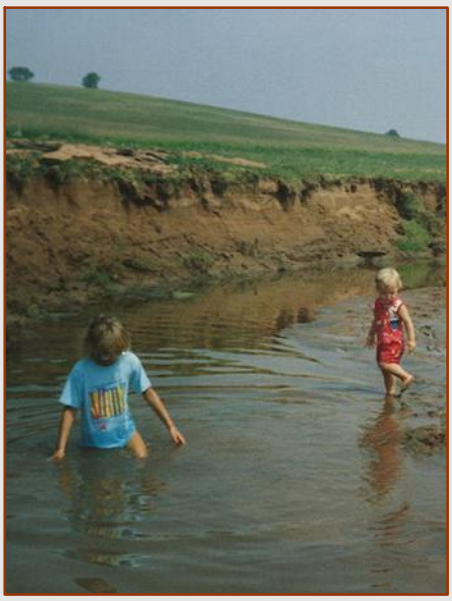
Oklahoma's Nonpoint Source Program

2006 Annual Report



Responsible Care for Oklahoma's Natural Resources

Oklahoma's Nonpoint Source Program

The Oklahoma Nonpoint Source (NPS) Program is a combination of federal, state, and local agencies collaborating to identify and reduce nonpoint source pollution in Oklahoma's waters. NPS pollutants come from a variety of sources including homes, lawns, agricultural practices, parking lots, septic systems, and building activities. "Nonpoint" simply means coming from more than one location.

The Oklahoma Conservation Commission

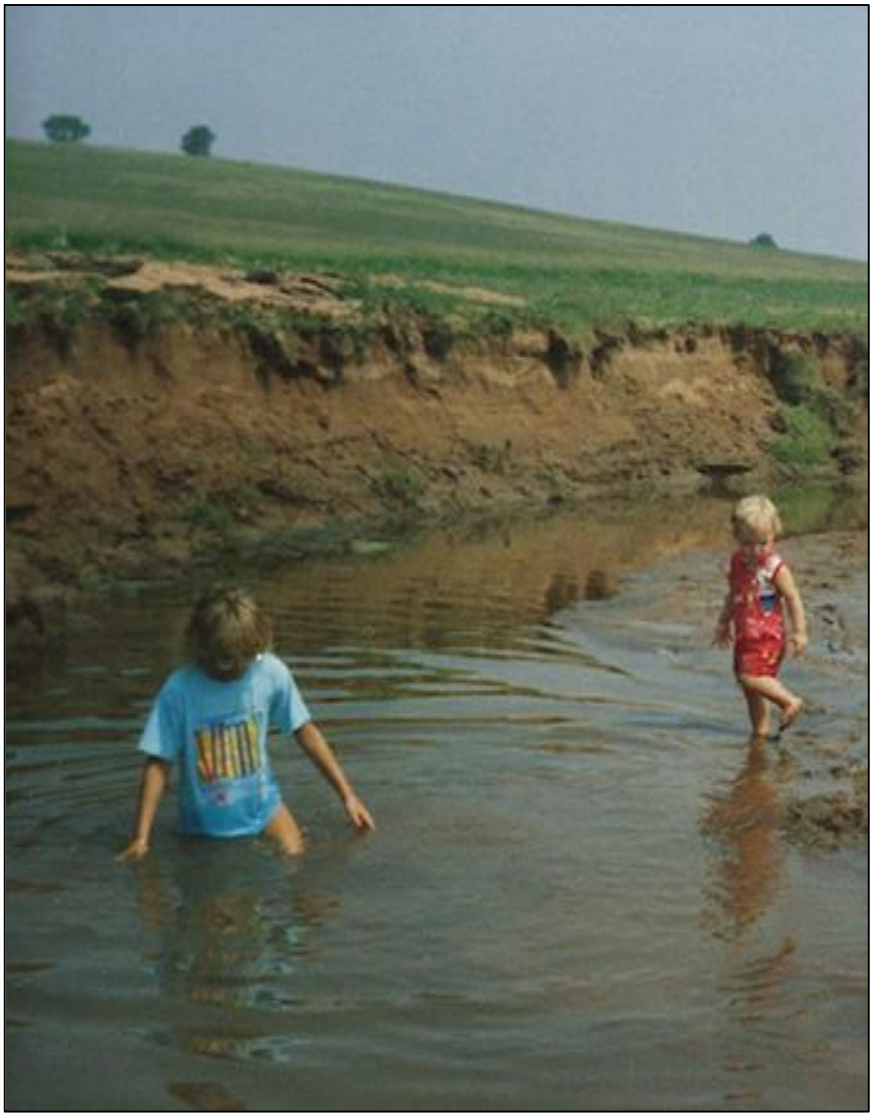
The Oklahoma Conservation Commission (OCC) is the technical lead managing agency with jurisdiction over and responsibility for directing NPS pollution prevention programs at the statewide level. The OCC is charged with identifying all waters impacted by NPS pollution and developing and implementing programs to correct any identified problems.

The Office of the Secretary of the Environment (OSE) is the administrative lead agency for the Oklahoma Nonpoint Source Program, and the state's liaison with the Environmental Protection Agency.

The OCC conserves Oklahoma's natural resources through a voluntary—***nonregulatory***—approach. The OCC has statutory jurisdiction over:

- monitoring, evaluation, and assessment of the state's *flowing, wadeable* surface waters to determine the extent of NPS pollution;
- soil conservation and erosion control;
- wetland protection and conservation strategy;
- environmental education; and
- assessment and conservation plan development and implementation.

The OCC works in collaboration with 88 Conservation Districts in every county to accomplish the functions above. The districts facilitate contact with landowners and local leaders who partner to implement water quality programs.



The conservation districts, with their Natural Resources Conservation Service/U.S. Department of Agriculture partnership, are vital to the success of Oklahoma's Nonpoint Source Program, as are other partners, many of whom are highlighted in this report.

In 2006, the Oklahoma State Legislature recognized the importance of the work done by the OCC and conservation district staffs by approving a long-overdue pay raise. This placed the agencies on scale with other State agencies doing similar work, and reinvigorated those working to protect the health of Oklahoma's natural resources, particularly in a challenging year of sizzling heat and scant precipitation.

Honey Creek

Two OCC divisions play a critical role in the NPS Management Program: The Conservation Programs Division and Water Quality Division.

Conservation Programs Division

≈ Provides technical assistance to conservation districts in three major program areas:
- upstream flood control,
- conservation cost-share, and
- conservation education.

≈ Assists conservation districts in the new construction, rehabilitation, operation, and maintenance of upstream flood control structures. These structures help reduce flooding and sediment delivery, which may also reduce downstream bank erosion.

≈ Administers the **Locally-Led Conservation Cost-Share Program**. This program, funded through the State Legislature, provides monies to conservation districts to install best management practices on private lands to reduce erosion and improve water quality.

Water Quality Division

≈ Works with conservation districts, universities, and other agencies to implement the state's NPS Management Program, including related best management practices and education.

≈ Chairs the **NPS Working Group**, composed of state and federal agencies, tribes, nonprofit organizations, and other groups with NPS interests in the state.

≈ Represents the NPS Program in various **working groups**, meetings, planning sessions, and program reviews related to water quality efforts in the state.

≈ Collects consistent, accurate, and complete **water quality data** by strictly following quality assurance protocols to generate outputs and reports.

≈ Assesses the **quality of aquatic systems** and habitats by collecting fish, macroinvertebrates, and physical and chemical data.

The OCC organizes NPS projects into four phases:

- **Planning**
- **Monitoring**
- **Education**
- **Implementation**

Helpful Facts

A **watershed** is an area of land from which water drains to a common lower point. Every waterbody receives water runoff from the land area around it, either from the surface or underground. This land area is called a watershed.

Oklahoma has **78,800 miles of streams** and over ***3 million people***.

NPS pollution occurs when rainfall, snowmelt, or irrigation water runs over land or through the ground, picks up pollutants such as pesticides, oil, animal or human waste, and deposits them into streams and lakes, or introduces them into groundwater.

