Oklahoma's Nonpoint Source Program



2007 Annual Report



Protecting Oklahoma's Natural Resources

Working together to protect Oklahoma waters from nonpoint source pollution.



Oklahoma Nonpoint Source Pollution Management Program 11/2006 - 10/2007

The Nonpoint Source (NPS) Program is authorized by Section 319 of the Clean Water Act, which requires states to develop an assessment report that identifies NPS problems and a Management Program that include milestones for addressing the identified problems.

Section 319(h) authorizes the U.S. Environmental Protection Agency to operate a grant program to fund projects and milestones in the Management Program. The Oklahoma Office of the Secretary of the Environment, by Oklahoma Statutes, is the recipient and administrator of Federal Clean Water Act Funds. The Oklahoma Conservation Commission (OCC) serves as the technical lead agency for Oklahoma's Nonpoint Source Program.

As the technical lead agency for the NPS Program, The OCC has jurisdiction over and responsibility for directing nonpoint source pollution prevention programs at the statewide level and developing and implementing projects to correct identified problems.

The state follows an organized process to identify threats and impairments to water resources and the causes, extent, and sources of the problems. The NPS Program is **nonregulatory**, using planning, implementation, monitoring, and education to reduce pollution to help waters meet water quality standards.

The OCC works in collaboration with 88 Conservation Districts that facilitate contact with landowners and local leaders who partner to implement water quality programs at the local level.





Numerous agencies contribute significantly to the NPS Program, including:

- Oklahoma Water Resources Board
- Oklahoma Department of Environmental Quality
- Oklahoma Corporation Commission
- Oklahoma Department of Agriculture, Food and Forestry
- Oklahoma Department of Wildlife
 Conservation
- Oklahoma Scenic Rivers Commission
- Oklahoma Association of Conservation
 Districts
- Oklahoma Groundwater Protection
 Council
- OSU Department of Biosystems and Agricultural Engineering
- Indian Nations Council of Governments
- Oklahoma Office of the Secretary of the Environment
- U.S. Geological Survey
- U.S. Army Corps of Engineers
- U.S. Department of Agriculture / Natural Resources Conservation Service
- U.S. Environmental Protection Agency

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

Planning

Oklahoma Nonpoint Source Management Program Funding

Funding for the NPS Program comes from the U.S. Environmental Protection Agency and the Oklahoma State legislature. During FY2007 the EPA provided \$2,929,900 and Oklahoma contributed \$1,952,600 to the NPS Program.



State Federal

Watershed Project Planning

Watershed based plans 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. 2007 was a busy year! Five plans were written, submitted to and/or approved by the EPA under the NPS Program.

	NA / *11			T D O I 111 I
Watershed Plan	Written	Submitted	Approved	To Be Submitted
	2007	2007	2007	2008
	2007	2007	2007	2000
Fucha Lake / Spavinaw Creek			X	
			Χ	
N. Canadian River		X		
		Λ		
Elk City Lake		Y		
		~		
Thundorbird Lako	V			V
	~			^
Illinois River	Х			Х
WisterLake	Y			Y
	^			~
T I O I				
Turkey Creek	X			Х

Oklahoma Locally-Led Conservation Cost Share Program Funding

An important part of project planning is deciding which BMPs to cost-share with landowners and at what percentage. In the 2006 grant year, this cost-share program provided \$375,283 in incentive payments to landowners to voluntarily apply water and soil conservation practices on their land. In turn, landowners used over \$627,000 of their own money for a total of \$1,002,000 spent protecting water quality through the cost-share program.



Targeting Priority Areas

In 2007, Soil and Water Assessment Tool (SWAT) targeting was completed for four watersheds.



N. Canadian River
 Grand Lake

• Honey Creek

Project managers use targeting and modeling information to focus project dollars on priority areas in the watershed to get the most water quality benefit per dollar spent. Targeting begins by gathering data from numerous sources, including monitoring data, the USDA land use census, topographic maps, and the National Weather Service. Computer modeling is then done to predict where in the watershed the pollution is likely originating. Data are entered into a computer and digitally rendered into geographic information system (GIS) maps that show information such as soil types, land use, land cover, and nutrient distribution in the watershed.

Natural Resources Conservation Service and OK Conservation Districts

The Conservation Commission and Conservation Districts work in partnership with USDA's Natural Resources Conservation Service (NRCS) to deliver federal conservation programs to Oklahoma land users. The 2002 federal farm bill dramatically increased federal conservation funding. This increased emphasis on conservation has been a tremendous benefit to the state. Significant work has been accomplished on soil erosion control, water quality improvement, wildlife habitat, wetlands protection, and farmland protection. During the past year, the NRCS working through Conservation Districts in Oklahoma provided \$34.1 million in financial assistance and assisted a total of 12,769 land users. Education of children and adults is a large part of outreach efforts by all participating agencies and it sets the groundwork for present and future implementation projects across the state.

An Outdoor Classroom was held at Crystal Lake in Oklahoma City for 70 third grade students attending Rollingwood Elementary School. The students were divided into four different groups to learn about wildlife tracks, fishing, water quality, soil and forestry (right).





The staff from NRCS field offices in Marietta, Ardmore, and Madill assisted with Natural Resources Conservation Education at Lake Murray State Park. The program taught elementary school students about tree ID, fossils and fuel, soils, wildlife and habitats, water erosion, and natural resources (right).



