# Oklahoma's Nonpoint Source Program 2010 Annual Report



USEPA Grant # C9-996100-16, Project 2



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Cover photo: Illinois River in Adair County, Oklahoma (Tashina Mitchell 2010)

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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.



# **Oklahoma's Nonpoint Source Program**

Oklahoma's Nonpoint Source (NPS) Pollution Management Program is a combination of federal, state, and local agency The NPS Program is authorized federally by programs. 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 non-regulatory, 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 2010.

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.

### 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.

### 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. On-the-ground conservation is the primary focus of the nonpoint source program, and less than 5% of OCC funds support administrative duties.

In the 2010 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 2010 Program Activities:

#### IMPLEMENTATION

From January 2010 through December 2010, OCC staff accomplished a great deal of conservation in priority watershed areas (Spavinaw Creek, Honey Creek, North Canadian River, and Illinois River Watersheds) and in the Conservation Reserve Enhancement Program (CREP) area:

- Protected more than 1,000 acres of riparian area by offering exclusion incentive payments to landowners.
- Installed nearly 15 miles of riparian area exclusion fencing to protect sensitive areas around streams and rivers from erosion and NPS runoff.
- Constructed 7 waste storage or cake-out facilities to improve animal waste handling and storage.
- Replaced 32 improperly functioning rural septic systems.
- Installed 108 watering tanks and 17 ponds, and drilled 25 wells to supply alternative water to livestock fenced out of creek or to encourage more uniform pasture utilization.
- Installed over 125,983 feet of cross-fencing to reduce over grassing and sediment runoff.
- Converted 12,080 acres of conventional farming to no-till faming (North Canadian River watershed).
- 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.

#### EDUCATION

- Through the nationally recognized Blue Thumb Education Program, volunteers monitor 107 streams sites across the state each month. In 2010, over 10,449 volunteer hours were logged from education and stream monitoring events.
- Currently, a total of 37 counties across the state are participating in Blue Thumb stream monitoring.
- Teams conducted 28 fish collections and 139 macroinvertebrate collections.
- Blue Thumb held five stream monitoring trainings and nine mini-academies trainings.

#### MONITORING

OCC monitors 245 fixed stream sites and 250 probabilistic sites across the state every five years through the Rotating Basin Program. In 2010, the OCC water quality staff monitored 138 fixed sites, 13 implementation monitoring sites, and 50 probabilistic sites, for a total of 201 stream sites monitored. In doing so, the program:

- Collected 3,615 water samples (2009-2010) for analysis of conventional pollutants at over 310 sites.
- Completed 221 fish collections with concurrent aquatic habitat assessments.
- Collected over 540 macroinvertebrate samples.

**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 areas to target through 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.

As a result of these and similar efforts, Oklahoma documented at least 4 new stream delistings in 2010 where voluntary NPS management measures have effectively addressed water quality problems. In addition, another eight similar success stories are on tap for 2011. In summary, 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, which 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,

and thely

Shanon Phillips Oklahoma Conservation Commission Water Quality Director

# **Nonpoint Source Partners**

Oklahoma's Nonpoint Source (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.

### 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

### Federal Partners include:

- U.S. Environmental Protection Agency
- U.S. Department of Agriculture: Natural Resources Conservation Service Farm Services Agency

### **Other Important Partners:**

Oklahoma Association of Conservation Districts City of Oklahoma City Oklahoma Office of Secretary of the Environment Oklahoma Energy Resources Board Oklahoma Scenic Rivers Commission Oklahoma Water Resources Board Oklahoma State University University of Oklahoma

- U.S. Army Corps of Engineers
- U.S. Geological Survey
- U.S. Federal Emergency Management Agency
- U.S. Fish & Wildlife Service

City of Norman City of Tulsa

# Planning

# **Oklahoma NPS Management Funding**

Funding for the NPS Program comes from the US Environmental Protection Agency and the Oklahoma State legislature. During FY2010, the EPA provided \$2,928,900 and Oklahoma contributed \$1,952,600 to the NPS Program. In addition, cost-share funds from participating landowners comprise a significant contribution to NPS 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 best management practices will be focused in a watershed. A well organized plan is vital to planning and implementing a successful watershed project that will result in improved water quality. In 2010, the Lake Thunderbird Watershed Based Plan was approved by USEPA Region 6. The Illinois River Watershed Based Plan is currently under review. An important part of the project planning is deciding which BMPs to cost-share with landowners and at what percentage; this is decided per watershed by area landowners.

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

In the 2009 grant year, the cost-share program provided \$935,741 in incentive payments to the landowners and landowners contributed over \$1,026,000 for a total of \$1,961,741. In the 2010 grant year, this cost-share program provided \$729,550 of state incentive funds to landowners to voluntarily apply water and soil conservation practices on their land. In turn, landowners contributed over \$665,237 of their own money for a total of \$1,394,787 spent protecting water quality through the cost-share program.