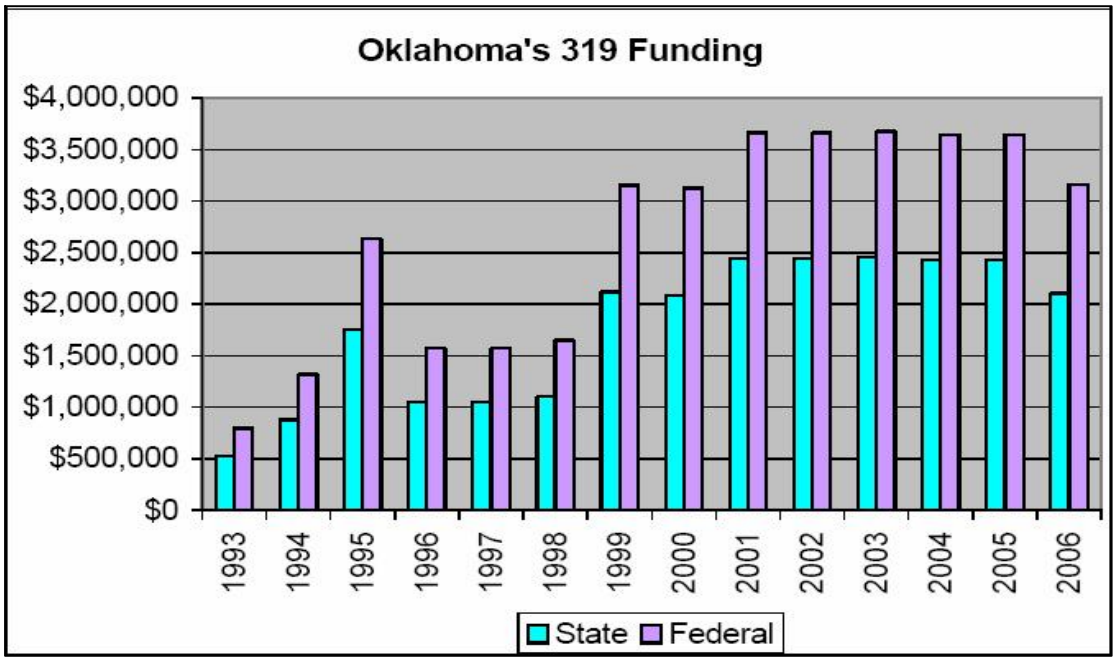
Planning

Financial Report

Oklahoma's Nonpoint Source Program

The **Federal budget** for the Oklahoma Nonpoint Source (NPS) Program grew from the FY1993 EPA 319(h) grant of $793,000 to the $3.15 million grant for the FY2006 program.

State Resources spent on NPS control have also grown from $529,000 in 1993 to $2.10 million in 2006. The State also provides $3,250,000 annually for operation of 88 conservation districts, which spend half of the funds on NPS pollution.



In 1999 State funding for a statewide NPS control effort grew substantially with the introduction of the Oklahoma Locally-Led Conservation Cost-Share Program.

Ft. Cobb watershed, Caddo County

Oklahoma Locally-Led Conservation Cost-Share Program

A State Cost-Share watering facility provides an alternative source of water for livestock, protecting stream areas.

In 2006, the Oklahoma Locally-Led Conservation Cost-Share Program continued providing financial assistance to landowners, via the Conservation Districts, to voluntarily apply water and soil conservation practices on their land.

Practices that specifically address water quality have been approved by EPA as match for the State's 319 Nonpoint Source Program.

The maximum rate of locally-led cost-share is 60 percent, and the landowners frequently provide more than the required 40 percent match to implement practices.

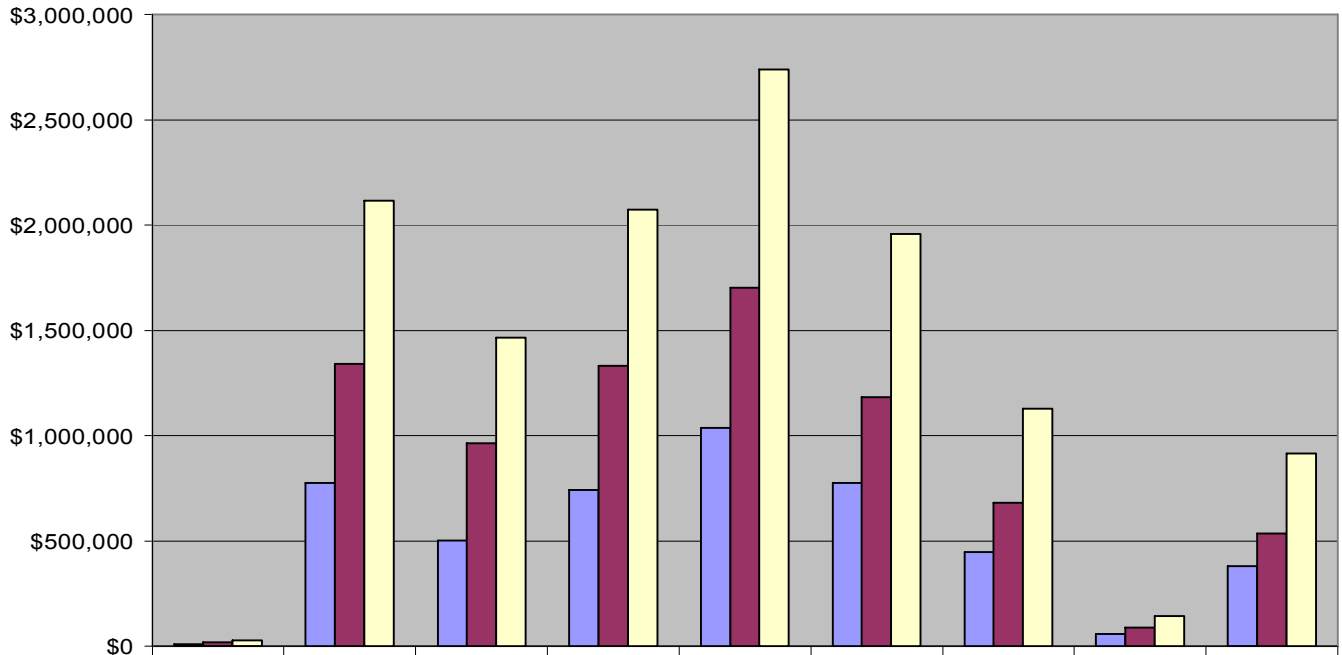
The pollution load reductions that have resulted from the program are difficult to quantify due to the large scale of the program and high number of practices implemented each year. However, use of the STEP L model estimates that a typical year of the **program could result in the following NPS load reductions statewide per year:**

- 534 tons of sediment,
- 2,621 lbs of phosphorus, and
- 9,617 lbs. of nitrogen

Practices installed through the program include:

- pond cleanings or constructions
- critical area plantings
- diversions
- fencings
- pipelines
- range seedings
- grade stabilizations
- grassed waterways
- pasture and hayland plantings
- pest management practices
- terraces
- water facilities for livestock
- wells
- water tanks
- nutrient managements
- well decommissionings
- brush managements

Oklahoma Locally-Led Conservation Cost-Share Program Funding



	FFY1997	FFY1998	FFY1999	FFY2000	FFY2001	FFY2002	FFY2003	FFY2004	FFY2005
Paid to participants	$10,218	$776,301	$500,693	$740,560	$1,036,350	$776,732	$447,917	$56,981	$380,431
Paid by participants	$17,539	$1,339,961	$965,382	$1,332,791	$1,702,860	$1,182,487	$681,309	$86,782	$534,404
Total Cost	$27,756	$2,116,262	$1,466,076	$2,073,351	$2,739,210	$1,959,219	$1,129,226	$143,763	$914,835

This stream is not protected by a riparian buffer. Research has shown that maintenance of a natural buffer of vegetation between agricultural or otherwise developed land and a stream can reduce pollution to that stream by up to 90 percent.

Conservation Reserve Enhancement Program (CREP)

The OCC continued working with the State and USDA in 2006 to garner support for The Conservation Reserve Enhancement Program (CREP). This program will sign-up and **assist farmers in priority watersheds** to install riparian buffers on their property.

The Conservation Reserve Enhancement Program (CREP) is a partnership between State (including local and state government, nonprofit groups and industry) and Federal Partners (USDA FSA and NRCS) to protect and improve water quality by retiring environmentally sensitive land from agricultural production for up to fifteen years.

