attend quarterly quality assurance (QA) checks to assure that the data collected is of acceptable quality. **A total of 79 QA sessions were conducted during FY2009.**

This year was our third year to create a Blue Thumb Calendar. It has proved to be a wonderful way to showcase the work of the volunteers and get citizens interested in the Blue Thumb Program. The 2010 calendar showcases streams monitored by volunteers and contains information on how to protect water quality and the environment. A total of 3,000 Blue Thumb calendars are being distributed!

In August 2009, Blue Thumb was featured in the Tulsa World and the Daily Oklahoman! In 2009, the following communities have become active in curb-marking: Sapulpa, Bristow, El Reno, and Geary.

See the website for more! [www.bluethumbok.org](http://www.bluethumbok.org)

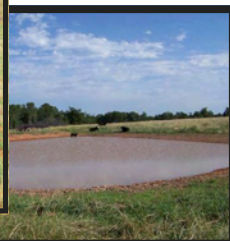


# Implementation

Priority Watershed 319 Implementation projects are a major component of Oklahoma's NPS Program. These projects focus on reducing the amount of NPS pollution runoff from privately owned land. Through the 319 projects, conservation practices called best management practices (BMPs) are installed on a voluntary, cost-share basis with approximately 60 percent of the cost being paid by USEPA funds and the remainder of the cost funded by the State and participating landowner.

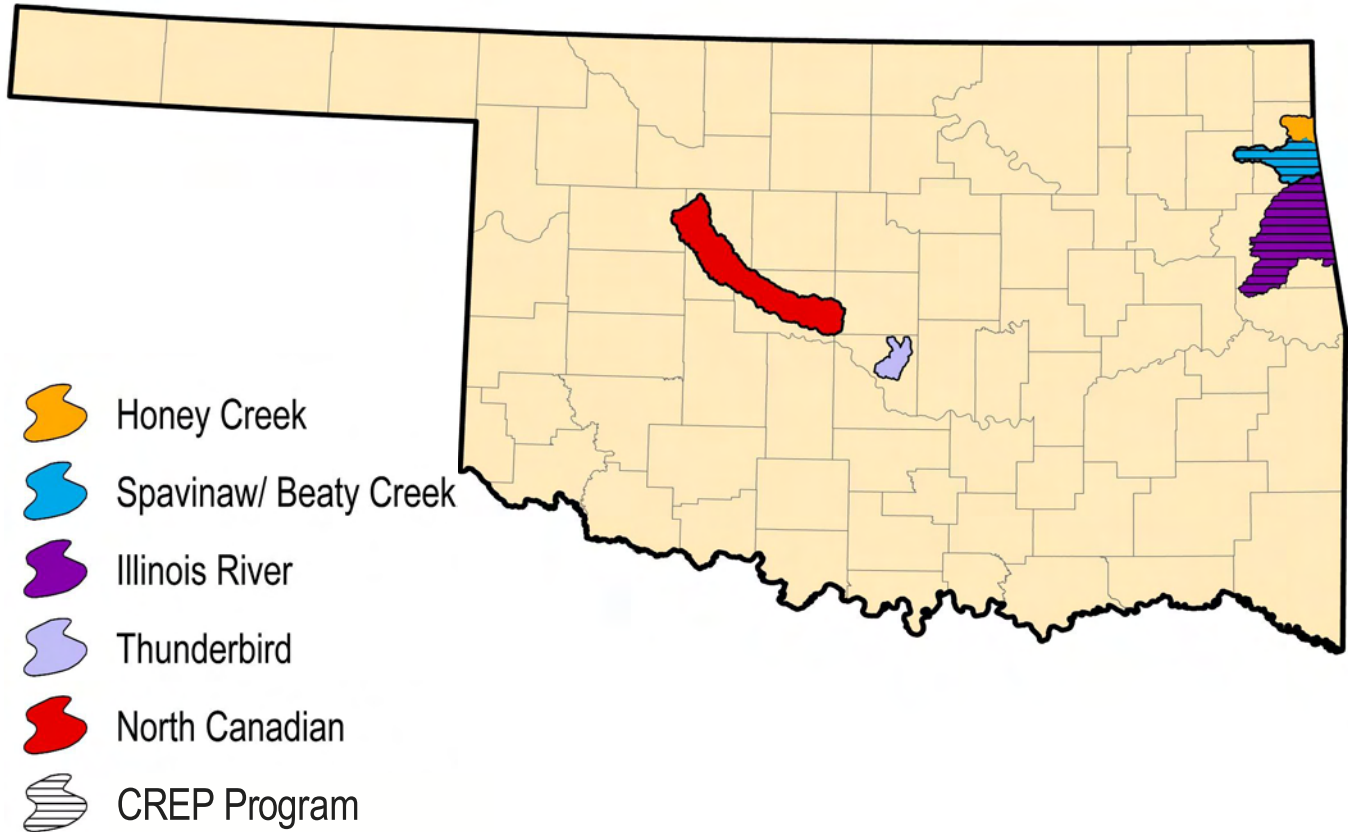
The willingness from the citizens of Oklahoma to voluntarily install practices that protect water quality on their privately owned land has been awe-inspiring. The USEPA has nationally recognized our success from past implementation projects. Data collected from pre-implementation and post-implementation monitoring have shown success in reducing nonpoint source pollutants. Reductions in NPS pollution protect many drinking water reservoirs in Oklahoma. In addition, NPS reductions keep our lakes and streams fishable and swimmable. Common best management practices are shown below.

**The majority of our 319 Implementation Projects are in rural areas and focus on reducing the NPS pollution impacts from agricultural activities.**



# 2009-2010 Implementation Projects

## 2009 Priority Watershed 319 Implementation Projects



### Best Management Practices Completed January 2009 through December 2009

319 Implementation Projects:	North Canadian River	Illinois River	Honey Creek	Spavinaw Creek	Total BMPs in 2009
Riparian area exclusion (acres)	391	352	196	8	947
Riparian fence (feet)	30,228	7,338	6,885	940	45,391
Animal Waste storage buildings and poultry litter cake-out buildings	0	8	9	9	26
Cross fencing (feet)	0	22,445	45,441	56,923	124,809
Watering facilities (tanks)	4	30	44	37	115
Rural waste (septic system) replacements	1	37	3	6	47

# Spavinaw Creek Watershed Project

The Spavinaw Creek watershed is located in northeastern Oklahoma in Delaware County. Spavinaw Creek is an important tributary to Lake Eucha, and eventually, Lake Spavinaw. These sister lakes supply water to nearly a half million citizens of Tulsa, Jay, and Spavinaw. Both Lake Eucha and Lake Spavinaw have been on the State's impaired waterbody list (303(d) list) since 2002 for impairments from phosphorus and low dissolved oxygen. Due to their high nutrient levels, these reservoirs have experienced excessive algal blooms that have compromised the taste of the water and increased water treatment costs.

Studies have found that nonpoint source runoff is the most likely source of the high levels of nutrients, primarily phosphorus. Animal waste and sediment (with attached nutrients) increase phosphorus concentrations in streams, which promote algal blooms. Spavinaw Creek is the origin of 45% of the nutrient loading to Lake Eucha. The OCC was awarded an EPA grant for a NPS cost-share program in the Spavinaw Creek Watershed to improve water quality by reducing nonpoint source pollution.

**The original allocation period for this project was from 2003 to 2008, but due to its success, it has been extended until October 2010.**

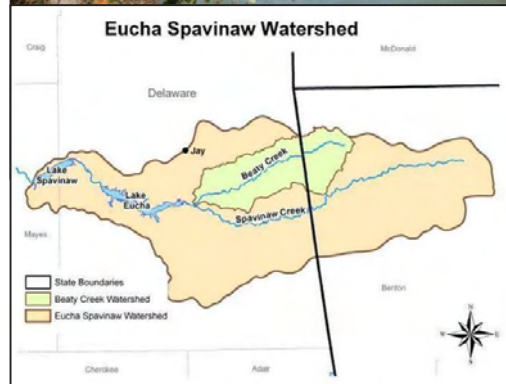
**Over 200 landowners in the watershed have participated in the Spavinaw Creek 319 Projects.**



**A frost free watering tank installed as an alternative water source for cattle that have been fenced out of streams.**



**Spavinaw Creek**



The OCC has implemented a variety of best management practices (BMPs) in the Spavinaw Watershed, which have decreased nutrients and sediment flowing into the streams that enter Lakes Eucha and Spavinaw. The cost-share practices that have been implemented in the watershed in Delaware County include riparian management and improvement, riparian area fencing, stream bank stabilization, critical area planting, pasture establishment/management, rotational grazing, rural waste systems (septics), animal waste storage/ winter feeding buildings, alternative watering facilities (tanks, wells, or ponds), heavy use areas (gravel or concrete), and waste and nutrient management.