# Implementation

Clean Water Act §319 Priority Watershed 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 §319 projects, conservation practices or "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. Common BMPs such as riparian area fencing, cross-fencing, waste storage buildings, heavy use areas, no-till farming, and alternative water supplies are implemented in priority watersheds to reduce nonpoint source pollution.

The willingness of Oklahoma's citizens to voluntarily install practices that protect water quality on their privately owned land has been awe-inspiring and effective. Modeling of the effects of the practices installed in 2009 indicated that Oklahoma was first in the nation in the reduction of phosphorus and third in the nation in the reduction of nitrogen due to BMP implementation. Nitrogen and phosphorus are forms of nonpoint source pollution which heavily impact waters in the state. By reducing the amount of these nutrients flowing into streams, downstream reservoirs that supply drinking water are improved as well.

Currently, the Oklahoma Conservation Commission has five ongoing Priority Watershed §319 Projects: Honey Creek, Spavinaw Creek, Illinois River, North Canadian River, and Lake Thunderbird. Over eight million dollars in federal, state, and landowner funds have been invested in implementation in these five projects so far. In addition, the OCC is partnering with the Farm Services Agency (FSA) to administer the Conservation Reserve Enhancement Program (CREP) to protect riparian forest areas in the Illinois River and Eucha/Spavinaw River watersheds.







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 were on the EPA's 303(d) list in 2002 for impairments from phosphorus and low dissolved oxygen. Lakes Eucha and Spavinaw have suffered poor water quality due to high levels of nutrients from phosphorus loading into streams via nonpoint source runoff. 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.

In 2010, the OCC continued to implement a variety of best management practices (BMPs) in the Spavinaw Watershed, which decreased the amount of nutrients and sediments flowing into the streams that enter Lakes Eucha and Spavinaw. The costshare practices that have been implemented in the watershed include riparian area establishment, riparian area fencing, stream bank stabilization, critical area planting, pasture establishment and management, rotational grazing, rural waste systems, animal waste storage buildings / composters / cake-out houses, wells, watering facilities, ponds, and heavy use areas.



Since 2000, \$4,025,553 has been spent installing BMPs in the Spavinaw Watershed and over 200 landowners have participated.

From August 2008 through December 2010, landowners contributed \$744,659 of the \$1,751,617 total spent installing BMPs. An additional \$1,348,551 has been obligated for implementation in the future.

As of December 2010, a total of 200 conservation plans have been written.

Spavinaw Creek 319 Implementation Project		
Completed Practices	2010 only	Total 20082010
Riparian acres excluded	60	130
Riparian fencing (feet)	14,319	15,259
Ponds	6	9
Animal waste storage buildings	3	16
Cross-fencing (feet)	51,648	159,919
Watering facilities, tanks	35	138
Wells	8	24
Heavy use areas	43	80
Rural waste replacements	6	23









Livestock Waste Storage Building



The Honey Creek watershed is a 79,000 acre subwatershed of the Grand Lake Watershed. Honey Creek originates from Benton County, Arkansas and McDonald County, Missouri into Delaware County in northern Oklahoma. There it drains into Grand Lake O' the Cherokees, an important water supply for the cities of Grove, Langley, Afton, Ketchum, and Vinita. Grand Lake is also one of Oklahoma's premier recreational reservoirs. 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 December 2012. Targeting and modeling were used to determine the areas of highest priority that were contributing the most pollution. Best management practices (BMPs) are being installed on a voluntary, cost-share basis to reduce the amount of bacteria, phosphorus, and sediment entering the streams and lake. A wide variety of practices have been implemented to improve water quality in the watershed. The approved cost share practices implemented include: riparian area exclusion fencing, riparian improvement management, pasture and management, animal waste storage facilities, septic tanks, and alternative water supplies such as wells, ponds, and watering tanks.



Currently, a total of over 19,354 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 2010, a total of 100 conservation plans have been written to install BMPs. This represents \$1,546,115 obligated for BMP implementation, of which \$1,272,202 has been spent.

Honey Creek 319 Implementation Project		
Completed Practices	2010 only	Total 20082010
Riparian acres excluded	148.3	374.3
Riparian fencing (feet)	23,089	38,090
Ponds	8	20
Animal waste storage buildings, litter cake-out & composters	2	24
Cross-fencing (feet)	50,427	145,239
Watering tanks/ponds	53	117
Wells	10	40
Heavy use areas	39	153
Rural waste replacements	3	11











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North Canadian River Watershed Implementation Project

The North Canadian River Watershed Project area lies in Blaine, Oklahoma, Dewey, and Canadian Counties in western Oklahoma, encompassing the area between Canton Lake and Lake Overholser. Lake Overholser water is pumped into Lake Hefner, the public water supply for Oklahoma City.

This section of the North Canadian River has repeatedly exceeded water quality standards for turbidity and *Enterococcus* bacteria. In 2007, OCC began the watershed implementation project to install best management practices to reduce the amount of nutrients, sediment, and bacteria entering the river.

The focus of this project is to reduce nonpoint pollution from agricultural activity. The approved, voluntary cost-share installed practices on landowners' property includes: riparian area exclusion fencing, no-till farming conversion, conversion of cropland to pasture, alternative watering facilities, wells, solar pumps, septic replacements, nutrient management, and crossfencing.