The program will extend the success of current 319 programs, both in duration and extent, by allowing states to "enhance" their ongoing Conservation Reserve Program to meet specific needs and encourage more farmers to sign-up.

The program will invest approximately **$67,000,000 of Federal, State, and other partner dollars. The federal dollars require a 20 percent non-federal match from the State.**

Soil and Water Assessment Tool (SWAT)

With the support of EPA Region VI and Oklahoma State University Department of Biosystems and Agricultural Engineering, OCC continues to develop more precise methods of **targeting landowners that should be eligible for OCC programs** based on whether their land is likely a significant contributor to pollutant loading in the watershed.

The Soil and Water Assessment Tool is vital to planning and implementing OCC's conservation projects.

During 2006, the OCC worked with partners to complete targeting in the

- North Canadian River watershed from Canton dam to Lake Overholser. Results will be incorporated into a watershed based plan for the area.
- Oklahoma portion of the Grand Lake Watershed and the Honey Creek watershed in Missouri and Arkansas. These results are guiding implementation of the 2006 Honey Creek watershed implementation project, and will be used in future Grand Lake projects.
- Lake Thunderbird watershed. The results will be incorporated into the watershed based plan for upcoming 2007 projects in the watershed.
- Turkey Creek watershed. The results will be incorporated into a watershed based plan and used in future projects.

Monitoring

Nonpoint Source (NPS) Assessment Program

The NPS Assessment Program identifies the location and extent of NPS-related water quality problems in Oklahoma waters. Assessment by monitoring also helps focus NPS Program planning, education, and implementation efforts in areas where they can be most effective.

In 2006, the OCC monitored more than 190 sites through the Rotating Basin Monitoring Program, Blue Thumb Volunteer Monitoring Programs, Lake Eucha Priority Watershed Implementation Projects, and the Peacheater Creek National Monitoring Program.

Many State agencies use comprehensive, statistically sound, methods to monitor and evaluate the condition of the State's waters including background, diagnostic, implementation, and success monitoring.

Ongoing monitoring programs by **State agencies** in 2006 included:

- OCC monitoring efforts,
- Oklahoma Department of Agriculture pesticide and groundwater sampling,
- Oklahoma Department of Environmental Quality sampling, including biological sampling for fish flesh analysis, and
- Oklahoma Water Resources Board Beneficial Use Monitoring Program and Statewide Probabilistic Monitoring Program.

Monitoring programs were also conducted by **Federal partners** in 2006**,** including the:

- Army Corps of Engineers,
- U.S. Geological Survey,
- U.S. Fish and Wildlife,
- Bureau of Reclamation, and
- Environmental Protection Agency.

2006 Accomplishments

- Collected water quality, fish, and macroinvertebrate samples, and conducted habitat assessments on priority streams.

- Continued the Quality Assurance Program, which conducts quarterly calibration sessions for field staff, annual field audits, and annual fish I.D. training to assure accurate data.

- Assisted with fish collections and assessed fish communities at Blue Thumb monitoring sites.

- Continued bacterial source identification monitoring in the Eucha/Spavinaw watershed.

- Expanded monitoring partnerships with peer agencies, including continued collaborative efforts with the OWRB to develop and implement a probabilistic monitoring program, which OCC is incorporating into its Rotating Basin Monitoring Program.

OCC staff and volunteers monitor year-round, rain or shine--or snow! North Canadian River.

Collected fish, like this large mouth bass, provide important information about a stream's health.

Oklahoma's Rotating Basin Monitoring Program

Oklahoma is committed to systematically identifying waters impaired by nonpoint source pollution. The Rotating Basin Monitoring Program comprises physical, chemical, and biological sampling of 300 priority streams in Oklahoma grouped by planning basin. Monitoring is conducted by basin in a rotational manner allowing coverage of the entire state in five years. Each basin is monitored for two years. 2006 marks the end of the first rotation and the beginning of the second cycle through the basins. Final reports summarizing Year 2 and Year 3 basin streams were submitted to the EPA in 2006.

OCC staff use a seine to collect fish while monitoring Bear Creek.

Purpose

- Ascertain the beneficial use support status of wadeable streams in the specified watersheds,
- Collect information on nonpoint sources of pollution,
- Gather data for planning and implementing restoration,
- Evaluate success of implementation and education efforts, and
- Provide sound information to define where programs should concentrate remediation and education efforts.

Year	Year/ Phase	Paired basins monitored under Oklahoma's Rotating Basin Monitoring Program
2001	1	Upper Canadian and Neosho
2002	2	*Upper Canadian and Neosho*
		Upper North Canadian, Cimarron, and Upper Arkansas
2003	3	*Upper North Canadian, Cimarron, and Upper Arkansas*
		Lower North Canadian, Lower Canadian, and Lower Arkansas
2004	4	*Lower North Canadian, Lower Canadian, and Lower Arkansas*
		Washita and Upper Red
2005	5	*Washita and Upper Red*
		Lower Red
2006	6	*Lower Red*
		Upper Canadian and Neosho

Oklahoma's Statewide Probabilistic Monitoring Program

The probability-based survey was designed to assist Oklahoma's water quality managers in several ways:

1. It allows the state to make a statistically valid assessment of the condition of all of Oklahoma's streams/rivers using data from an adequate subset.

2. The survey assists in long- and short-range planning and resource allocation. When integrated with fixed-station networks such as the Rotating Basin Program, it will assist in identifying local areas of concern.

3. It allows for the assessment of more waters of the state.

To date, two CWA Section 104(b)(3) grants and state monies have supported the study.

Each year of the study includes at least 1 of Oklahoma's 11 planning basins (27 sites) plus 15 statewide sites. Study year's 4 and 5 are still in the planning stage. The study collects a wide a range of chemical, physical, biological, and habitat data.

The study is being conducted with the cooperation of the Oklahoma Water Resources Board, Oklahoma Conservation Commission, and Office of the Secretary of the Environment.

Distribution and number of Probabilistic Monitoring sites per year over years 1-3 of study

Study Year (SY)	Planning Basin	Sites
SY-2005 (1)	Lower Red River	27
	Statewide Stations	15
SY-2006 (2)	Grand-Neosho River	15
	Upper North Canadian River	5
	Upper Canadian River	7
	Statewide Stations	15
SY-2007 (3)	Upper Arkansas River	10
	Lower Canadian River	6
	Cimarron River	11
	Statewide Stations	15
SY-2006-2004	**Total Stations**	**126**

Oklahoma's Beneficial Use Monitoring Program (BUMP)

In 2006, the Oklahoma Water Resources Board BUMP continued to monitor 100 stream and river sites around the state approximately every five weeks. The program also collected quarterly samples on 35 lakes during the past year (43 were scheduled but due to drought conditions were inaccessible).

Collections are made for a variety of parameters. The streams program has begun a comprehensive biological monitoring program collecting fish, benthic macroinvertebrate, and habitat data.

The annual BUMP report is typically distributed in March-April of every year and provides an assessment of the attainment of beneficial uses for all sites. Future reporting will also include comprehensive trend analysis.

Bird Creek in Tulsa County has had a BUMP monitoring station on it since 1998.

Collected data is used in all stages of the Nonpoint Source Program.

Education

Education is a major tool used to address nonpoint source pollution (NPS). In 2006, several agencies provided numerous outreach programs in the field, at meetings, and special events across the state to educate adults and children about the effects and prevention of NPS pollution. (Photos courtesy of OK NRCS).

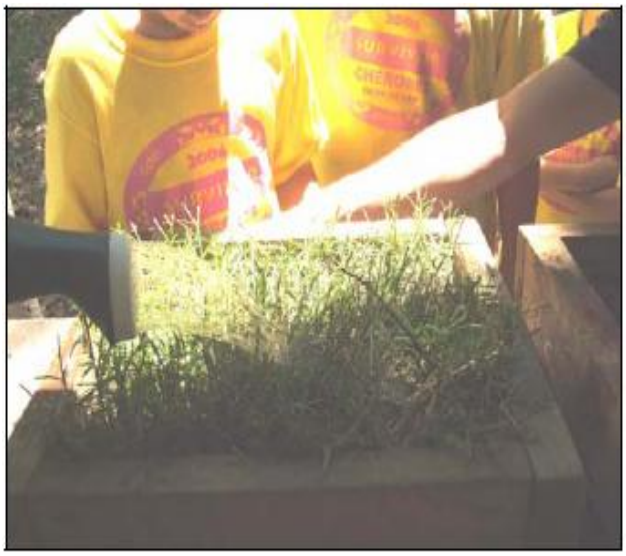
Over 275 participants attended the Southern Plains No-Till Seminar first annual meeting in Hollis.