**As of December 2009, a total of \$3,061,948 has been spent installing BMPs in the Spavinaw Watershed from (FY00), (FY01), (FY03), and (FY08) funds.**

**From August 2008 through December 31, 2009, \$526,911 of claims were paid under the FY08 grant.**



**OCC staff certifying a watering facility.**



# Spavinaw Creek 319 Implementation Project

Completed Best Management Practices	January 2009 - December 2009	Total 2007- 2009
Riparian acres excluded / protected	8.0	69.8
Riparian fencing (feet)	940	4,905
Ponds	3	6
Animal waste storage / winter feeding facilities and Cake-out litter storage buildings	9	19
Cross-fencing (feet)	56,923	132,032
Watering facilities, tanks	37	68
Pipeline (feet)	10,074	23,825
Wells	10	29
Heavy use areas (gravel or concrete)	25	59
Rural waste replacements (septic systems)	6	23



The Spavinaw Project Coordinator held an appreciation dinner on October 27, 2009 at the Delaware County Fairgrounds to thank producers for participating in the 319 priority watershed programs. Over 77 cooperators were in attendance. Corporate and individual sponsors provided food and door prizes for the event. Attendees were thanked for their support and updated on program progress and performance.

## Total BMPs installed from 2003 - 2009:

- 46 animal waste storage facilities
- 9 cake-out litter houses
- 306 acres of riparian easements
- 313,130 feet of cross-fencing
- Over 1,000 acres of pasture
- 25 ponds (alternative water sources for livestock)
- 139 watering tanks
- 70 water wells
- 58,929 feet of pipeline for livestock water
- 32,576 feet of riparian exclusion fence to protect over 306 acres of riparian area

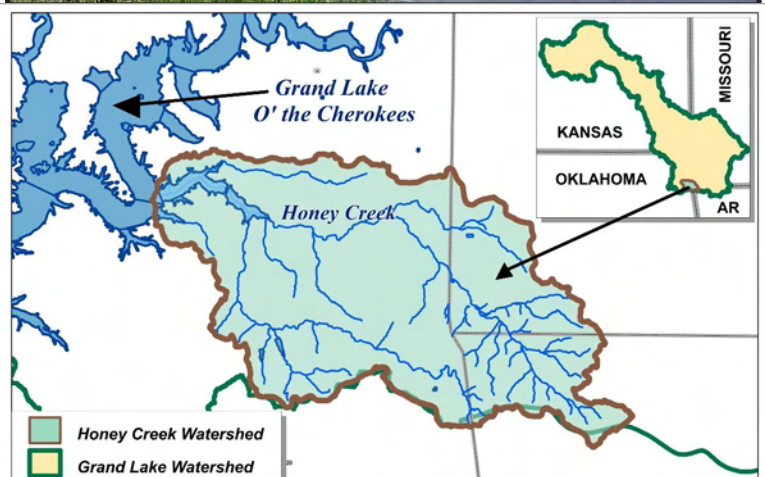
# Honey Creek Watershed Project

Honey Creek is a 79,000 acre subwatershed of Grand Lake, one of Oklahoma's premier reservoirs. Honey Creek flows from Benton County, Arkansas, and McDonald County, Missouri, into Delaware County in northern Oklahoma. There, it drains into Grand Lake O' The Cherokees, which is an important water supply for the cities of Grove, Langley, Afton, Ketchum, and Vinita. Grand Lake has been impaired by nutrients and sediment which have caused low dissolved oxygen and algal blooms in the lake.

The Honey Creek project began in 2006 and will continue through September 2010. Targeting and modeling were used to determine the areas of highest priority that were contributing the most pollution. Best Management Practices are being installed on a voluntary, cost-share basis to reduce the amount of bacteria, phosphorus, and sediment entering the streams and lake.

**The approved cost share practices implemented include:**

- riparian area exclusion fencing
- riparian management
- pasture establishment
- animal waste storage facilities
- cake-out litter buildings
- septic tanks
- wells
- ponds
- watering tanks



**Currently, a total of over 17,405 acres have planned conservation practices, which represents over 1/3 of the total 54,408 acres in the Oklahoma portion of the watershed.**

**As of December 2009, a total of 92 contracts have been written to install best management practices.**

**This represents \$1,396,060 obligated for BMP implementation, of which \$902,701 has been spent.**

# Honey Creek 319 Implementation Project

Completed Best Management Practices	January 2009 - December 2009	Total 2007- 2009
Riparian acres excluded/protected	196	196
Riparian fencing (feet)	6,885	13,551
Ponds	4	10
Waste storage/winter feeding facilities and cake-out litter storage buildings	9	9
Cross-fencing (feet)	45,441	93,971
Watering facilities, tanks	44	78
Wells	14	30
Heavy use areas (gravel or concrete)	57	114
Grass Pasture Planting (acres)	68	117
Rural waste replacements (septic systems)	3	8

## ***Education:***

In 2009, the Honey Creek Demonstration Farm provided prospective cooperators the opportunity to observe a variety of best management practices available under the Honey Creek Project. Educational tours were also held at the Demonstration Farm for high school and university students.

Information on the Honey Creek project has been exhibited at poultry waste continuing education classes, Delaware County Cattlemen's Association meetings, the Jay Farm Fest, and the Grand Lake Earth Day Celebration.



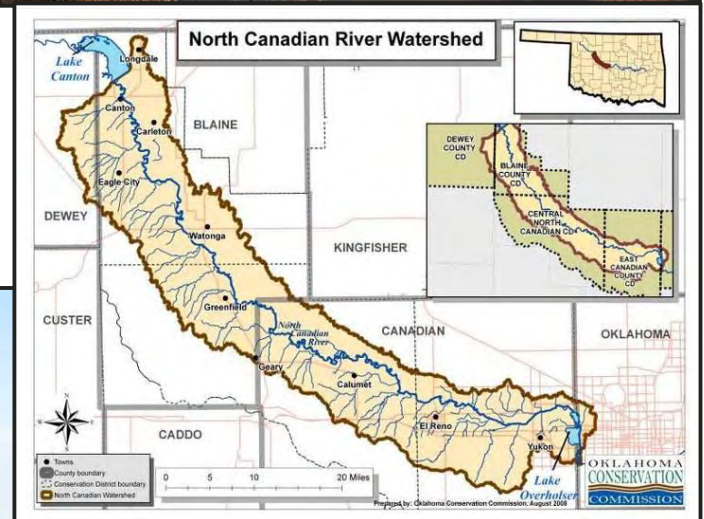
# North Canadian River Watershed Project

The North Canadian River Watershed Project area lies in Blaine, Oklahoma, Dewey, and Canadian Counties in Oklahoma, encompassing the watershed area between Lake Canton and Lake Overholser. This area was chosen for a watershed implementation program because of the strong local leadership and initiative on the part of local conservation districts interested in addressing NPS issues in this waterbody, which has repeatedly exceeded water quality standards for turbidity and *Escherichia coli* and *Enterococcus* (forms of fecal bacteria).

This three-year project is installing best management practices to reduce bacteria, nutrients, and sediment entering the area streams and river. A local watershed advisory group set cost-share rates in September 2007. Sign-ups began in January 2008 and have been very successful.

**As of December 30, 2009, a total of 94 landowners have installed \$406,599 in BMPs.**

Over \$50,194 of this amount has come from landowners. In addition, \$1,374,716 has been obligated for 2010 BMP implementation.



# North Canadian River 319 Implementation Project

Completed Best Management Practices	January 2009 - December 2009	Total 2008 - 2009
Riparian acres excluded / protected	391	391
Riparian fencing (feet)	30,228	39,138
Watering facilities / tanks	4	4
Wells and solar pumps	4	4
Rural waste replacements (septic systems)	2	4
Grass Pasture Planting (acres)	190	474
No-till farming conversion (acres)	10,497	10,497

## Conversion to no-till farming is a critical practice in this watershed.



One of the most exciting things about this project is that the practices being implemented by landowners are those that maximize pollutant reduction and water quality protection: **no-till farming** and **riparian area protection**. The majority of the conservation plans written have included converting from conventional farming to no-till farming. In addition, **24 participants have enrolled 9,614 acres in the carbon sequestration pilot program**, described later in this report.