### A total of 394 acres have been protected with 8.7 miles of riparian fencing.







As of December 2010, a total of 73 landowners have installed \$961,075 in BMPs. Over \$98,365 of this amount has come from landowners. An additional 21 cooperators have already obligated \$259,605 for conservation practices in 2011.

Conversion to no-till farming of nearly 18,000 acres has occurred in the watershed due to the 319 project.

North Canadian River 319 Implementation Project			
Completed Practices	2010 only	Total 20082010	
Riparian acres excluded	68	394	
Riparian fencing (feet)	12,080	45,780	
No-till farming conversion (acres)	2,019	17,976	
Cross-fencing (feet)	7,842	7,842	
Watering facilities, tanks	4	5	
Wells and solar pumps 4		5	
Grass pasture planting (acres)	524	920	
Rural waste replacements15			







The Illinois River located in northeastern Oklahoma is designated as a State Scenic River and is recognized as one of Oklahoma's most valuable water resources for aesthetic and recreational value, as well as a drinking water source. The current §319 project, initiated in 2008, is a supplemental effort of previous NPS management efforts in the watershed and complements the ongoing Conservation Reserve Enhancement Program (CREP).

The project focuses on protecting riparian 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, by establishing healthy riparian buffers and well-maintained pastures.

As of December 2010, a total of \$1,403,313 has been spent on implementation of conservation practices. Of that, \$943,111 came from §319 funds and \$460,202 was contributed by landowners.

As of December 2010, a total of 130 contracts have been approved and 58 conservation plans have been written.





### Illinois River 319 Implementation Project

Completed Practices	2010 only	Total 20082010
Riparian acres excluded	573	663
Riparian fencing (feet)	18,384	36,783
Ponds	2	3
Animal waste storage buildings	2	9
Cross-fencing (feet)	16,066	41,398
Watering tanks/ponds	16	47
Wells	3	12
Heavy use areas	22	75
Rural waste replacements	22	61

Common best management practices for the Illinois River §319 Project:

- Riparian area exclusion fencing
- Watering facilities (tanks and ponds)
- Wells and pipeline
- Animal waste storage
- Septic system replacement
- Heavy use areas





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% nonfederal 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 watersheds.

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. 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.

Enrolled CREP acreage in the Illinois River watershed filters runoff from 3,284 acres. CREP brings FOUR federal dollars to Oklahoma for every State dollar.



The following accomplishments occurred in 2010:

- 25 CREP applications were taken
- 45 site visits occurred
- 14 contracts were signed
- 154 riparian acres were enrolled



Since the inception of CREP in 2007:

- 115 applications have been taken
- 113 site visits have occurred
- 42 contracts have been approved
- 432 acres are enrolled in CREP
- 27,455 bare root seedling trees were planted
- 30,783 linear feet of fencing was installed

During 2010, OCC staff has been busy contacting landowners. Nearly 400 letters were sent out to eligible landowners. CREP staff attended six poultry meetings, and three local cattlemen association meetings. In addition, staff spoke and assisted at annual NRCS public and tribal outreach meetings and had displays at Northeastern State University's Earth Day celebration, Conservation Day at the capitol, and the Delaware County 4-H Fair.



The Oklahoma Carbon Program verifies, certifies, and registers Oklahoma carbon offsets from agriculture, forestry, and downhole injection. During FY2010 the program participated on a climate change adaptation working group, created a 4-level verifier training program, was selected for grant funding by USDA, approved the program's first official aggregator, designed a new logo, and continued developing carbon offset verification protocols.

#### Verifier Training Program

With input from NRCS, the Oklahoma Carbon Program developed a 4-level training process for approved verifiers of grasslands and no-till fields under carbon contract. It is similar to the NRCS process for conservation plan writers and requires classroom and field instruction, as well as successful demonstration of field skills prior to certification.





### **Partnerships**

In 2010, the program approved its first official "state approved" aggregator eligible to receive verification, certification, and registration of Oklahoma carbon offset projects through the Oklahoma Carbon Program. In 2010, staff worked with graphic designer Jon Phillips to create a logo.



### Pilot Program Verification – Year 1

The goal of the pilot program is to increase the number of producers implementing BMPs in the North Canadian River watershed while testing verification protocols developed for grasslands and no-till. In fall 2009, WQ and Blaine County Conservation District staff verified 9,290 acres in the North Canadian River watershed. This represents one half of the producers signed up for the §319 Water Quality Project at that time and 3,698 metric tons of CO2 sequestered by land management techniques that protect water and air quality. The Pilot Program will continue through calendar year 2011.

### **Climate Adaptation Working Group**

The Carbon Program participated in the State Climate Planning Committee, which is a joint effort of the Oklahoma Climatological Survey and the Southern Climate Impacts Planning Program. The group encourages information sharing across agencies to determine agency needs for adapting programs to climate change. Some studies predict that agriculture, water quality, and water quantity will be adversely affected by severe weather events related to a changing climate.