Emmet Rackley, Soil Conservation Technician, providing experience to Langston students in the fine art of setting up a level.

Wes Lee, OSU Extension Service, uses the Stream Hydrology Table to demonstrate the effects of soil erosion by water at Garvin County's Natural Resources Day for fourth graders.

Greg Hartman, Beckham County Extension Agent, discusses the importance of fresh water and illustrates with a water quality model at Beckham County's Outdoor Classroom for fifth graders.

Emmet Rackley, Soil Conservation Technician, and Dwight Guy, USDA, explain an exercise to the Water Quality class at Langston University.



This demonstration by NRCS/Conservation District personnel shows the erosion difference between bare soil and vegetated soil.

Aaron Henson, OSU-Extension, demonstrates the effect of various changes in a watershed on water movement and erosion at Natural Resources Day at Hackberry Flat in Tillman County.

In 2006, OCC again offered a fish identification course to interested State, Tribal, and local partners. The fish ID course serves as an annual QA session, ensuring accuracy and consistency among fish identification and collection methods among agencies. The course allows OCC staff to share their considerable knowledge about fish identification and collection methods with other entities.

Kim Shaw, OCC Blue Thumb, uses a watershed model to show children at Apple Jacks Daycare what NPS pollution is, and where it comes from (OCC photo).

Gary King, a farmer on the West Caddo CD in the Ft. Cobb/Cobb Creek watershed, points out a riparian area to participants at a farm tour demonstration project held on his family's property (OCC photo).

Blue Thumb

Blue Thumb is a nationally recognized nonpoint source pollution education and water monitoring program for adults and children.

The Blue Thumb Program is an important conduit between the Oklahoma Conservation Commission, the Conservation Districts in each county, and local citizens. In addition to its general role as an education program, Blue Thumb plays an important role in directing and implementing education in priority watershed projects. This includes everything from developing volunteer monitoring programs and providing NPS education to producers, citizens and youth, to directing the Education Watershed Advisory Group that helps decide what types of education should occur in watersheds and how best to reach the target audience.

Blue Thumb's 465 volunteers include an array of student groups, neighborhood and community groups, Girl and Boy Scout troops, families, couples, and individual citizens doing their part to protect water quality in the state.

Volunteers undergo rigorous training where they learn sampling methods, use of kits for sample analysis, and related safety and procedural lessons. The training also provides background on NPS pollution, aquatic ecology, and best management practices for water protection.

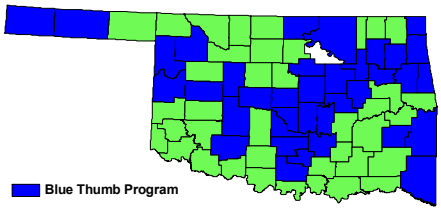
Water quality monitoring is an important part of most Blue Thumb programs, which require a substantial commitment from volunteers, including at least monthly water quality sampling of a stream and quarterly quality assurance checks.

Tulsa area volunteers learn about aquatic insects from Cheryl Cheadle, Blue Thumb Program Director, at Blue Thumb training.

Eighth-grade Blue Thumb volunteers from Hodgens Middle School pose for a picture while monitoring the Black Fork of the Poteau River. Also shown are OCC staffers Wes Shockley (far left) and Nicole Norris (far right). Latimer County Conservation District Technician Robert Hunnicutt is standing between the two white measuring poles.

In 2006 Blue Thumb volunteers monitored 100 streams in 37 counties in Oklahoma. The goal is to have a Blue Thumb group in all 77 counties in the state.

Current Blue Thumb Counties



Volunteers assess the habitat of Bear Creek with BT Coordinator Kim Shaw.

2006 Accomplishments

≈ Conducted 5 volunteer training sessions in Tishomingo, Tulsa, Oklahoma City, Lawton, and Grove.

≈ Conducted quarterly QA sessions to help assure both the volunteers and BT staff that the data collected were of acceptable quality.

≈ Held 2 aquatic macroinvertebrate collection and "bug picking" training sessions.

≈ Held groundwater screenings to help homeowners identify potential concerns with their well water.

≈ Continued wetlands monitoring.

≈ Conducted fish collections on 24 streams in 13 counties.

≈ Wrote and distributed the quarterly *Blue Thumb Prints* volunteer newsletter.

≈ Conducted 2 data interpretation sessions for volunteers from across the state.

≈ Staffed education tables and/or made presentations at more than 30 events across the state.

≈ Continued outreach to tribes and businesses.

≈ Completed a Program website: **www.ok.gov/okcc/Agency_Divisions/Water_Quality_Division/Blue_Thumb/**

Gizzard Shad collected from Wolf Creek, Ellis County. Fish are an excellent indicator of water quality.

Volunteers collect a sample of macroinvertebrates in Chisolm Creek, Oklahoma County. The sample results will be an indicator of the creek's water quality.

Volunteers conduct a groundwater screening session in Chandler with the Prague FFA.

Implementation

During 2006 the OCC Water Quality Division had over thirty active projects including 319 NPS and 104(b)(3) wetlands grants. One of the most effective aspects of the NPS Program is the demonstration of pollution prevention and abatement techniques.

Watershed Implementation Projects

In addition to other projects, such as the Fort Cobb Reservoir No-Till Project, the OCC Water Quality Division and partners worked on several Watershed Implementation Projects, each in a different phase of its 5-year duration.

Each Project focuses on the problems and needs of a particular watershed and its citizens, and is usually a collaborative effort between several agencies.

The purpose of the projects is to improve water quality and/or riparian health. Demonstrating best management practices within the watersheds is a way to educate landowners by showing them ways to reduce NPS pollutants entering waterways from their property or community.

Although funding for projects is temporary and limited, the year-to-year activities of the conservation districts and other local interests continue.

It is the intent of these projects to demonstrate methods people can ***continue*** to use in their regular activities that will benefit watershed health in the long term.

Deeply incised and sloughing banks are common in the Ft. Cobb watershed.

Ft. Cobb Reservoir
No-Till Implementation Project

2005-2008

Building upon the success of the 2001 Ft. Cobb/Cobb Creek Reservoir Watershed Implementation Project, this project is attempting to convert 35,000 acres of cropland to "no-till" cropland in the Fort Cobb watershed. The conversion partially fulfills the TMDL recommendation that 50%, or approximately 51,000 of the 101,000 acres, of cropland need to be no-till to achieve phosphorous load reductions. Implementing no-till could eventually lead to a 12% reduction of phosphorus loading to the watershed.

2006 Accomplishments

≈ Held initial and second sign-ups for landowners and farmers.

≈ Began contacting landowners and developing farm plans.

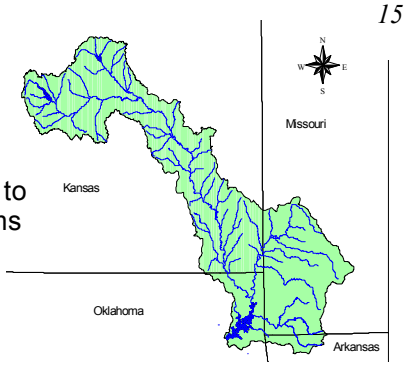
≈ Coordinated no-till demonstrations for four conservation districts.

The TMDL completed for the Fort Cobb Reservoir by ODEQ in 2005 was the first based entirely on nonpoint source pollutants. The practices implemented by projects in the watershed are based on the TMDL, which recommends a 70% reduction in phosphorous loading to the reservoir requiring:

- 50% of the wheat and row crop in the watershed is converted to no-till,
- 20% of the worst cultivated land is converted to pasture,
- 60% of the watershed has riparian buffers,
- 90% of the producers implement nutrient management planning,
- grade stabilization structures are put in place to allow these practices to be effective.