***A total of 391 acres of riparian area have been protected with 7.43 miles of riparian fencing!***

### ***Education***

Education in this project is critical to encourage long-term, voluntary adoption of efforts to protect water quality. Agricultural producers in the watershed have been provided no-till workshops and demonstration tours. The urban communities in the watershed have also been targeted with several educational, outreach events. OCC staff have trained Blue Thumb volunteers and support active volunteers as a foundational component. Educational highlights include:

- **Establishment of four Blue Thumb monitoring sites in the North Canadian Watershed.**
- **Involvement of Boy and Girl Scout Troops in an extensive curb marking effort. Over 250 neighborhood storm drains have been marked to date!**



El Reno curb marking

# Illinois River Watershed Project

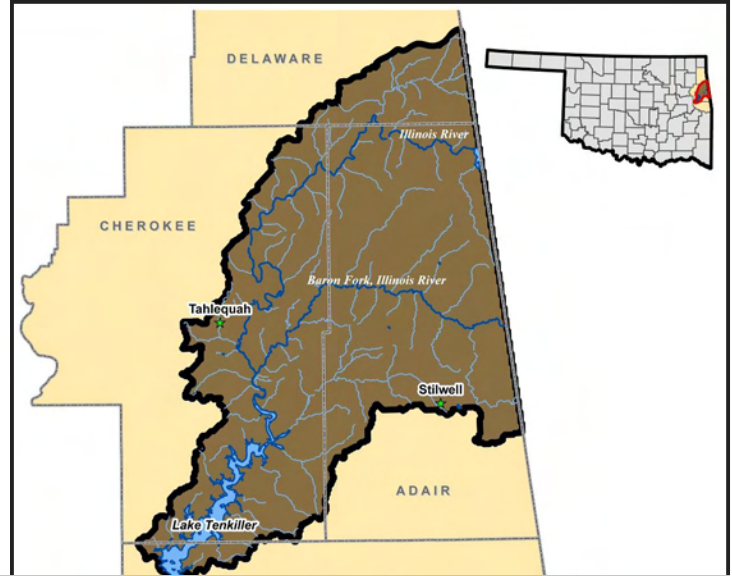


A supplemental effort to extend and compliment ongoing NPS management efforts in the Illinois River watershed began in 2008. This program provides funding match and complements the Conservation Reserve Enhancement Program (CREP) with a focus on riparian area protection.

The project area encompasses Delaware, Adair, Cherokee, and Sequoyah Counties in northeastern Oklahoma. The project focuses on protecting areas that are not eligible for CREP, therefore extending the impact of the CREP program. The goal is to reduce the runoff of nutrients, especially phosphorus, into the area waterbodies.

**As of December 2009, the program has spent \$981,749 to implement best management practices.**

**A total of 105 contracts have been approved and 46 conservation plans have been written.**



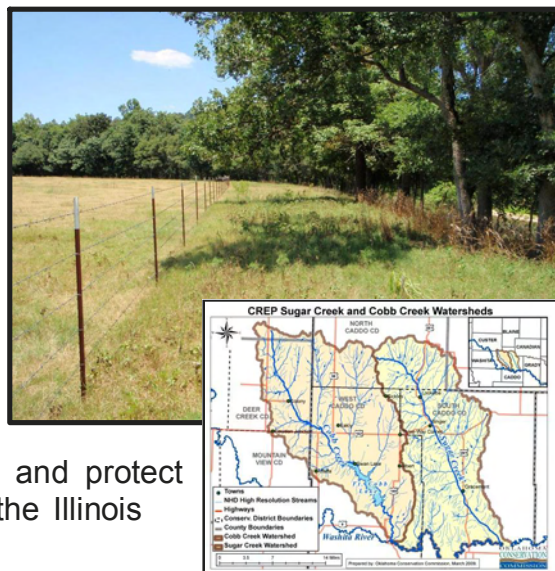
**Our Illinois River 319 Project is cooperating with the CREP and OSRC riparian easements program to protect a continuous stretch of approximately 6.5 miles on the Baron Fork River, a tributary of the Illinois River!**



Illinois River 319 Implementation Project		
Completed Best Management Practices	January 2009 - December 2009	Total 2008 - 2009
Riparian acres excluded/ protected	352.7	352.7
Riparian fencing (feet)	7,338	11,320
Ponds	2	2
Waste storage/winter feeding facilities and cake-out litter storage buildings	9	9
Cross-fencing (feet)	22,445	22,445
Watering facilities, tanks	30	30
Wells	8	8
Heavy use areas (gravel or concrete)	48	48
Rural waste replacements (septic systems)	37	37

# Conservation Reserve Enhancement Program

Oklahoma's Conservation Reserve Enhancement Program is a partnership between local, state, and federal partners (FSA and NRCS) to protect and improve water quality through voluntary retirement of agricultural land currently under production in environmentally sensitive riparian areas along streams and rivers. Landowners are paid an incentive to protect these areas for up to 15 years. CREP is entirely voluntary, providing incentive payments to producers in priority watersheds who enter a 10-15 year contract to fence off and protect riparian buffer areas along streams in program zones. The CREP program requires a 20% non-federal match to receive the federal dollars. In Oklahoma, OCC, City of Tulsa, Oklahoma Scenic Rivers Commission, FSA, and NRCS are currently utilizing the CREP program to restore and protect thousands of acres of riparian area in the Oklahoma portion of the Illinois River and Spavinaw watershed.



Planting trees

**The following overall accomplishments have taken place since 2007:**

- 90 applications have been taken
- 88 site visits have occurred
- 28 contracts have been approved
- 252 acres are enrolled in CREP (22 contracts)

## Public Outreach

During FY2009, OCC staff have been busy contacting landowners. Nearly 500 letters were sent out to eligible landowners. CREP staff attended 6 poultry meetings and 3 local cattlemen association meetings. In addition, staff spoke / assisted at annual NRCS public outreach meetings and a water quality day camp on the Illinois River.

Initial commitments from City of Tulsa, OSRC, and OCC program matching funds are sufficient to implement a \$20.6 million dollar program in the Eucha/Spavinaw and Illinois River Watersheds. However, OCC has compiled additional money to secure approximately \$40 million and allow the program to expand into the Fort Cobb and Sugar Creek Watersheds. This program is an excellent means to extend what are often short-term NPS programs into 10-15 years, with a new source of federal funds.

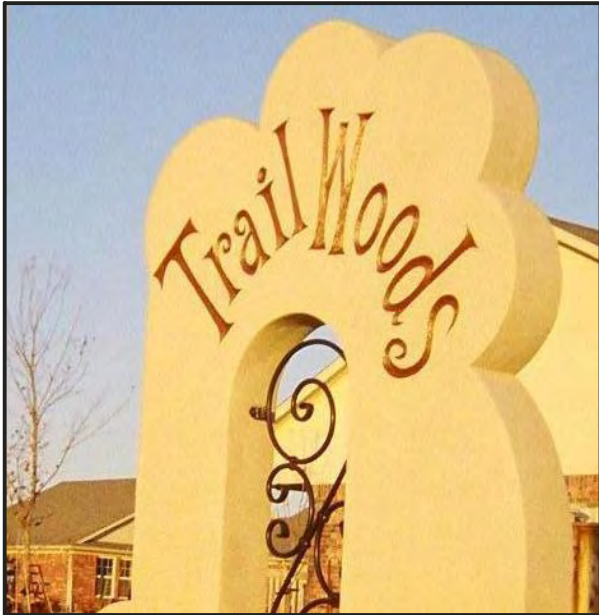
After its second year, two main items appear to be driving an increased interest in CREP: a stepped-up effort to contact landowners individually through letters, and word of mouth between neighbors who are participating.

**The following accomplishments occurred from January 2009-December 2009:**

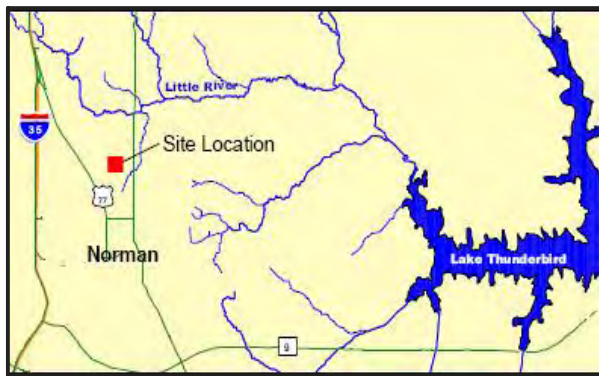
- 30 applications were taken for CREP
- 59 site visits occurred
- 17 contracts were approved and signed
- 164 riparian acres enrolled (1,285 acres pending)
- 2,500 bare root tree seedlings were planted
- CREP staff completed the NRCS Conservation Plan Writing Level 2 Certification

**CREP brings four federal dollars to Oklahoma for every local dollar.**

# Lake Thunderbird LID Project



Lake Thunderbird is a sensitive water supply lake serving Norman, Midwest City, and Del City. Excessive algal growth in the lake has led to water quality degradation, including periodic taste and odor problems, low dissolved oxygen, and turbidity issues. Growth of algae has been accelerated via nutrients and sediment transported to the lake by runoff from the watershed, causing the lake to exceed the water quality limit for chlorophyll-a. As urban development continues and impervious surfaces increase, nutrient loading is projected to escalate, causing further deterioration of the lake's water quality. Modeling conducted by Vieux and Associates, Inc. shows that each year an average of 20 tons of phosphorus is transported to the lake from non-point sources in the watershed.