#### **Conservation Innovation Grant Award**

The Conservation Commission was selected for funding from the United States Department of Aariculture Natural Resources Conservation Service FY2010 Conservation Innovation Grant. OCC received matching support from the Oklahoma Association of Conservation Districts and Western Farmers Electric Cooperative for the \$606,352 three-year project. The project provides information about carbon sequestration to agriculture producers, supports development and field testing of verification protocols, and facilitates soil carbon sampling by OSU to determine average sequestration rates of aggregated acres under conservation management. The project will also use EPA's STEP-L model to quantify the water quality benefits of BMPs in the project area.

For more information on the Carbon Program go to www.ok.gov/conservation/Carbon\_Sequestration





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 provide 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.



View the Oklahoma Wetland Inventory maps at: *http://www.owrb.ok.gov/WIMS* 

### Wetland Classification

In 2010, the OCC Wetlands Program partnered with Oklahoma State University to complete the classification of wetlands utilizina the Hydrogeomorphic (HGM) Approach in the Central Great Plains and Cross Timbers Ecoregions of the This project utilized recently digitized state. National Wetland Inventory maps to locate wetlands for the development of an HGM classification system for wetlands in Oklahoma. The HGM approach for wetland classification has been incorporated into a number of state wetland monitoring programs because it supports functional assessment of wetlands by classifying wetlands based on their hydrogeomorphic characteristics (i.e. landscape setting, water source, hydrodynamics).

In addition, the project has evaluated the need for regional wetland subclasses within these ecoregions and collected baseline abiotic and biotic data that can be used to support development of functional assessment models for these ecoregions. The study not only supports existing wetland projects in Oklahoma, but will serve as a critical first step toward implementing functional assessment protocols as part of the State's wetland monitoring program.

#### **Stormwater Issues**

This year, the Wetlands Program was also involved in the implementation of design plans for an urban stream and wetland enhancement project to address stormwater in the City of Norman. As technologies grow, cities and 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, with questionable results in many cases.

The OCC and its partners demonstrated an alternative to the highly engineered system to address stormwater in an urban setting by installing Newberry riffles in Brookhaven Creek in Norman. The project utilized 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, staff worked with the City to update its stormwater master plan and provided education about low impact development in urban areas.

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# Additional OCC Projects



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Lake Thunderbird is a sensitive water supply lake serving Norman, Midwest City, and Del City areas with a great deal of urban growth. Excessive algae in the lake have led to water quality degradation, including periodic taste and odor problems, low dissolved oxygen, and turbidity issues. Production of nuisance 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.

The Lake Thunderbird Watershed Project is focused on reducing nonpoint source pollution due to urban development. This project, initiated in 2008, is a partnership between the OCC, University of Oklahoma, and a local developer to provide a Low Impact Development (LID) demonstration Norman's Trailwoods residential project in neighborhood. One of the foundational goals of this project is to show community and public officials how LID techniques can be used to improve runoff quality.

A block of 17 houses are being constructed with raingardens in each front yard and curbs which shunt stormwater from the street into the gardens. In addition, these houses will be equipped with rain barrels. An adjacent block of 17 houses will be built with conventional curbs and no rain barrels or rain gardens.



As construction of the neighborhood nears completion, monitoring of stormwater from both streets will commence in order to evaluate the differences between the storm water runoff from the LID area and the conventional (control) area.

The Oklahoma Conservation Commission has a \$240,228 contract with the University of Oklahoma for phase I of this project. As of December 2010, a total of \$73,235 has been spent. The majority of this funding has gone toward planning and design purposes.

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. A model LID code is being written for the City of Norman to provide guidance on planning, design, and construction of new developments using LID techniques.





In August 2007, tropical storm Erin flooded Caddo County with torrential rainfall and damaged a stretch of Sugar Creek that had been part of an improvement project in the 1960's. This qualified the area for federal funding under the Federal Emergency Management Agency (FEMA). The Sugar Creek Project involves a 22 mile stretch along its channel. The project area begins at the mouth of Sugar Creek at the Washita 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 have partnered with FEMA to implement this project to restore the channel function of conveying water away from the watershed dams and to 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 comes from FEMA (7.6 million); however, matching funds are coming from the Oklahoma Conservation Commission and NRCS to improve additional sites in the watershed.

In 2010, major accomplishments included acquiring the needed land rights from private landowners, the Bureau of Indian Affairs, and the Oklahoma Department of Transportation to begin construction of the repairs needed in the first reach of the creek. Currently, FEMA has not approved the final engineering plans. Once FEMA has approved the drawings submitted, the first reach of the project will be advertised for construction bids.



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

During 2010, a Keechi drop, an engineered riffle and pool system, was constructed to stabilize a major overfall in Keechi Creek. The drop was constructed by the NRCS using ARRA stimulus funds. In addition, an unfunctioning 30 year old grade stabilization structure was removed so that the wear and condition of the structural components could be studied and evaluated by FEMA.