Grand Lake

Watershed Implementation Project 2004-2008



This project educates and demonstrates to citizens, students, and municipal officials ways to reduce nutrient, sediment, and fecal bacteria pollution flowing from land into nearby streams and Grand Lake.

Background
The Grand Lake basin encompasses portions of Arkansas, Kansas, Missouri, and four counties in northeastern Oklahoma, draining a total area of 10,298 square miles. Three major rivers, the Neosho River, the Spring River, and the Elk River drain into the lake. The lake itself covers 46,500 surface acres.

Water Problems
Grand Lake is impaired by excessive nutrients from confined animal operations, residential fertilizers, and poorly functioning septic systems. Grand Lake and eleven of its tributaries are listed on the Oklahoma 2002 Integrated Report Category V List for **pathogens, low dissolved oxygen, turbidity, pH, sulfate, total dissolved solids, chloride, and unknown causes.**

Purpose of Project
The Grand Lake project improves near-lake land uses and water quality by implementing 1) nutrient management projects for lawns and gardens, 2) soil evaluations for septic systems, 3) biofilter raingardens for filtering runoff, and 4) expanded monitoring of lakes and streams.

Volunteers prepare a demonstration garden for planting. The garden is used as a nutrient-management demonstration project at the Grand Lake Visitors Center.

An instructional soil pit is used to teach participants about soil profile evaluations for septic system installations.

Source: Michael Clar, P.E., Ecosite, Inc., Ellicott City, Maryland
Working biofilter rain garden in an urban application. The gardens hold stormwater, filtering it as it soaks into the ground or is released through evapotranspiration.

2006 Accomplishments

- Completed 3 soil profile workshops to educate local officials, agency employees, area septic system installers, and developers about the benefit of performing soil profiles instead of percolation tests to evaluate the suitability of septic system installation.
- Conducted a recertification course for current soil profilers.
- Added water quality education to the Delaware County Master Gardener Course offered by the OSU Cooperative Extension.
- Held a collaborative training with Blue Thumb and Oklahoma Water Watch Volunteers.
- Completed phase I of the demonstration garden located at the Grand Lake Association Visitors Center. The garden highlights nutrient management practices.
- Completed plans for construction of 9 rain gardens to begin in 2007.
- Developed a project website: **http://grandlakefun.com/cleargrand**

Partners
OK Conservation Commission
U.S. Environ. Protection Agency
Office of the Secretary of the Environ.
The Grand Lake Association
OSU Cooperative Extension
U.S. Dept. of Agriculture/NRCS
OK Water Resources Board
Grand River Dam Authority
City of Grove
Delaware Co. Master Gardeners
Mayes Co. Conservation District
Craig Co. Conservation District
Ottawa Co. Conservation District
Delaware Co. Conservation District

Spavinaw Creek

Watershed Implementation Project 2003-2008

Due to the success of the nearby Beaty Creek watershed project, in 2006 there was a waiting list of people anxious to participate in this project. Popular BMPs selected by cooperators so far are wells, watering facilities, cross fencing, and waste storage buildings. To date, $840,551 has been spent on BMPs in the watershed, of which $506,000 was paid to cooperators for their cost share percentage.

Lake Eucha in northeastern Oklahoma

Background
The Spavinaw Creek Watershed comprises 200 square miles located in the poultry and cattle producing area of northeastern Oklahoma. It is a subwatershed of the Lake Eucha Watershed. The cities of Tulsa and Jay, Oklahoma depend on Lake Eucha to supply approximately 400,000 people with drinking water and high quality recreational areas.

Water Problems
Excess nutrients and riparian degradation have been identified as the main causes of water quality impairment in the watershed. Lake Spavinaw is listed on the 2002 303(d) List of Impaired Waters as **impaired by phosphorous and dissolved oxygen.**

Purpose of Project
The project initiates a watershed scale effort, aimed at landowners, to reduce nonpoint source loading to Spavinaw Creek from private land by helping landowners implement best management practices.

2006 Accomplishments

- Obligated most of the project funds and ranked unfunded applicants to receive contracts as additional funds become available—anticipated in early 2007.
- Conducted 2 tours of the 196-acre demonstration farm for poultry producers and the public.
- Completed a majority of the demonstration farm projects, including a pond, wells, watering facilities, and a stream crossing.

This stream crossing was stabilized with re-engineering and rock to prevent further erosion.

- Exported 10,313 tons of poultry litter from the watershed and worked with growers and buyers to increase hauling awareness and participation.

Partners
OK Conservation Commission
U.S. Environ. Protection Agency
Office of the Secretary of the Environ.
U.S. Dept. of Agriculture/NRCS
Delaware Co. Conservation District
Benton Co. Conservation District
Washington Co. Conservation District
Delaware Co. Cooperative Extension
OK Dept. of Wildlife
OK Dept. of Ag., Food and Forestry
OSU Cooperative Extension Service
OSU Agricultural Experiment Station
OK Water Resources Board
City of Tulsa
Kansas Public School, Tulsa
Arkansas Cooperative Extension

A feeding facility for cattle was a BMP installed for this project. The facilities concentrate animal waste away from nearby waterways.

Landowners attended a demonstration farm tour to see best management practices at work.

Cobb Creek/Fort Cobb Reservoir

Watershed Implementation Project 2001-2006, extended to 2007

2006 would have marked the final year of this project, but it is difficult to assess the effectiveness of BMPs in the absence of rain! Therefore, the EPA granted a one year extension. In spite of difficult weather, the program was very successful in demonstrating conservation practices proven to improve water quality. More landowners elected to install BMPs in 2006 than in any other year of the project.

Grade stabilization structures divert water to prevent gully erosion and provide water for cattle.

Best Management Practice (BMP) Installed	2006	Project Total
Planted grass to convert cropland to pastureland	3,056 acres	6,049 acres
Erected fencing to protect riparian areas of streams	3.3 miles	7.7 miles
Installed grade stabilization structures	13	35
Installed terraces	500 feet	7000 feet
Converted gullies to grass waterways	1500 feet	8800 feet
Installed creek jacks to restore severely eroded stream banks	0	30
Repaired, updated, or replaced septic systems	0	5

Background
The Fort Cobb Watershed covers 314 square miles in southwestern Oklahoma in Caddo, Washita, and Custer Counties. Land use in the watershed is primarily agricultural with wheat, peanuts, sorghum and cotton crops, a confined hog operation, and rural communities.

In 2005, the Oklahoma Department of Environmental Quality completed a TMDL for Fort Cobb Reservoir, recommending a 70 percent phosphorus load reduction from the loading levels documented between 1998 and 2001.

Anticipating that load reductions would be necessary, in 2001 OCC began this project as a pre-emptive program to address loading and to demonstrate BMPs to landowners.

Water Problems
Failing septic systems, run off from confined animal feeding operations, and agricultural practices are thought to impair the water by causing or contributing nutrients, silt, phosphorous, pathogens, low dissolved oxygen, and turbidity. Fort Cobb Reservoir and six stream segments in its watershed are listed on the 1998 303(d) List of Impaired Waters as **impaired by nutrients, pesticides, siltation, suspended solids, and unknown toxicity.**

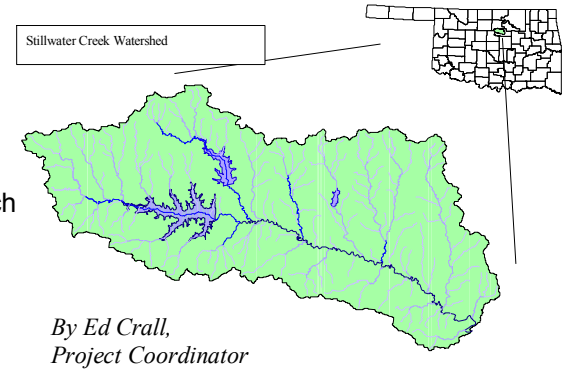
Purpose of Project
The purpose of this project is to improve water quality by educating landowners about best management practices and financially assisting them to implement the practices aimed at protecting riparian areas and reducing nutrient and sediment loads to streams.

2006 Accomplishments
The STEP L model estimates that BMPs have reduced phosphorous loading by 3,990 pounds and prevented 533 tons of sediment from entering the creek and reservoir.