The Lake Thunderbird Watershed Project will focus on reducing nonpoint source pollution from urban development. The project will study the innovative techniques and the effects of Low Impact Development (LID). This 2008 grant for Lake Thunderbird is a joint partnership with the University of Oklahoma staff and a local developer who are contracted to provide a demonstration project in Norman's Trailwoods residential neighborhood. One of the foundational goals of this project will be to show community and public officials how LID techniques can be used to improve runoff quality.



Environmental assessment of the neighborhood is already underway, with construction to occur over the next two and a half years. As construction nears completion, monitoring will commence in this development and in a paired development in which LID practices were not used. This will allow the LID practices to be evaluated by measuring differences between the storm water runoff from the LID area and the conventional (control) development.

Part of this process will assess current impediments to effective storm water management that exist in land development ordinances that prohibit principles and practices of low impact development. The team will compile existing codes from nearby states that support Low Impact Development. A model LID code will be written for the City of Norman to provide guidance on planning, design and construction of new land developments using LID techniques.



# Caddo County Projects / Sugar Creek Project

In August 2007, tropical storm Erin flooded Caddo County with torrential rainfall. It damaged a stretch of Sugar Creek which had been part of an improvement project in the 1960's, which qualified the area for federal funding under the Federal Emergency Management Agency (FEMA). The Sugar Creek Project lies in Caddo County and involves a 22 mile stretch along its channel. The project area begins at the mouth of Sugar Creek at the Wichita River and extends northward approximately one mile north of Lookeba. The Sugar Creek Project includes Sugar Creek and short sections of its tributaries: Fiat, Keechi, Kickapoo, Medicine, and Whitebread Creeks.



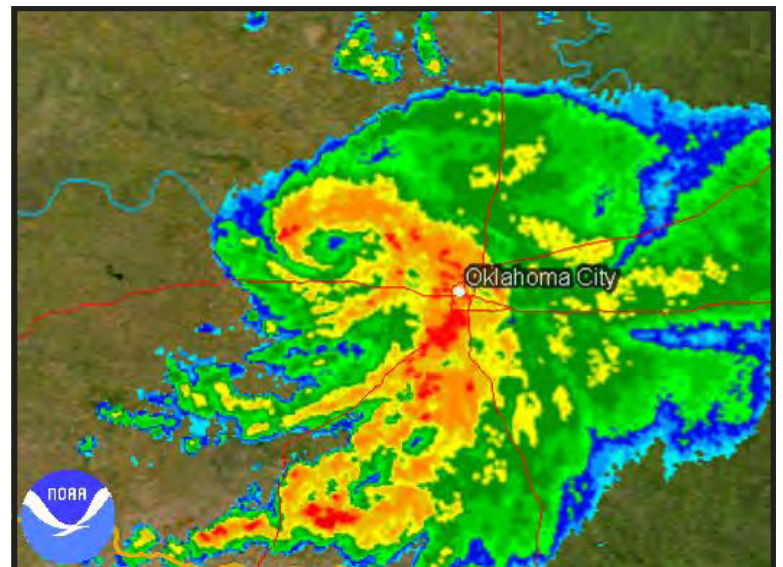
The Oklahoma Conservation Commission, NRCS, and South Caddo Conservation District are partnering with FEMA to implement a project to restore channel function of conveying water away from the watershed dams and stabilize the channel. In addition, the project will allow water to flow from the floodplain into the channel without eroding the adjacent farmland. Primary funding will be coming from FEMA (7.6 million); however, matching funds are coming from the Oklahoma Conservation Commission and NRCS to fund additional sites in the watershed.

To protect the floodplain from erosion, the project will install the following practices:

- Grade stabilization structures (GSS)
- A system of diversions to direct water to GSS
- Jacks to stabilize the channel
- At least one riffle and pool structure to stabilize the bottom of the channel

In 2009, required easements, needed to begin engineering work, were established. In 2010, work will begin on the first five mile stretch of Sugar Creek.

**Torrential rainfall from Tropical Storm Erin left deep gullies along Sugar Creek in Caddo County.**

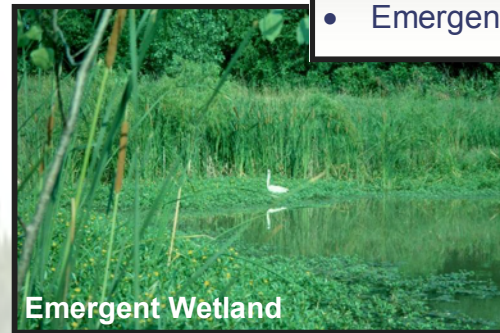


# Wetlands Program

The OCC has a variety of ongoing cooperative wetland projects across Oklahoma. Wetland activities and programs initiated by the OCC provide demonstration, restoration, and protection aspects that directly improve the resource, as well as providing educational opportunities. The program is primarily funded through the CWA Section 104(b)(3) Wetlands Program Development Grants (WPDG) with matching funds from state and local sources. Program administration is based on a cooperative model involving other state, local, federal, and tribal governments to ensure high quality products, services, and the ability to leverage funding sources. Every wetland project the OCC pursues has the potential to improve water quality, particularly with regard to nonpoint source pollution. Specifically, these projects include youth and adult wetland education, watershed-based assessment and planning, wetland assessment, stream corridor restoration, and wetland restoration.

## OK Wetland Types:

- Riparian Corridors
- Forested Wetlands
- Fringe Wetlands
- Oxbows
- Playas
- Swamps
- Marshes
- Bogs
- Emergent Wetlands



**In 2009, the OCC Wetlands Program completed the digitization of the National Wetlands Inventory (NWI) Maps for the entire state.** This project was a great success on several levels by utilizing partnerships among state and federal agencies, creating a usable digital format for wetlands maps, providing on-line access to wetland maps, enabling varied use of the maps through ArcIMS tools, and offering educational material to help users better understand wetland maps and wetland systems. In addition, the digital wetland coverage will be utilized by the state as a tool for tracking wetland status and trends, wetland monitoring, watershed planning, protecting and avoiding wetlands during development, locating areas for restoration, and updating the digital wetland coverage. Finally, the digital maps will be used to develop a wetlands classification system for the state, which will be completed next year for the State's two largest ecoregions.

**The Wetlands Program was also involved in the establishment of design plans for an urban stream and wetland enhancement project to address stormwater in the City of Norman.** As cities and technologies grow, they must increasingly focus on better planning, monitoring, and design to



implement their stormwater programs. In the past, they have often relied upon highly engineered, less natural systems to address stormwater, often with questionable results. The OCC and its partners will demonstrate an alternative to the highly engineered system to address stormwater in an urban setting. The program will utilize principles of geomorphology to restore a stream to a more natural configuration, at the same time reducing the propensity of the area to flood neighboring landowners. In addition, the program will work with the City to update its stormwater master plan and demonstrate and educate about principles of low impact development. This project is in the planning phase and will be implemented in 2010.

# Carbon Program

In 2001, Oklahoma became the first state in the U.S. to give statutory authority for the verification of carbon offsets to a state agency. In July 2008, the Oklahoma Carbon Sequestration Verification Program was launched when the Governor signed emergency rules into law. In 2009, the Commission worked tirelessly to bring the Program to fruition. Staff drafted program rules with the input of working groups from agriculture, forestry, and oil and gas sectors. **The Oklahoma Legislature approved the rules on March 29 and the rules went into effect July 1, 2009!**



In August 2008, Oklahoma's first agricultural carbon offset pilot program was launched tandem with the North Canadian River Watershed project. To launch the program, Western Farmers Electric Cooperative agreed to sponsor the program by purchasing 25, 714 metric tons of carbon dioxide from agricultural producers. Payments of \$3.50 per metric ton of CO<sub>2</sub> will be disbursed in annual payments over three years. Carbon offsets are created when 319 Project participants implement no-till, pastureland management, or rangeland management. The practices, which are known to improve water quality and reduce erosion, also sequester carbon dioxide at a known rate because they minimize soil disturbance while optimizing vegetative growth. Other partners for the pilot program include the Oklahoma Association of Conservation Districts which is handling carbon contracts and payments to producers, and local Conservation Districts in Blaine, Dewey, and Canadian Counties.



**Four field verifier training days were held in 2009.**



**During year one of the pilot program, producers in the watershed project area signed up 9,614 acres.** The first verification of carbon contracts will occur in winter 2009 when 319 Project no-till fields are verified by Project Coordinator.