In 2010, a grant from the Cooperative Conservation Partnership Initiative (CPPI) of \$1.9 million dollars was awarded to allow channel and streambank stabilization work in Sugar Creek and its tributaries. The CCPI funding is being matched with State funds and will allow additional stream stabilization work that did not qualify for funding under FEMA.





### Greenseeker / Optical Pocket Sensor 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<sup>™</sup> 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 (OSU) 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 pocket 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.

Trials were initiated in 2008, with work continuing during the 2009-2010 winter wheat cropping season. Research has shown an average overall decrease in nitrogen inputs of nearly 25 lbs of nitrogen per acre, resulting in increased nitrogen use efficiency and improved environmental stewardship. **Prototype development is expected to be completed sometime in 2011.** 

For more information see the following websites: http://nue.okstate.edu/Pocket\_Sensor/Pocket\_Sensor.htm http://npk.okstate.edu/greenseekersensor/index.htm



# Subsurface Phosphorus Transport Project

Oklahoma State University partnered with the OCC to conduct research on the preferential flow pathways in subsurface alluvial floodplains to determine the effects of phosphorus transport in the Ozark Plateau region. The project's goal was to research the rate of phosphorus transport through the coarse subsoil to gravel bed streams of northeastern Oklahoma. In addition, the project investigated whether the subsurface gravel acted as a transient storage zone, providing a phosphorus sink during high flow and phosphorus source during base flow. Study areas included a section of the Barren Fork Creek, Flint Creek, Honey Creek, and Pumpkin Hollow. Each study site consisted of four observation well stations where tracer dye was used to determine the preferential flow pathway. Water samples were obtained from the observation wells and the stream and analyzed for total phosphorus to document concentration gradients over time. The project evaluated the broad-level phosphorus mass balance of each riparian floodplain site and evaluated the buffer effectiveness from each study site with regard to the ability to limit subsurface transport.

Results suggested that the subsurface phosphorus transport capacities were significant compared to surface runoff phosphorus loads at low intensity agricultural field sites. The project demonstrates that preferential flow pathways can transport water and phosphorus through the groundwater system, but more research needs to be conducted to characterize the runoff phosphorus leaching through the topsoil, its connectivity to the preferential flow pathways, and its rapid movement to the stream bypassing riparian buffers. Due to the sporadic nature of the recharge and discharge in these systems, more research is necessary to understand the occurrence and activation of alluvial preferential flow pathways. **The final report summarizing this project was submitted to the USEPA Region 6 in fall 2010.** 



### Improving Estimates of Carbon Sequestration in No-till Soils Project

The OCC provided funding to Oklahoma State University to conduct research to determine accurate carbon sequestration rates in no-till soils as compared to conventionally tilled soils in Oklahoma. Obtaining accurate soil carbon sequestration rates for Oklahoma could result in greater participation in the Oklahoma Carbon Program, as carbon sequestration payments to producers are likely to be higher, and this increased adoption of no-till would then result in reduced erosion and improved water quality in project areas. This research project compared total carbon and total nitrogen amounts at five depth intervals (from 0 to 110 cm) in no-till and conventional till fields which were sampled in four locations. Results from the study indicated that, on average, no-till fields had higher organic carbon concentrations compared to conventional till fields. The longer the time in no-till and the higher the annual precipitation, the greater the carbon sequestration compared to conventional till fields. The results further suggested that in wetter climates no-till will sequester more carbon than conventional till within at least 5 years. In drier climates, the advantages of no-till in sequestering more organic carbon than conventional tillage may not be observed until the no-till system has been in place for a longer period of time. **The final report summarizing this project was submitted to the USEPA Region 6 in fall 2010.** 



# Education



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-thetrainers" 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. Volunteers attend quarterly quality assurance (QA) checks to assure that the data collected is of acceptable quality.

In addition to its general role as an education program, Blue Thumb also directs and implements public education and outreach in priority watershed project areas.

Monthly chemical monitoring accounts for a good portion of total volunteer hours logged. The remainder of volunteer hours comes from participation in training, quality assurance sessions, educational events, fish and macroinvertebrate collections, and groundwater monitoring. Under the direction of Blue Thumb staff, volunteers compile and analyze their own data in order to produce an annual summary report for the stream that they monitor.





### Blue Thumb 2010 Fast Facts:

- A total of 107 stream sites in 37 counties across the state are now monitored by Blue Thumb every month.
- A total of 10,449 volunteer hours were logged this year.
- Fish collections were obtained for 28 sites, and macroinvertebrates were sampled from 139 sites.
- Five new volunteer water monitoring trainings, nine mini-academies, four groundwater screening sessions, and 86 quality assurance sessions were held.
- Blue Thumb staff installed rain gardens in Grove, Miami, Tulsa, and Broken Arrow.
- Staff and volunteers displayed 4 posters and gave a presentation at the North American Lake Management Society's International Symposium.