Partners
OK Cooperative Extension Service
Deer Creek Conservation District
West Caddo Conservation District
North Caddo Conservation District
Mountain View Conservation District
OK Conservation Commission
U.S. Department of Agriculture/NRCS
Farm Services Agency
OK Corporation Commission
OK Dept. of Agriculture/NRCS
Bureau of Land Reclamation
Agricultural Research Service
OK Dept. of Environmental Quality
OK Water Resources Board
U.S. Environ. Protection Agency
Office of the Secretary of the Environ.

Stillwater Creek

Watershed Implementation Project 2001-2006



Best Management Practices (BMPs) installed for this successful project, which ended in 2006, included many traditional conservation practices used on agricultural land as well as upgrades of some septic systems for rural single-family residences. The Step L model estimates BMPs have reduced phosphorous input to the creek by 242 pounds and sediment by 73 tons.

By Ed Crall,
Project Coordinator

Aerobic Septic Systems
The conversion of failing septic systems to aerobic systems was probably the most effective practice installed as a part of this project. Most of the soils in the Stillwater Creek watershed do not percolate adequately for the lateral lines commonly installed to disperse the effluent from septic tanks properly. Therefore, the installation of aerobic systems was included as a best management practice for this demonstration project. An aerobic septic system consists of a three stage septic tank and a surface application area.

Grade Stabilization Structures and Ponds
The most popular best management practices of the Stillwater Creek project in the agricultural areas of the watershed were grade stabilization structures and ponds. Depending upon the location, the terrain, the design, and the needs of the landowner, some of each of these were installed to control gully erosion and to provide water to livestock.

Freeze-Proof Tanks for Watering Livestock
An additional practice that fit well with most ponds and many grade structures was the inclusion of freeze proof tanks for livestock watering. These tanks use embankments of soil and a small stream of continuously flowing water to keep water available for the livestock during periods of freezing weather. Installing a freeze proof tank enables an exclusion fence to be built around the pond, thus protecting the water from the degrading influences of overgrazed banks, and livestock loitering in the water.

Aerobic septic systems have been a popular component of the project and have created a great deal of awareness about water quality among the residents of the watershed's many rural subdivisions.

Cropland Conversion to Grassland
Converting cropland to grassland was accomplished by planting a permanent cover of grass and installing riparian exclusion fences. Several acres of cropland were planted to permanent grass vegetation; however this practice has been severely impacted in a negative way by the drought that is continuing to plague the area. The installation of riparian exclusion fences was hampered by a shortage of fencing contractors and the rapid escalation of the cost of fence materials over the last few years.

The Stillwater Creek watershed includes the Stillwater metropolitan area, which is an area rapidly growing new subdivisions and all the other related urban sprawl. This rapid growth has the potential to require additional projects and programs to maintain and enhance the quality of water leaving the watershed.

Freeze-proof tanks (l) use embankments of soil and a small stream of continuously flowing water to keep water available for livestock in freezing weather. The tanks allow fencing of ponds (r), which protects the ponds from the effects of loitering cattle.

Partner Highlights

Several agencies worked collaboratively and independently in 2006 to implement programs under the Nonpoint Source Program. Here are some highlights.

Oklahoma Conservation Commission (OCC)

Demonstration Project: Technology for Converting Poultry Waste to Energy and Chemical Products

Initially set to expire in May 2004, this project has been extended repeatedly due to delays in obtaining a building site and permits. Major accomplishments in 2006 included obtainment of building and environmental permits from the Department of Environmental Quality, preparation of the building site and initiation of construction. When complete, the site will house a waste-processing facility for converting poultry waste to energy and chemical products. The project is scheduled to continue through 2007.

Monitoring Edge of Field Phosphorous Loss to Validate a Phosphorous Loss Index for the Spavinaw Creek Watershed

This FY2002 project is 60 percent complete in its fourth year. In 2006, OCC received the EPA's approval of the Quality Assurance Project Plan and initial data collection began with flumes and automatic samplers to capture nutrient loads from storm events.

This project supplements other ongoing and proposed data collection studies to perform a comprehensive validation of the new common P Loss Index. This P Loss Index models phosphorus loss from individual fields using a localized Soil and Water Assessment Tool (SWAT) model.

In later stages of the project, materials will be developed to educate the general public and local growers about phosphorous.

Poultry Litter Transport from the Illinois River Watershed (Oklahoma) to Non-Nutrient Limited Watersheds

In 2006, OCC and partners arranged for 32,814 tons of poultry litter to be hauled out of the Illinois River watershed, providing subsidies to transporters and growers. Removing the litter prevents further phosphorous loading to the nutrient-limited Illinois River watershed.

Use of Fluvial Geomorphology to Restore Streambank Stability to a Section of Honey Creek in Delaware County Oklahoma

Post-implementation monitoring began in 2006 to determine the success of this stabilization project. This FY2002 project improved channel characteristics and in-stream habitat at the Honey Creek site with the following objectives in mind:

1) increase abundance of wetlands habitat;
2) improve living conditions for biota;
3) reduce property loss from accelerated erosion; and
4) improve flow and sediment transport regimes.

Prior to the project the stream site was moving two feet laterally per year, which inferred significant channel instability.

Monitoring and landowner tours will continue through 2007.

Channel stabilization project at Honey Creek in northeastern Oklahoma

Lake Carl Blackwell in northeastern Oklahoma

Oklahoma Water Resources Board (OWRB)

Grand Lake Watershed Implementation Project

OWRB with funding from GRDA is introducing aquatic plants to Grand Lake with help from the Lewisville Aquatic Research Facility and Oklahoma Dept. of Wildlife Conservation (ODWC). While the primary goal is to mitigate fish and waterfowl habitat in the watershed, erosion control and improved water quality are additional benefits gained from this project. With the use of plastic coated wire, over 600 cages and pens have been built at 11 sites around the lake to provide long-term protection from carp, turtles and other herbivores in the lake. These cages of plants termed "founder colonies" have been planted with 25 native species of aquatic emergent and submergent plants beneficial to fish and waterfowl. These long-term founder colonies will stay in place for several years sending out seeds and fragments slowly but surely populating the lake. Once established these plants will protect the shorelines of these and other coves around the lake from wave action and actually trap sediment being washed in from surface runoff.

A similar project is being implemented by OWRB and Oklahoma City. A 104(b)(3) Wetlands Grant from EPA is being used to introduce aquatic plants to **Stanley Draper Lake** with help from ODWC. While the primary goal is to increase wetland acreage in the watershed, erosion control and improved water quality are additional benefits gained from the project.

Erosion Control project at Lake Carl Blackwell, Stillwater Creek Project

OWRB in cooperation with the OSU Lake Carl Blackwell staff and with EPA 319 funding implemented bio-engineered erosion control measures at Lake Carl Blackwell near Stillwater Oklahoma. 250 feet of a badly eroded escarpment was armored with large degradable fiber filled logs. These logs and the bank were then planted with black willow shoots and aquatic plants that will fill in over time and permanently stabilize the eroded bank. More aquatic plants such as softstem bulrush and American pondweed were caged and planted further out in the water. These will, over time, fill in to create a buffer to the shoreline as they dissipate incoming waves.

Water Quality Standards Revision Process Continues

The main NPS-related topics for the 2006 OWRB Water Quality Standards revision process included Nutrient Criteria for Eucha and Spavinaw lakes, a newly designated Nutrient Limited Watershed and second attempt to promulgate Sediment Use Support Assessment Protocol (USAP). Public meetings for USAP were held in August, September and October of 2006. Additional meetings were held in October and November. This process will culminate in a formal hearing in January 2007. The USAP allows the use of habitat data to determine whether the biological impairment of a waterbody is related to sedimentation.

First Ever Joint Training Held between the Two Oklahoma Volunteer Monitoring Groups

A first ever joint training was held between the two Oklahoma volunteer monitoring groups: **Oklahoma Water Watch (OWW)** and Blue Thumb, as part of the Grand Lake watershed project. Approximately 15 participants were informed about the Blue Thumb stream monitoring and the OWW lake monitoring protocols. Basic limnology, stream ecology, and non-point source watershed concepts were also covered. Meetings were also held to plan an additional joint training. Total Phosphorus and Total Nitrogen sample collection protocols for volunteers are also in the process of being drafted for the wide network of OWW volunteers at Grand Lake and will be implemented in spring of 2007.