The partnership also includes Oklahoma State University, who began a two-year study of the soil carbon in the project area to determine carbon sequestration rates of no-till by dominant soil types within the watershed. A majority of the state's Conservation Districts have embraced the Carbon Program. Of eighty-seven Conservation Districts, fifty-two agreed to provide verification services, and seventeen to provide information. The OCC is also proud of the partnership with the Natural Resources Conservation Service in Oklahoma, who worked with the OCC in 2009 to design and teach a curriculum for Carbon Program verifiers on assessing no-till fields and grasslands for their carbon sequestration potential. Oklahoma Forestry Services, who participated in the rules process, agreed to partner with the Commission to verify forestry carbon offsets for the program. Other agency partners include the Corporation Commission and Department of Environmental Quality, who partnered with the Commission to develop the first rules, protocols, and applications for verifying carbon sequestration resulting during enhanced oil recovery.

The Carbon Program was represented at over 20 events reaching an estimated 700 people in FY2009. The Carbon Program Director created webpages, brochures and participated in media coverage to educate the public about the Program and the co-benefits of practices such as no-till, conversion of marginal croplands to grass, reforestation, and carbon capture and storage. The program was noticed by Carl Lucero, Director of Ecosystem Services at the USDA, who made a summer trip to Oklahoma to learn about the program. For more information on the Carbon Sequestration Verification Program see the following website: [www.ok.gov/okcc/Carbon\\_Sequestration/index.html](http://www.ok.gov/okcc/Carbon_Sequestration/index.html).

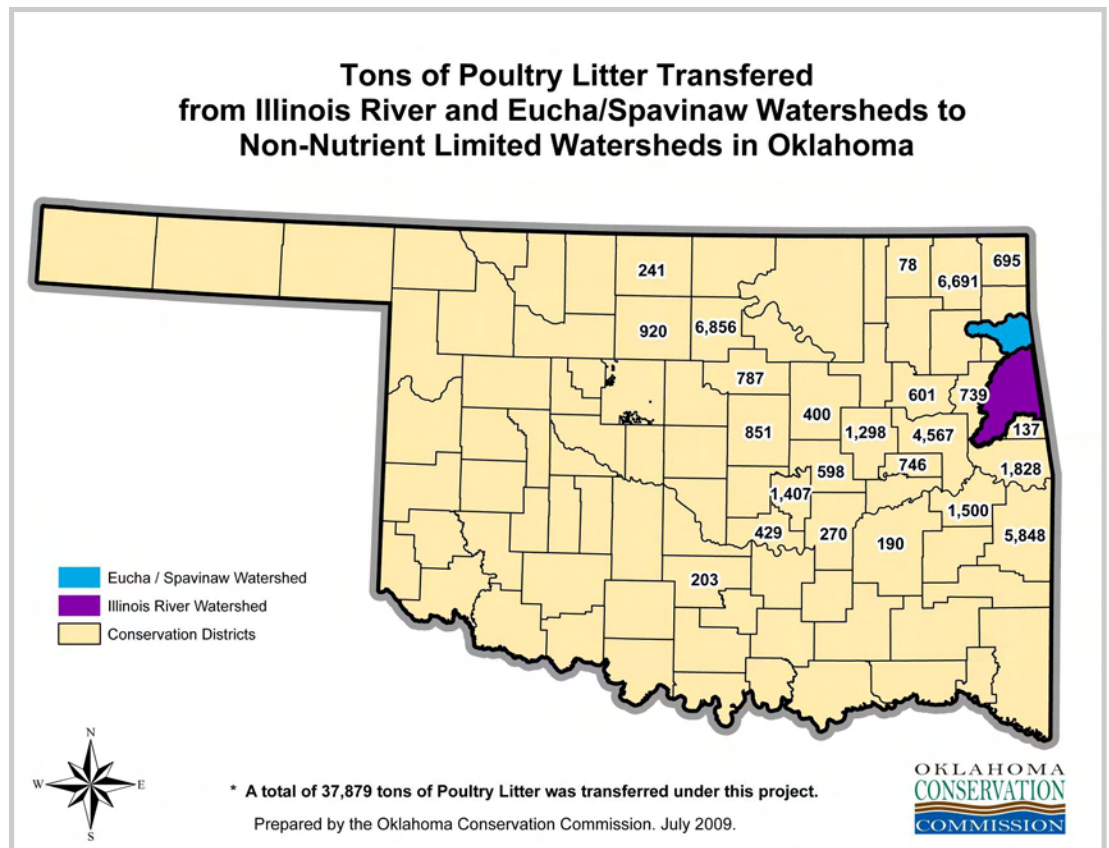
# Poultry Litter Transfer Program

The purpose of this project, which was begun in 2002 and has been supplemented multiple times since, was to protect water quality in the Illinois River and Eucha-Spavinaw watersheds by reducing land application of poultry litter through exportation. The latest iteration was launched in late 2007 and uses lessons learned from the previous program to help expand the litter market. Buyers were eligible to receive \$0.03/ton/mile or up to \$8/ton for litter purchased from the Illinois River or Eucha/Spavinaw watersheds. Haulers and growers were not subsidized through this program and buyers were responsible for locating their own sources and haulers of litter.

This revamped program is administered by local Conservation Districts, which ensure that buyers complete the steps necessary to receive the subsidy. Conservation Districts who support the program are eligible to receive up to \$1.00/ton for the litter that moves to their district. In return for these administrative fees, Conservation Districts process claims and advertise the program. It is believed that this subsidy will help encourage cash-strapped districts to strongly endorse the use of poultry litter in an environmentally protective manner, as an alternative to commercial fertilizer. Many one-time users of litter become repeat users; therefore, the intent of these subsidy programs is to get producers educated about and committed to the economic and agronomic benefits of litter such that they will continue to purchase it beyond the life of the subsidy.

***A total of 95,682 tons of poultry litter have been moved out of the Illinois River and Eucha-Spavinaw Watersheds from October 2007 through November 2009.***

**Approximately \$325,000 federal and \$288,000 in state funds were spent to accomplish this effort.**



**In 2009, two poultry litter spreaders were purchased for the Kay County and Tahina Conservation Districts.**

# Greenseeker Project

A crop's nitrogen requirements and the optimum nitrogen application rate changes drastically from year to year due to weather and other factors. The GreenSeeker™ system combines optical sensor measurements to calculate yield potential and response to additional fertilizer and to determine the nitrogen fertilizer application rate. Under a contract with OCC, Oklahoma State University has developed optical sensors which are mounted on a tractor boom in order to make fertilizer rate determinations. OSU has implemented and tested a program to extend the technology. However, the cost of the sensor (approx. \$4,000) limits the adoption by individual farmers. This project is working toward developing a new, affordable optical sensor (approx. \$100) with proven agronomic science and extension methodology. The sensor can determine the nitrogen needs of the growing crop and reduce excess nitrogen application.



In the fall of 2008, 13 trials were set up in Ottawa, Garfield, Alfalfa, Canadian, Kiowa, and Woodward Counties. Each trial consisted of three nitrogen (N) treatments replicated three times. Before treatment application, field variability was determined. Results of the trials varied significantly, but several important conclusions can be drawn at this point.

Of the measurable outputs of this trial, profit per hectare is one of the most important. While nitrogen input and yield are extremely important to the Oklahoma producer, the final deciding factor resides in which practice is perceived to be the safest and most likely to result in the highest profit. An important finding in this study was that at 5 of the 8 harvest locations the sensor based application rate resulted in the highest economic return, an increase of \$24.71 per hectare. It is also significant that the increase in profit was not always due to a reduction in nitrogen rate, as many presume, but at 4 sites an increase in nitrogen rate above the farmer's practice resulted in higher yields. When reviewing total nitrogen application, the sensor based recommendation applied 10.60 kg N/ha less across the 8 locations while resulting in an increase of yield of 8.73 kg grain/ha. Over all sites, the sensor based recommendation did not always maximize profit, yet on the average applied less nitrogen per hectare, maintained yield, and increased profit.

This work continues in the 2009-2010 winter wheat cropping season, with some modification. One change is the addition of a fourth treatment that evaluates a variable rate sensor based application. This applicator, commercially available and sold in Oklahoma, senses wheat using 6 GreenSeeker™ sensors attached to a tractor boom. While traveling across the field, the applicator, using preset references, collects readings and prescribes a recommended rate to apply on that specific area, with a new rate prescribed every second. The applicator then adjusts flow rate through the use of pulse modulated nozzles.

**This technology has the potential to optimize the application of nitrogen fertilizer so that farm costs are reduced and environmental impacts are minimized.**

# NPS Program Partner Activities:

## Oklahoma Department of Agriculture Forestry Services

The Oklahoma Department of Agriculture, Food, and Forestry, Forestry Services Division administers Oklahoma's silvicultural nonpoint source management program and the forestry best management practices. The program relies on a non-regulatory approach to BMP compliance developed in cooperation with landowners and land users. Forestry's mission is to conserve, enhance, and protect forests and the natural resources of Oklahoma for present and future generations.

Forestry Services continued to partner with the OCC using EPA Section 319 funds to carry out its comprehensive Forest Water Quality Program. The approved project includes compliance monitoring and educational activities, landowner assistance with water quality issues, correction of forestry related water quality problems using technical assistance and cost-share funding, and a timber bridgemat loan program.