On November 9, 2010, the Blue Thumb Program was the recipient of the Golden Paddle award from the Illinois River Watershed Partnership at its annual Stakeholders Meeting in Springdale, Arkansas. The award recognized the Blue Thumb Program for good stewardship in the protection, preservation, and enhancement of the water quality and wildlife habitat in the Illinois River watershed in Arkansas and Oklahoma.



Visit the Blue Thumb website at: www.bluethumbok.org

# 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 monitoring is absolutely crucial in gauging the program's success over time.

During 2010, OCC staff collected more than 1,600 water samples for analvsis of conventional pollutants at over 200 sites. Biologists completed approximately 100 fish collections, with concurrent aquatic habitat assessments. and collected 250 over macroinvertebrate samples.

All OCC monitoring is conducted following methods and sampling plans established in EPA approved Quality Assurance Project Plans (QAPPs).

In 2010, OCC water quality staff monitored 138 fixed sites, 50 probabilistic sites, and 13 implementation project sites, for a total of 201 stream sites.

### Rotating Basin Fixed and Probabilistic Monitoring Program

The USEPA requires states to assess streams, rivers, and lakes to determine whether each waterbody attains its designated uses. Most Oklahoma waterbodies are assessed according to State standards, set by the OWRB, to determine suitability for Recreation, Fish and Wildlife Propagation, Aesthetics, and Agriculture, with other uses such as Water Supply assigned as necessary. The OCC's Rotating Basin Monitoring Program (RBMP) provides routine water quality data in support of designated use assessment.

Through the RBMP, the OCC has fixed monitoring sites at the base of most USGS eleven digit HUC watersheds in the state. Each basin is monitored for a two-year period on a five year cycle resulting in a total of 245 fixed sites throughout the state. During the five year cycle, 19 physical and chemical parameters are measured at each site every five weeks for two consecutive years. In addition, an intensive fish collection and instream habitat assessment are performed once every five years at each site, and aquatic macroinvertebrates are sampled twice a year for the two consecutive years.

The RBMP also includes a probabilistic monitoring component to provide data necessary for extrapolation of stream assessments to a system scale. Fifty randomly chosen sites from a basin group 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.

The RBMP is currently in the last year of its second five year cycle. In 2010, a total of 138 fixed and 50 probabilistic sites were monitored in Basin Groups 4 and 5.





# **Rotating Basin Monitoring Program**

### Implementation Project Monitoring

Monitoring is also a vital part of the OCC's Priority Watershed Implementation Projects:

- Initially, data is used in the planning process to prioritize areas for implementation to reduce pollution and to characterize pollutant loading from watershed sources.
- Data is then collected in a project area prior to BMP implementation, during the project period, and after installation of BMPs in order to evaluate the effectiveness of the pollution abatement measures.
- Pollutant loading is estimated in order to track water quality changes and used to calculate total maximum daily load allocations (TMDLs).

The OCC has embraced a paired watershed methodology to evaluate project effectiveness. Using automated water samplers in either an upstream/downstream or control/treatment configuration has proven beneficial in documenting the effects of implementation in relatively short time spans. The OCC autosamplers are used to collect continuous, flow-weighted composite samples. Because autosamplers provide continuous data and the paired watershed design is able to account for environmental effects. statistically significant changes in water quality can be documented within a shorter period of time than with conventional monitoring by field personnel.

### In 2010, the OCC maintained autosamplers at 13 sites as part of four priority watershed projects.



# 13 Continuous Flow-Weighted Automated Water Samplers:

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

### Use of Monitoring Data

Nonpoint source monitoring data is used for many purposes including:

- Designated use support assessments for Oklahoma's Biannual Integrated Report
- Watershed Implementation Project Reports
- Trend analysis
- Watershed targeting
- TMDL development
- Effectiveness monitoring



# **NPS Program Partner Activities**

Oklahoma's Nonpoint Source (NPS) Program is a collaborative effort of federal, state, and local agencies as well as the citizens of the State of Oklahoma. The following pages provide brief summaries of some of the activities of NPS program partners.

### Oklahoma Department of Agriculture, Forestry Services: Silvicultural NPS Management Program

The Oklahoma Department of Agriculture, Food, and Forestry (ODAFF), Forestry Services Division Oklahoma's silvicultural nonpoint administers source management program and 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. Maintaining forest health will sustain the critical ecosystem services provided by the State's forests including woodlands, well-managed and watersheds and plentiful supplies of clean water.

In 2010, the Forestry Services continued to partner with the OCC, using EPA Section 319 funds to carry out its comprehensive Forest Water Quality Program. The project includes BMP compliance monitoring, educational activities, landowner assistance with water quality issues, correction of forestry-related water quality problems using technical assistance, load reduction modeling, and a timber-bridgemat loan program.

Currently, the Forestry Services and the Forestry BMP Committee continue to work on a major revision of Oklahoma's Forestry BMP Guidelines. The document is in review draft form, and will be completed in FY 2011.