Oklahoma Water Watch volunteer training at Grand Lake in northeastern Oklahoma.

Office of the Secretary of the Environment (OSE)

Water Quality Training

The OSE coordinated a conference for environmental volunteers entitled "Pulling Together: A Stewardship Conference for Environmental Volunteers" held June 26-27, 2006 at the Wichita Mountains National Wildlife Refuge. The conference was designed to benefit volunteers who had a particular interest in water quality issues with a combination of education, recognition, motivation and networking for the volunteers. Also, as part of a tribal training series, OSE coordinated a class on basic water quality in July, and a quality assurance training session in August. The primary objective of the training series is to provide comprehensive water quality monitoring training for tribal environmental staff.

OK Department of Environmental Quality (ODEQ)

TMDL and Data Accessibility Projects Continue

The ODEQ continued to work on Total Maximum Daily Loads (TMDLs) for the State. ODEQ also continues to improve access to and visibility of the State's Water Quality Data through their online data viewer and GIS map. A Total Maximum Daily Load is a calculation of the maximum amount of a pollutant a waterbody can receive and still meet water quality standards.

Well Decommissioning to Prevent Groundwater Contamination

Annually, the partnership of the NRCS Boise City Field Office, Cimarron County Conservation District, and Oklahoma Water Resources Board (OWRB) join forces to encourage local farmers and ranchers to utilize the well decommissioning practice by holding onsite demonstrations.

In 2006 the field office and District collaborated with the OWRB personnel to oversee the decommissioning of a 161-foot irrigation well with 20-inch casing and two livestock wells, each 50-feet deep and 50 or more years old. The EQIP Ground and Surface Water Conservation Program provided cost-share for the projects. To assist the producers, NRCS and the District measured the depths of the wells and figured materials needed for the decommissioning. These annual projects help protect groundwater in the Ogallala Aquifer.

Deer Creek

Indian Nations Council of Governments (INCOG)

Regional Urban Stormwater Program

City and County stakeholders in northeast Oklahoma joined INCOG's "Green Country Stormwater Alliance" to receive regional assistance in developing and implementing urban stormwater protection programs. Education materials and display boards were developed for local meetings. Work Groups for ordinances and inspections identified optimal strategies for controlling illicit discharges from a variety of urban sources and construction sites. INCOG also developed a comprehensive Quality Assurance document for stormwater data collection and management. Stakeholders began collecting map and stormwater system data and performing inspections. Regional training by INCOG is planned for next fiscal year, along with adoption of local ordinances and implementation of inspection programs.

INCOG's Oklahoma Stream Team

The Oklahoma Stream Team worked with the OSU Botanical Gardens over many months to amend the Master Plan to incorporate a comprehensive suite of BMP demonstration areas and research facilities showcasing Low Impact Development (LID) options and Green Building construction BMPs. If funded, this one site can be used to educate the public and building professionals on the latest low impact development and green construction techniques for protecting water quality by treating and reducing runoff. The Stream Team also assisted the City of Norman with hosting a one-day stream restoration and bioremediation seminar, and provided speakers on the same topics at the Resource Management Conference in Tulsa. The Oklahoma Stream Team is an association of Federal, State and local environmental agencies devoted to providing communities, planners and developers with realistic options for stream modification and stormwater management projects that protect and enhance water quality.

Natural Resources Conservation Service (NRCS)

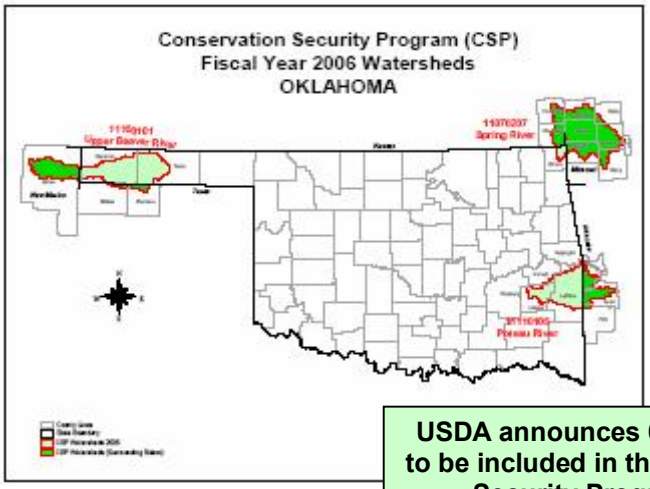
The partnership between the NRCS, OCC, and State Conservation Districts was stronger than ever in 2006. NRCS delivered over $109 million to conservation in Oklahoma, including over 6000 payments to landowners and producers for implementation of best management practices that protect natural resources.

State Watershed Boundary Coverage Map Completed

OK NRCS GIS and Water Resources sections completed the statewide Hydrologic Unit map that will become part of a national Watershed Boundary Dataset. Once certified, the coverage will become part of the national seamless watershed boundary dataset. Eleven states are currently certified.

Environmental Quality Incentives Program (EQIP)

In 2006 NRCS/USDA allocated over $22 million in financial assistance at county level and statewide through EQIP. The program continued to fund animal waste management applications statewide, including closure of livestock waste storage ponds, manure transfer, and nutrient management conservation practices that protect water resources.



Rapid Watershed Assessment Maps

The GIS section continued work on maps in the rapid watershed assessment model. The maps show land use, soil capability class, miles of streams, land use buffering streams, flood control structures, aquifers, topography, climate, land resource regions and other types of information at the watershed level.

3-D Imaging for Watersheds

OK NRCS initiated a contract for Light Detection and Ranging (LIDAR). This new surveying technology was used to collect 3-D topographical data in the Sallisaw Creek Watershed in Adair and Sequoyah counties. Gathered data and Future potential uses for LIDAR were evaluated in 2006. They include gathering data needed for watershed structure rehabilitation, conservation practice designs, watershed boundary delineations, reservoir storage area curve development, fluvial geomorphology, stream assessments and natural resource assessments.

SUMMARY OF CSP CONTRACT ACTIVITY IN 2006

Watershed Name	Watershed Year	No. of Contracts	Contract Acres	2006 Payments	Avg. Ac./Contract	Avg. $/Contract	Avg. $/Acre
Lower Salt Fork	2004 & 2005	207	150,170	$1,079,257	725.5	$5,213.80	$7.19
Lower Cimarron River - Skeleton Creek	2005	65	46,037	$246,467	708.3	$3,791.80	$5.35
Lower Neosho River	2005	34	11,630	$259,523	342.1	$7,633.03	$22.31
Little River	2005	21	7,288	$107,318	347.0	$5,110.38	$14.73
Upper Beaver River	2006	27	45,357	$516,084	1679.9	$19,114.22	$11.38
Poteau River	2006	397	105,850	$2,514,675	266.6	$6,334.19	$23.76
TOTALS		751	366,332	$4,723,324	487.8	$6,289.38	$12.89

USDA announces 60 watersheds to be included in the Conservation Security Program (CSP)

The watersheds in Oklahoma eligible for CSP funding in FY2006 were the Spring River, Upper Beaver River, and Poteau River Watersheds. The Poteau River Watershed obtained the most CSP contracts in the nation in 2006. It acquired 412 contracts for $2.6 million. Total contract cost for 2006 was $3.05 million. The NRCS attributes the success to teamwork.

In September 2006 the USDA announced the Upper Washita watershed was eligible for CSP funding in 2007. To be eligible, most of a producer's agricultural operation must fall within the boundaries of an eligible watershed.

The signup for the CSP ended with some astounding numbers in the Poteau River Watershed. Through 13 CSP meetings, many telephone calls, Public Service Announcements, and personal contacts, 436 applications were processed through Poteau, Stigler, and Wilburton offices. This number represents approximately one third of all the farms in the Poteau River Watershed. The conservation partnerships in these field service centers are to be commended for their outreach efforts.

The CSP is a voluntary program that supports ongoing conservation stewardship on private agricultural working lands and enhances the condition of the nation's natural resources. Under this program, the USDA rewards producers who practice good stewardship on agricultural lands and offers incentives to increase the use of conservation practices.