### ***BMP Compliance Monitoring Project***

Forestry continued the third round of forestry BMP compliance monitoring. The Forestry Best Management Compliance Monitoring Project measures the implementation of BMPs across eastern Oklahoma's commercial forest area. The information gathered from the project is used to identify activities that need improvement. Then, the Forestry Services Division emphasizes these activities during training and education with landowners, loggers, foresters, and other land users. **In 2009, Forestry Services Division monitored 46 sites, bringing the total to 82 sites for the current monitoring period.** In 2010, a report will document the overall rate of compliance at 100 monitoring sites.

### ***Education***

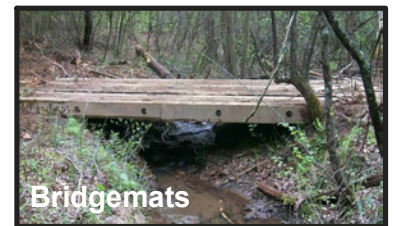
**In 2009, Forestry Services Division conducted six BMP workshops for loggers, landowners, and foresters, with 165 attendees.** Training and education at these workshops focused on forestry BMPs. The workshops included presentations, discussions, videos, and a field trip.

### **COMPREHENSIVE WATER QUALITY PLANNING**

Forestry's water quality specialist participated in the state's comprehensive water planning process throughout 2009, attending public meetings, submitting input, and participating as a member of the Regional Input Committee for the southeast region and the Stakeholder Involvement Committee.

### ***Bridgemats***

With funding from the EPA 319 and the OCC, **Forestry purchased four sets of timber bridgemats for use by loggers to create temporary stream crossings.** The mats are 24 feet in length and are placed across relatively narrow streams and drainages to provide a stable crossing for skidders and logging trucks. This allows forestry operations to be conducted with relatively minor impacts on the crossing itself. The bridgemats are now available for free on loan to loggers.



### ***Water Quality Publications***

**In 2009, Forestry services published a series of nine Water Quality Forestry Notes:**

- Introduction to Road Stream Crossings
- How to Install a Forest Road Culvert
- Designing and Constructing Large Rocked Fords
- Constructing Small Rocked Fords on Forest Roads
- A Handy Gauge for Forest and Farm Road Construction Measurements
- Low-Cost Gully Control Using Fiber Mat and Trees
- Stabilizing Gully Walls and Bottoms With Deflectors and Trees
- Side-Gully Control
- Using Bridgemats for Stream Crossings

Copies were distributed to our foresters and all Conservation Districts in the state. The Forestry BMP booklet produced by the OSU Cooperative Extension Service was also reprinted.

# Oklahoma Water Resources Board (OWRB)

The Water Quality Division of OWRB develops and maintains Oklahoma's Water Quality Standards and routinely collects physical, chemical, and biological data to support the document. The Division directs Oklahoma's Beneficial Use Monitoring Program to document beneficial use impairments, detect water quality trends, provide needed information for the Water Quality Standards, and facilitate the prioritization of pollution control activities.

As part of its three-tiered Clean Lakes Program, the Water Quality Division conducts water quality assessments to determine the relative health of state lakes and the problems impairing them, coordinates a successful volunteer water quality monitoring program, and implements diagnostic and feasibility studies which seek to restore the recreational benefits of public lakes throughout the state. The Water Quality Division also participates with municipal governments and federal agencies to assess and control various water quality problems impacting Oklahoma waters.



**Check for the American Recovery Reinvestment Act**

## ***Clean Water State Revolving Fund***

In 2009, the OWRB was granted \$31.6 million in federal funding by the USEPA to provide increased subsidization for wastewater systems improvements funded through the Clean Water State Revolving Fund (CWSRF). The Legislation further required that not less than 20% of the funds shall be for projects to address green infrastructure, water or energy efficiency improvements, or other environmentally innovative activities.

With the passage of the American Recovery Reinvestment Act (ARRA) the OWRB began to review the CWSRF Project Priority List to identify projects or aspects of projects which could qualify as "green." Several components of traditional wastewater project were identified. Nonpoint Source (NPS) projects have been eligible for funding under the CWSRF program for many years. Under ARRA, many NPS projects also met EPA's definition of "green." The OWRB conducted an additional solicitation for green projects in early 2009 which resulted in the proposals for several NPS projects.

The following NPS projects have received funding awards through the CWSRF Program. Construction/Implementation is anticipated to begin on each project in the spring/summer of 2010. More information regarding the OWRB's CWSRF ARRA program can be found at [www.owrb.ok.gov/recovery.php](http://www.owrb.ok.gov/recovery.php) or by contacting Jennifer Wasinger, Assistant Chief, Financial Assistance Division at 405.530.8800.

<b>Central Oklahoma Master Conservancy District (COMCD)</b>	<b>Lake Thunderbird In-Lake Restoration</b>	<b>\$1,104,590</b>
<b>Oklahoma Conservation Commission (OCC)</b>	<b>Riparian Restoration in the Illinois River and Eucha /Spavinaw Watersheds</b>	<b>\$2,000,000</b>
<b>University of Oklahoma with OCC</b>	<b>Green Roof at the National Weather Center</b>	<b>\$86,067</b>
<b>Tulsa City-County Library System</b>	<b>Sperry Library Rain Garden and Tulsa Library Green Roof</b>	<b>\$278,580</b>
<b>Oklahoma State University with OCC</b>	<b>Riparian Restoration along Cow Creek, Stillwater, Oklahoma</b>	<b>\$2,000,000</b>

# Oklahoma Cooperative Extension Services

The programs of Oklahoma State University's (OSU) Division of Agricultural Sciences and Natural Resources benefit Oklahoma's rural and urban communities in many ways. County offices of the Oklahoma Cooperative Extension Service (OCES) are within reach of every citizen of the state, and the Oklahoma Agricultural Experiment Station has research sites across Oklahoma. These efforts improve the lives of Oklahomans in measurable ways. The College of Agricultural Sciences and Natural Resources provides a first-rate education for many of Oklahoma's future scientists, educators, agricultural producers, and professionals in a wide variety of occupations, thus benefiting the state. OCES is the public service arm of the OSU Division of Agriculture and Natural Resources. As part of the Land-grant University System, OCES is affiliated with the USDA-Cooperative State Research, Education, and Extension Service (USDA-CSREES) with educators in each of the 77 counties in Oklahoma and a system of subject-matter specialists at ten locations around the state plus Stillwater.



## Rain Garden and LID Workshop

OCES and the City of Stillwater Stormwater Program held a Rain Garden and LID Workshop June 9, 2009. The workshop incorporated a train-the-trainer webcast from North Carolina State University and the University of Georgia-Athens entitled "Rain Water Harvesting and Rain Gardens." The event included an afternoon design and installation program and a hands-on activity led by the City of Stillwater Stormwater Programs manager to construct a rain garden at the Stillwater Community Center. The workshop included presentations by extension faculty and staff from the OSU Horticulture and Landscape Architecture and Biosystems and Agricultural Engineering departments. The workshop drew 30 participants and included members from the Stillwater community as well as from Edmond, Moore, Oklahoma City, and The Village (photos below).





# Poultry Waste Management Education and Electronic Litter Market

There are over 700 poultry farms in Eastern Oklahoma that produce more than 300 million birds and generate approximately 200,000 tons of poultry litter annually. Concerns about phosphorus from the litter polluting important water resources prompted the state of Oklahoma to pass the Registered Poultry Feeding Operations (RPFO) Act and the Poultry Waste Applicators Certification Act in 1998, paving the way for the OCES Poultry Waste Management (PWM) Education Program. Through this program, OCES has educated over 2,300 poultry feeding operators and waste applicators, addressing water quality concerns associated with improper or excessive land application of poultry litter.

As set forth in the Acts, all poultry production operators and poultry waste applicators must complete an initial nine-hour series of PWM educational sessions, and then each year take three hours of continuing education (Annual Update Education). OCES provides the required training and issues certificates to attendees upon completion of each session.

**In fiscal year 2009 (Oct. 1, 2008 to Sept. 30, 2009), OCES Educators offered the initial nine-hour training sessions nine times, attracting 133 new operators and applicators to the certification process.** These sessions covered basic training on regulations, animal waste management plans (AWMP), nutrient management, sampling and calibration procedures, conservation practices and poultry litter marketing. Annual Update Education balances environmental protection needs with the latest knowledge and practices for poultry production.

**Over the past year, Cooperative Extension developed 12 new presentations to meet educational needs. Annual Update Education efforts consisted of 78 hours of classroom and field instruction in calendar year 2009, resulting in 3,855 people-hours of training.**

Cooperative Extension also developed the Oklahoma Litter Market website to assist with the transfer of poultry litter to areas of need and away from nutrient surplus areas. The website, [www.ok-littermarket.org](http://www.ok-littermarket.org), assisted substantially in promoting the transfer of poultry litter out of Western Arkansas / Eastern Oklahoma to more distant areas of the state with nutrient-deficient soils.