### Notable achievements in 2010 include:

- Forestry BMP compliance monitoring of 100 sites in eastern Oklahoma's commercial forest area, which had an overall compliance rate of 92.1%. This monitoring provides an estimate of BMP compliance and identifies activities that need improvement and follow-up training and education. Project information is derived from field inspection of timber harvesting and site preparation activities randomly selected on all ownerships throughout the forestlands of eastern Oklahoma.
- 3 forestry BMP workshops for loggers, landowners, and foresters with a total of 98 attendees
- 4 "tailgate" sessions where BMPs were discussed on-site
- Formal evaluation of Oklahoma's forestry water quality program by the Southern Group State Foresters review team. Team members included a U.S. Forest Service water quality specialist and representatives from the Texas Forest Service and Kentucky Division of Forestry.
- Assisting the NRCS with tree planting plans for two watershed mitigation projects
- Participation in the State's comprehensive water planning process



### **Oklahoma Water Resources Board: ARRA Projects**

The Oklahoma Water Resources Board (OWRB), through its Financial Assistance Division, is committed to the implementation of sustainable or green infrastructure. The American Recovery and Reinvestment Act legislation required that not less than 20% of the funds through the Clean Water State Revolving Fund (CWSRF) be allocated to projects which address green infrastructure, water or energy efficiency improvements, or other environmentally innovative activities. After allocation of ARRA funds, the final Green Project Reserve (GPR) amount was \$7.9 million, which was \$1.5 million more than required. Of the 11 GPR projects, six projects (see table below) were characterized as addressing nonpoint source pollution. Prior to implementation, these projects were reviewed by the Oklahoma Conservation Commission and determined to be consistent with Oklahoma's NPS Management Plan.

Agency	Project	Loan Amount
OCC and OWRB	Riparian Restoration in the Illinois River and Eucha/Spavinaw Watersheds	\$2,000,000
University of Oklahoma with OCC	Green Roof at the National Weather Center in Norman	\$86,067
Tulsa City County Library System	Sperry Library Rain Garden & Tulsa Library Green Roof	\$278,580
Oklahoma State University with OCC	Riparian Restoration Along Cow Creek in Stillwater	\$2,000,000
OWRB and Central Oklahoma Master Conservancy District	Lake Thunderbird In-Lake Restoration	\$1,501,285

### **ARRA Projects Addressing NPS Pollution:**

In 2010, the 1,500 square foot green roof on the National Weather Center in Norman, the Central Library green roof in Tulsa, and the Sperry Rain Garden were completed. In addition, two Saturated Dissolved Oxygen System (SDOX) chambers, one control panel, one programmable logic controller, and two pumps and motors were installed as part of the Lake Thunderbird In-Lake Restoration Project.

Currently, the Cow Creek Stream Restoration and Stabilization Project remains in the planning phase. The project will consist of removing a current rip-rap obstruction, establishing a riffle/pool sequence along the stream, re-sloping stream banks as necessary, and reestablishing vegetation. Similarly, the Illinois River and Eucha/Spavinaw Streambank Restoration Project remains in the planning phase. This project will focus on reestablishing native vegetation along streambanks, re-sloping banks, and installing in-stream structures as needed.



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The Oklahoma Cooperative Extension Service (OCES) is the public service arm of the Oklahoma State University (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 accessible in all 77 counties in Oklahoma and a system of specialists at ten locations around the state.

In 2010, stream hydrology trailers were used across the state by OCES educators as educational tools at outdoor conservation classrooms, schools, landowner meetings, and other educational venues.

The stream hydrology trailers are highly engaging educational tools in which flowing water cuts through a bed of plastic grit to model stream processes. These models demonstrate the importance of riparian vegetation and the dangers of modifying stream channels and building in floodplains. The usefulness of the trailers was increased in 2010 through development of a new flood control retention structure model with which landowners can be instructed in the proper maintenance and safe use of flood control impoundments.





Students observe the flow of water at the stream hydrology trailer.

Also during 2010, training sessions for Extension Service and other agency professionals were held to increase the number of instructors.

### **OCES Poultry Waste Management Education and Electronic Litter Market**

There are approximately 700 poultry farms in eastern Oklahoma that produce more than 300 million birds and generate about 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 educates poultry feedina 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 take three hours of continuing education each year ("annual update education"). In 2010, OCES educators offered the initial training sessions six times, attracting 85 new operators and applicators to the certification process. Also in 2010, OCES developed 16 new educational presentations. Annual Update Education efforts consisted of 72 hours of classroom and field instruction in 2010, resulting in 3,597 people-hours of training between October 1, 2009 and September 30, 2010.

OCES 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, <u>www.ok-littermarket.org</u>, assisted substantially in promoting the transfer of poultry litter out of eastern Oklahoma to more distant areas of the state with nutrient-deficient soils.

The OCES 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, <u>www.poultrywaste.okstate.edu</u>, or contact Dr. Payne at <u>joshua.payne@okstate.edu</u> or (918) 686-7800.

### Oklahoma State University Botanical Garden Integrated Environmental Research and Education Site (IERES)

The Integrated Environmental Research and Education Site (IERES) on the west side of Stillwater encompasses approximately 20 of the 100 acres owned by the Botanical Gardens at Oklahoma State University. 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- and post-development conditions to assess the effectiveness of each BMP.