Oklahoma Department of Agriculture, Food and Forestry (ODAFF)

Special Watershed Projects

In cooperation with the Oklahoma Conservation Commission, Forestry Services installed forest road BMPs on a demonstration farm near Jay as part of the Spavinaw Creek Watershed Project. The BMPs included road drainage practices, including turnouts, dips and proper sloping; and erosion control practices, such as riprap and seeding. In addition to rehabilitating the road to minimize soil erosion, the Commission and local Conservation District plan to use the site for landowner educational purposes.

Water Quality Program Review

The Southern Group of State Foresters Water Resources Committee and the U.S. Forest Service completed a formal review of Oklahoma's forestry BMP program in 2006. Review teams have visited all 13 states in the south and use a standardized checklist to determine each State's capabilities and commitments to a forest water quality management program.

Education and Outreach

In 2006, Forestry Services continued to make others aware of the need to protect water quality while using and managing the land. Through its partnership with OCC, Forestry conducted workshops and field tailgate sessions for loggers and landowners to educate about specific forestry BMPs that protect water quality. Forestry BMP information was also presented at the Annual Regional Agriculture Conference in Wilburton, an Agroforestry Workshop in Idabel and the Forestry and Wildlife Youth Camp held at Beavers Bend State Park.

Agency foresters included forestry BMP information in Forest Stewardship management plans written for landowners and advised hundreds of landowners on the need to include water quality protection in their land management objectives. The Forestry Services Forest Regeneration Program distributed more than 80,000 trees for erosion control tree plantings in Oklahoma.

Field tailgate sessions give loggers and landowners an up-close look at forestry BMPs that protect water quality.

Forestry Best Management Practices Compliance Monitoring Project

Forestry Services completed its second Forestry Best Management Practices Compliance Monitoring Project in 2006. This project consisted of the inspection of best management practices on forestlands that have been harvested and/or site prepared in order to grow the next crop of trees. These sites were randomly selected from a large pool of sites collected from counties in eastern Oklahoma.

Forestry Services inspected 41 individual forestry practices in seven major BMP categories. The goals of the project are to monitor trends in BMP implementation, identify and correct problem areas and raise awareness of Oklahoma's forestry community about the need to minimize the amount of sediment and nutrients that result from forestry activities.

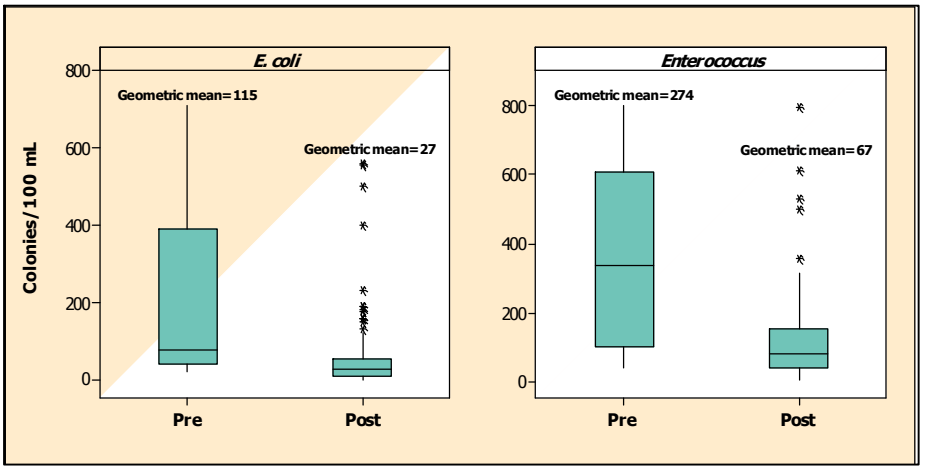
Oklahoma Unwanted Pesticide Disposal Program

ODAFF continued preparations to begin collection and disposal of unwanted pesticides. Established by the Oklahoma State Legislature in 2003, Senate Bill 606, the Oklahoma Unwanted Pesticide Disposal Program developed as a cooperative effort between the OSU Pesticide Education Safety Program, the Oklahoma Agribusiness Retailers Association, and ODAFF. All Oklahoma farmers and ranchers, commercial and non-commercial pesticide applicators, and pesticide dealers will be eligible to participate. The collections will provide an economical, safe way to dispose of cancelled, suspended, expired, unwanted, unused, and unstable pesticides. The program will help remove pesticides from storage and reduce the potential threat to public health and water quality. The first event is scheduled for December 2006.

Streamside Management Zone on Little Waterhole Creek, Pushmataha County

Success Stories

Best Management Practices Result in Significant Reduction of Bacteria



Bacteria levels in Beaty Creek. Both *E. coli* and *Enterococcus* exhibited significant reductions in mean bacteria levels. "Pre" data from August 1999-January 2001; "Post" data from July 2001-April 2004.

In 2006 the OCC Water Quality Division submitted two success stories to the Environmental Protection Agency (EPA). For the EPA, "success" means the water quality of a stream has improved enough for the stream to be eligible for complete or partial removal from the State's list of impaired waters.

Beaty Creek, in northeast Oklahoma, was impaired by *E. coli* and *Enterococcus* bacteria due in part to animal waste management practices from confined animal feeding operations, direct access of livestock to the stream, and extensive streamside cattle grazing on pasture fertilized with animal waste.

Education and implementation of best management practices (BMPs) led to significantly decreased amounts of bacteria in the creek. Practices implemented promoted proper animal waste application, including riparian management and improvement, pasture planting and nutrient management, offsite watering and construction of heavy use areas for animal feeding and waste storage.

Because these practices and the accompanying education of landowners and integrators resulted in decreased bacteria levels, **Beaty Creek has been nominated for removal from the 2006 303(d) List of Impaired Waters for *E. coli* impairment,** and is one step closer to full attainment of the primary body contact recreation designated use.

Partners

OK Conservation Commission
U.S. Environ. Protection Agency
Delaware Co. Conserv. District (OK)
Benton Co. Conservation District (AR)
OK Department of Agriculture
OSU Cooperative Extension Service
U.S. Dept. of Agriculture/NRCS
Arkansas Soil and Water Conservation Commission
Local area poultry producers
Local poultry integrators
Animal waste marketers
Farm Services Agency

An educational seminar for landowners demonstrated pasture management BMPs for improving water quality.

A winter feeding facility for cattle was a BMP installed for this project. These facilities are sited to help concentrate animal waste away from streams.

Education and Demonstration Efforts Result in Turbidity Improvements

Sandy and Yellowstone Creeks, both located in the Salt Fork of the Arkansas River watershed in north central Oklahoma, were impaired for turbidity due in part to practices associated with crop and cattle production. The Salt Fork watershed is located in an area of high agricultural activity, with wheat and alfalfa being the primary crops. Streamside cattle grazing also occurs within the watershed.

Ten demonstration projects were used to show that Best Management Practice (BMP) implementation can be achieved without production losses or excessive expense. Numerous educational meetings, tours, and field days, as well as a website and newsletter, promoted BMPs in the watershed.

This education combined with implementation of BMPs led to decreased amounts of sediment and nutrients in both Sandy and Yellowstone Creeks. As a result, Sandy Creek was removed from Oklahoma's 2004 303(d) List of Impaired Waters for turbidity impairment. **Yellowstone Creek is expected to be removed from the 2006 303(d) list for turbidity.**

BMPs emphasized in this project included no-till and reduced till planting; proper fertilizer, pesticide, herbicide, and fungicide application; the use of crop varieties that require fewer chemicals; and riparian buffer zone establishment.

Fields were often cultivated or grazed to the edge of the stream; riparian buffers were nonexistent or rare.

During the project 1999-2002

Conservation tillage use within the Salt Fork watershed increased by 21% (to 88% of producers)

Soil test-based fertilizer application increased by 29% (to 67% of producers).

78% of producers recognized the benefits of using vegetative buffers along streams.

Riparian fencing similar to that above was installed for the Beaty Creek project and the Sandy and Yellowstone Creek projects. Fencing excludes cattle from the stream and banks, allowing vegetation to both stabilize the banks and filter rain and irrigation runoff from croplands and pasturelands.

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Wolf Creek

Responsible Care for Oklahoma's Natural Resources