The Oklahoma Cooperative Extension Service Poultry Waste Management Education Program continues to thrive, led by Josh Payne, PhD, Area Animal Waste Management Specialist. For further information, visit the PWM website, [www.poultrywaste.okstate.edu](http://www.poultrywaste.okstate.edu), or contact Dr. Payne at [joshua.payne@okstate.edu](mailto:joshua.payne@okstate.edu) or (918) 686-7800.



# Integrated Environmental Research and Education Site (IERES) OSU Botanical Gardens

The planned Integrated Environmental Research and Education Site (IERES) on the west side of Stillwater will encompass approximately 20 of the 100 acres owned by the OSU Botanical Gardens. The IERES project will feature numerous best management practices (BMPs) that enhance and protect natural resources. These techniques will include water resource protection, green architecture, environmentally sensitive site design, habitat reclamation, and the protection/preservation of riparian buffers.

IERES will provide both opportunities for academic and public education. This site will be a BMP “testing ground” for the state of Oklahoma. Monitoring programs for groundwater recharge and stormwater runoff will compare pre-development and post-development conditions so that the effectiveness of each BMP can be assessed.

The site plan for the IERES includes the following major components:

- A 4,000 square foot energy efficient and environmentally friendly building to house education programs
- An entrance road and parking lot integrated with a series of structural BMPs working together as a “treatment train” for stormwater runoff
- A “Utility Garden” that promotes the sustainable integration of utility infrastructure into the landscape
- A trail network that includes educational signage for all environmental demonstration components
- An enhanced riparian corridor along Stillwater and Cow Creeks
- An improved richness in biodiversity and wildlife habitat

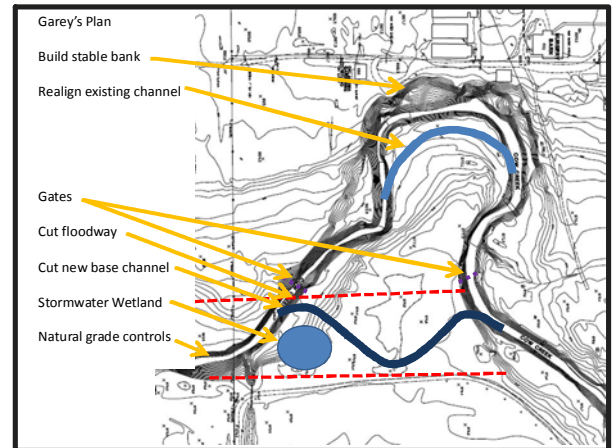


***The mission of the Oklahoma State University Botanical Gardens' Integrated Environmental Research and Education Site (IERES) is to be one of the most comprehensive collections of environmentally sensitive and energy efficient practices in Oklahoma and the Great Plains, providing programs for academic and public education as well as multidisciplinary research.***

Environmental Practices Included in IERES:	
Green Building Techniques Green Roof and Green Walls Passive Solar Heating Day Lighting Recycled and Renewable Materials Rainwater Harvesting Bioretention Bio-Swale Level Spreader Stormwater Retention/Detention Constructed Wetlands	Wind and Solar Energy Applications Utility Garden “The Right Tree in the Right Location” Pervious Pavements Flat Curbs (promoting sheet flow) Native Plantings Xeriscaping Buffering Visual Pollution Groundwater Recharge Stream Bank Stabilization Habitat Reclamation Riparian Corridor Enhancement

# Cow Creek Stream Stabilization (ARRA) Project

Many streams in Oklahoma are not meeting their beneficial uses because of sedimentation. Bank erosion is the source of sediment in many of these waterbodies. Historical and current land use activities have often resulted in streams that have been straightened, channelized, narrowed, widened, dammed, or any combination of the above. Riparian zones are often nonexistent due to urban development, livestock management, or farming practices. As a result, streams that once had a stable configuration, capable of transporting the sediment load and flood flows in the basin, are now unstable. As these streams destabilize, bank erosion increases and more sediment is delivered to the system. The condition of these destabilized systems may continue to worsen until action is taken.



Bank erosion was damaging areas of Cow Creek on the west side of Stillwater. Therefore, a request for funding from the 2009 American Recovery Reinvestment Act was approved and will go toward a stream stabilization and restoration project. The project area lies along a section of Cow Creek between West Virginia Avenue and Highway 51. In this area, over the last eighteen months, at least four feet of the streambank north of the Oklahoma Gardening Studio has been lost due to erosion. Without intervention, the erosion would threaten nearby infrastructure, such as the new ODOT OK-51 Bridge, the Oklahoma Gardening Studio, OSU service roads, electric lines, and other utilities.

This project will stabilize the most unstable banks along the proposed project planning area. Through the stream restoration efforts, the creation of a new floodplain channel will reconnect Cow Creek with its floodplain to increase energy dissipation and reduce downstream flooding potential. Monitoring will be performed to assess success of the bank stabilization and stream restoration.

Also, the project will become part of a bank and channel stability research facility to study alternate bank and channel stabilization techniques and mechanisms of instability. The project provides an opportunity to educate the public on riparian management, riparian ecology, natural approaches to correcting stream channel instability, and to conduct research on factors that affect the stability of banks and channels. The stabilization and restoration project will improve the educational value of the Integrated Environmental Research & Education Site (IERES) by adding a properly managed riparian area with trails, viewing areas, and educational signage. The Cow Creek project area lies along the border of the OSU botanical garden and the IERES project area; therefore, it is estimated to have over 100,000 visitors each year once completed.

**In July 2009, a stream stabilization and restoration project design was selected and developed by Dr. Jennings, a channel restoration engineer from North Carolina State University, representatives from the U.S. Army Corps of Engineers, Oklahoma Department of Wildlife Conservation, Oklahoma State University, City of Stillwater, and engineering consultants.** The chosen recommended design is shown above. Currently, design plans are being developed. The construction phase of the project will be sent out for bid during December 2009. A construction firm will be selected by January, and a contract will be in place by February 17, 2010. The majority of the construction work will take place from late summer to early fall in 2010 during low stage conditions of the creek.

# Oklahoma Scenic Rivers Commission (OSRC)

The Oklahoma Scenic Rivers Commission (OSRC) reaches many residents of and visitors to the Illinois River Basin through its Education Outreach Programs. Most of these programs focus on nonpoint source pollution and target residents and users of the Illinois River Basin in northeast Oklahoma.



The OSRC Illinois River Schools Program offers programs for preschool through high school students, tailored to reach children at their specific grade levels. Children and adults are exposed to discussions, presentations, and activities revolving around water quality and potential harmful and beneficial impacts on aquatic ecosystems.

In addition, OSRC hosts river cleanup events on the Illinois River, which is an important aspect of the litter abatement program and an excellent opportunity to increase the public's awareness about litter. The OSRC publishes and distributes an educational quarterly newsletter, *River Currents*. The newsletter focuses on the Illinois River Basin and other regional watersheds. Each issue has focused on some aspect of nonpoint source pollution. **The OSRC has 416 acres of 30 year riparian area exclusion easements along the Baron Fork and the Illinois River in Adair and Cherokee Counties. These easements were funded by the USEPA and by a poultry donation and will ensure riparian protection through at least 2037.**

## 4-H Water Conservation Projects

Oklahoma 4-H's project sites in eight counties cover a variety of water conservation techniques, including rain gardens, rain barrels, drip irrigation, and school-based demonstrations. Some programs partner with the Master Gardeners, school personnel, and other entities to complete these projects as youth-adult partnerships. Each of these locations has been used for public demonstrations and water conservation field day events to teach youth and the public practical water conservation techniques. The demonstration sites are in public locations, such as schools, business offices, and fairgrounds. **To date, more than 1,500 youth and 2,400 adults have participated in the demonstrations. The Cleveland County Demonstration and Teaching Garden installed a rain capture and drip irrigation system this year (shown below).**



# Chickasaw Nation Education Program

The Chickasaw Nation office located in Ada has been participating in the OCC Blue Thumb Program for approximately five years. The program is used to train staff and citizens in the community about water conservation and water quality.