Currently, Phase I is underway, which includes building the entrance road, bioretention cells, ADA walkways, and parking lot. Bioretention cells are designed to reduce runoff and improve water quality by capturing and storing nutrients, heavy metals, and organic chemicals during runoff events.



Other "green" practices to be included in the project include: sustainable landscape design, construction and maintenance practices and earth-kind horticultural gardens, pollution mitigation (ground and visual); environmental filters; stream bank stabilization measures; habitat preservation; stormwater management systems addressing erosion control, ground water recharge, and pollutant removal; water capture, redistribution, conservation and reuse in the landscape; utility management systems; and green building techniques.

### The mission of OSU's 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.

### 4-H Water Conservation Projects

Oklahoma 4-H project sites in eight counties cover a variety of water conservation techniques, including rain gardens, rain barrels, and drip irrigation. Each of these sites has been used for public demonstrations and water conservation field days to teach practical water conservation techniques. The demonstration sites are in public locations such as schools, business offices, and fairgrounds. Some 4-H groups partner with the Master Gardeners program, school personnel, and other entities to complete these projects as youth-adult partnerships. Thousands of youth and adults have participated in the demonstrations.





# **2010 Success Stories**

The OCC Water Quality Division drafted eight nonpoint source program success stories in 2010. These stories represent the results of cooperative efforts between the local NRCS, OCC, Conservation Districts, and landowners to achieve the voluntary, cost-shared implementation of best management practices (BMPs) to improve water quality. Stories were written for streams which showed improvement, as determined by assessment in accord with Oklahoma water quality standards, in at least one water quality parameter which was likely due to BMP implementation.

In general, BMPs focused on improving grazing land and crop land and protecting riparian areas. Typical BMPs included:

- grazing management
- cross-fencing
- alternative water supplies
- supplemental hay planting
- brush and weed management
- nutrient management

- heavy use area protection
- conservation tillage (no-till, mulch till, or strip till)
- conservation crop rotations
- waste storage facilities
- contour farming (terraces, diversions, waterways)
- riparian fencing

The effect of these practices on reducing erosion of soils from upland and riparian areas is evident in that seven of the eight streams had improved turbidity. Improved dissolved oxygen values indicate reduced nutrient runoff, and improved bacteria levels also resulted in one stream.

Funding for the implementation of these practices came from NRCS programs (federal funds), local costshare (state funds), and from the landowners themselves.

# Oklahoma's 2010 Success Stories



SiteName	Parameter(s) Delisted	County
Dirty Creek	Turbidity	Muskogee, McIntosh
Elk Creek	Turbidity	McIntosh
Cloud Creek	Turbidity	Okmulgee, Muskogee
Mission Creek	Turbidity	Osage
Bull Creek	E. coli and Turbidity	Rogers, Mayes, Wagoner
Little Wewoka Creek	Dissolved Oxygen	Seminole, Okfuskgee, Hughes
Dugout Creek	Dissolved Oxygen and Turbidity	Lincoln, Payne
Cooper Creek	Dissolved Oxygen and Turbidity	Blaine, Kingfisher

The Oklahoma Conservation Commission (OCC) 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. The OCC's administration of the §319 Nonpoint Source Program and related programs continues to manifest improvements in the quality of the State's waterbodies. As we move forward with our partners, further improvements are expected.

The OCC Water Quality Division has received national recognition for its projects to improve water quality. BMPs implemented through the §319 program in 2009 resulted in Oklahoma being first in the nation in the reduction of phosphorus loading and third in the nation in the reduction of nitrogen loading to streams. In addition, Oklahoma ranks among the top states in the number of success stories it has published on the USEPA website. These NPS success stories can be found at the *Section 319 Nonpoint Source Success Stories* website (www.epa.gov/nps/success/).

In 2010, the Water Quality Division also received two Governor's commendations for team projects where OCC personnel demonstrated initiative, collaboration, and accomplishment to improve efficiency, reduce costs, and improve services. One project focused on an effort to empower water quality field personnel to answer landowner questions about the quality of the streams being monitored. The other project highlighted the collaborative media campaign between OCC, OACD, and NRCS to showcase the fact that there are many good streams across the state due to the conservation efforts implemented statewide.



Contact with Questions: Oklahoma Conservation Commission Water Quality Division 4545 N. Lincoln Blvd., Suite 11A Oklahoma City, OK 73105 Phone: (405) 522-4500 Email: shanon.phillips@conservation.ok.gov This document was prepared as a requirement for the Clean Water Act Section 319 Program. This document is issued by the Oklahoma Conservation Commission (OCC) as authorized by Mike Thralls, Executive Director. Copies have not been printed but are available through the agency website. Two printout copies have been deposited with the Publications Clearinghouse of the Oklahoma Department of Libraries. All programs and services of the OCC and the Oklahoma Conservation Districts are offered on a nondiscriminatory basis without regard to race, color, national origin, gender, religion, marital status, or disability. CC/2010