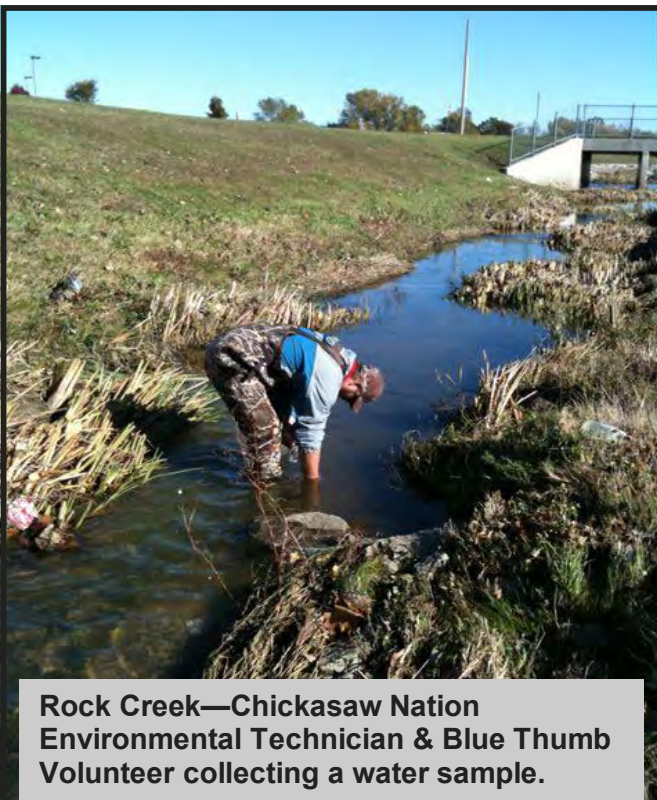
In 2009, the Chickasaw Nation monitored Little Sandy Creek in Pontotoc County and Rock Creek in Murray County. In addition to stream monitoring, the Chickasaw Nation hosted a Water Quality Day camp for Boy Scouts that taught students about water conservation and aquatic macroinvertebrates.



Students at Winter Smith Park listen to a Chickasaw Nation Environmental Specialist explain about water conservation and aquatic bugs.



Collecting macroinvertebrates



Rock Creek—Chickasaw Nation Environmental Technician & Blue Thumb Volunteer collecting a water sample.



Water Quality Day Camp



# Oklahoma City Storm Water Quality Management Program



The goal of the Storm Water Quality Management Division (SWQM) is to prevent or address any source of contamination of the community's waterways through education, public awareness, monitoring, stream restoration, inspections, investigation, and enforcement. Although Oklahoma City is permitted as a point source, pollutants washed off during precipitation are often non-point in scope. SWQM consists of the following programs:



- (1) **Construction Auditing** ensures that new utilities, industrial, commercial, or institutional facilities, multi-family residential subdivisions, and demolition of structures are permitted prior to all land disturbing activities.
- (2) **Industrial Auditing** permits industries and other businesses with the potential to cause pollution. Technicians review all necessary stormwater related documentation and conduct audits to determine if facilities are in compliance with stormwater regulations.
- (3) **Public Outreach** promotes environmental education for students of all ages. The goal is to inspire them to become responsible citizens by keeping the City's waterways clean and reaching out to neighborhood associations and other organizations as an advocate for greater environmental awareness.
- (4) **The Household Hazardous Waste Collection Facility** offers residents the convenience of safely disposing of unwanted harmful, household chemicals which can be hazardous to our community waterways if disposed of improperly. The facility accepts a wide variety of hazardous materials from residents' homes year-round.
- (5) **Illicit Discharge Detection & Maintenance (Hazmat & Spill Response, Pollution Investigation)** - SWQM works with emergency responders to prevent, reduce, and mitigate pollutants discharged from vehicle accidents, accidental releases, and other emergency situations. SWQM personnel also respond to water related complaints reported from multiple sources and investigate those complaints to determine sources of contamination and work towards remediation by responsible parties.
- (6) **Environmental Water Quality Program** - SWQM conducts monitoring in the streams and storm drainage systems. Four programs target floatable debris, wet weather discharges, dry weather discharges and ambient conditions through measuring the physical, chemical, and biological characteristics of our drainage infrastructure. These directed monitoring programs collect valuable information on the water resources within Oklahoma City to assist in directing future improvements and pollution prevention activities.



Hazardous Waste Collection Facility

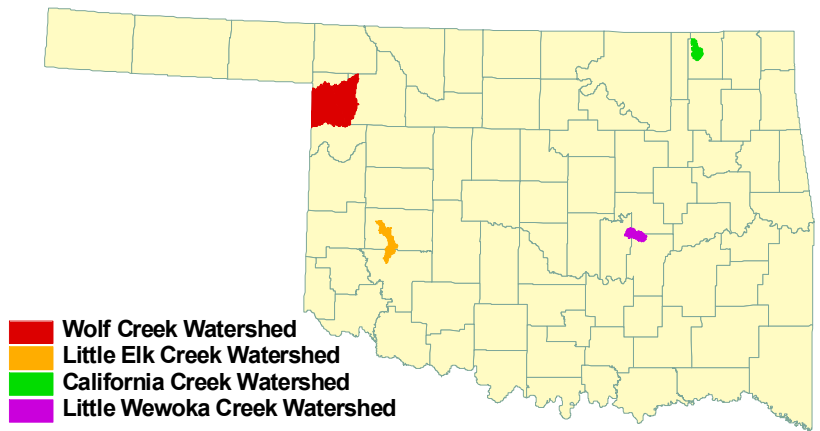


SWQ Industrial Training Class  
2009

# 2009 Success Stories

The OCC Water Quality Division submitted four NPS success stories to EPA in 2009. These stories represent the results of cooperative efforts of the NRCS, OCC, and conservation districts to implement BMPs to improve water quality. A brief synopsis of each story follows.

**Wolf Creek:** Wolf Creek had been on Oklahoma's 303(d) list as not attaining the Fish and Wildlife Propagation (FWP) use due to impairment by turbidity since 2002. Oklahoma's locally-led cost-share program and local Natural Resources Conservation Service (NRCS) programs, including the Environmental Quality Incentives Program (EQIP), the Conservation Reserve Program (CRP), the Grassland Reserve Program (GRP), and the Wildlife Habitat Incentives Program (WHIP), enabled installation of BMPs to improve water quality by improving grazing land through cross-fencing, alternative water supplies, and brush and weed management, as well as nutrient management planning. Education in the Wolf Creek watershed through Blue Thumb was an important component of the success; a local high school teacher and her students monitored Wolf Creek monthly beginning in 2002 and submitted monthly reports on the monitoring results to the local newspaper in order to inform local citizens about the stream and its problems. Success was shown with decreased turbidity in the stream, and Wolf Creek is now in full attainment of its Fish and Wildlife Propagation designated use.



**Little Wewoka Creek:** Little Wewoka Creek had been impaired by suspended solids / turbidity since 1998. BMPs were implemented through Oklahoma's locally-led cost-share program and through the NRCS as part of an EQIP Local Emphasis Area project starting in 2002. The primary goal of this program was to reduce erosion by improving grazing land. BMPs implemented to achieve this goal included pasture planting, brush and weed management, nutrient management, forage harvest management, grazing management, cross-fencing, alternative water supplies, heavy use protection, and conservation crop rotations. As a result of these efforts, the turbidity of seasonal base flow water samples was reduced from a 25% exceedance of the criterion to no exceedances, which allowed Little Wewoka Creek to be delisted for turbidity impairment.

**California Creek:** California Creek was on the State's 303(d) list since 2004 for turbidity impairment. Grazing land and cropland BMPs were implemented to reduce erosion in the watershed. These BMPs included rotational grazing, cross-fencing, diversion terraces, alternative water sources, pasture planting, and weed control as well as establishment of riparian buffers, conservation tillage, and proper nutrient management. These practices, established through cost-share programs such as the Oklahoma locally-led program, EQIP, CRP, GRP, and WHIP reduced the amount of sediment entering the creek and lowered the turbidity such that no samples exceeded the turbidity criterion in 2008.

**Little Elk Creek:** In the Little Elk Creek watershed, erosion of both cropland and grazing lands as well as improper management of cattle wastes were potential sources contributing to water quality impairments. Excess nutrients from agricultural runoff may cause overgrowth of nuisance algae, and the subsequent breakdown of the algae can lead to low dissolved oxygen levels. In addition, the runoff of wastes from grazing lands may increase levels of bacteria in a stream. BMPs were implemented through Oklahoma's locally-led cost-share program and through the NRCS EQIP and CRP. BMPs designed to improve pasture, range, and crop land resulted in denser vegetation and fewer bare spots, which reduced potential runoff of soil, nutrients, and bacteria. Little Elk Creek was delisted for low dissolved oxygen and *E. coli* bacteria impairments in 2008.

**All of Oklahoma's successes can be viewed on the *Section 319 Nonpoint Source Success Stories* website: [www.epa.gov/nps/success/](http://www.epa.gov/nps/success/)**

**The Oklahoma Conservation Commission has the responsibility of providing assistance to the 87 conservation districts in Oklahoma to foster a sense of care, wise use, and best management of Oklahoma's renewable natural resources. This assistance is provided through each of the seven divisions of the Oklahoma Conservation Commission.**

**For more information visit our website at :  
[www.conservation.ok.gov](http://www.conservation.ok.gov)**



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