Education stations were a hit at the Comanche Elementary School Natural Resources Day. An OSU Extension staffer demonstrates the Groundwater Flow Model (left).



The NRCS and the Caney Valley Conservation District Board of Directors sponsored the 13th Annual Outdoor Classroom for approximately 550 fourth grade students (left).

Implementation



Ongoing Priority Watershed Non-point Source Projects and the amounts allocated for best management practice implementation:

- Fort Cobb Watershed FY02/05 (\$4.3 million)
- Spavinaw Creek Watershed (\$2.8 million) except for Beaty Creek

- Grand Lake Watershed Phase I (\$2.1 million)
- Honey Creek (Grand Lake) Watershed (1.7 million)
- Illinois River Watershed Riparian Project (\$1.6 million)
- North Canadian River Watershed (\$1.1 million)

Fort Cobb

Watershed Implementation Projects

The Fort Cobb Reservoir Watershed Implementation Project began in 2001 and ended in 2007. The project objective was to reduce phosphorous loading by 70% to Fort Cobb Reservoir and its watershed. To achieve load reductions, the project promoted best management practices (BMPs) and provided technical and cost-share assistance to landowners who installed practices. The most popular BMP was converting cropland to pastureland by planting Bermuda grass. In total, 128 landowners contributed \$522,907 to install 198 BMPs on their property.

This project was challenged by extreme weather events including drought during most of the project followed by record rainfalls during the final year of the project.

Distribution of BMPs



The project used targeting, planning, education, demonstration, and implementation to focus on the most significant sources of pollution in the watershed: cropland erosion, riparian degradation, and pasture and waste management. **Monitoring data** collected throughout and after the project will be analyzed in 2010 to determine water quality improvements.

in the Fort Cobb Watershed Project Co FY 2001, 319 Project

Project Cost: State \$803,702 + Federal \$1,205,552 = \$2,009,254



The FY2005 Fort Cobb Project is in progress and is expected to further reduce nutrient and sediment loading to streams in the watershed by promoting the practice of no-till agriculture. Results from this project are expected to be seen in the 2010 data analysis. There are \$330,000 left to be obligated to BMPs and publicity and landowner sign-ups are ongoing.

North Canadian River

Watershed Implementation Project

Water samples at various locations along the North Canadian River have repeatedly exceeded Oklahoma water quality standards for fecal coliform, *Escherichia coli (E. coli)*, and *Enterococcus* bacteria, as well as turbidity. The Department of Environmental Quality recommends a 73% fecal coliform load reduction and a 96% *Enterococcus* bacteria load reduction to restore beneficial use support to the North Canadian River in Canadian County. As a result, the segment of the North Canadian River from Lake Overholser to the Canton Dam is the focus of the North Canadian River Watershed Project, which began in 2007.

This three year project, funded by the State of Oklahoma, the Environmental Protection Agency, and cost-share contributions from landowners, will install best management practices that reduce bacteria, nutrients, and



sediment entering the river. A local watershed advisory group formed and met in September to recommend best management practices and cost-share rates for the project. Sign ups for costshare will begin in January 2008.

Priority Practices	Cost-Share	Other Practices Cost-Shared		
Total exclusion	100%	Residue management	Contour strip cropping	
Total exclusion w/hay	100%	Contour farming	Water control structure	
Erosion control	80%	Contour buffer strips	Nutrient management	
Vegetative planting		Cover crop	Pest management	
Field border		Critical area planting	Terrace	
Residue management		Sediment basin	Tree/shrub establishment	
Structural practices		Diversion	Trough or tank	
Roadside concerns		Pond	Water well	
Riparian areas-buffers	90%	Fence	Stream crossing	
Vegetative planting		Field border		
Stream crossings		Riparian forest buffer		
Fencing		Filter strip		
Off site watering		Grade stabilization structure		
Livestock management	80%	Grassed waterway		
Vegetative establishment		Lined waterway or outlet		
Cross fencing		Use exclusion		
Watering facilities		Mulching		
Heavy use areas		Pasture and hay planting		
Nutrient management		Pipeline		
Septic Concerns	90%	Prescribed grazing		
Septic systems w/lateral lines		Range planting		
Rock reed filters w/septic tank		Heavy use are protection		
Residential sewage lagoons		Streambank/shoreline protection		

N. Canadian River Project Approved BMPs and Cost-Share Rates

Honey Creek Watershed Implementation Project

2007 was year two of this project. A Watershed Advisory Group (WAG), composed of nine landowners in the Honey Creek Watershed, met in September 2006 and determined what best management practices (BMPs) and costshare percentages to recommend for use in the project. Targeting and modeling to determine areas in the watershed likely contributing the most pollution was completed in winter 2006. In January 2007 a public meeting and initial sign-up was held and conservation plans were written for an initial 19 cooperators. Following the initial sign-up period, the program went to continuous signup and 52 conservation plans were written as of September 30, 2007. The project was promoted at the Grand Lake Earth Day Festival and through tours of the creek that highlighted riparian restoration efforts. In 2008, targeted area landowners will be contacted by letter, then by personal contact to promote the program during its third year.





Planned	Number	Units	Year 2007 Actual		I
Conservation Treatment			319/State	Producer	Total
Riparian Fencing	4,277	ft	7,396.60	4,748.10	12,144.70
Cake out/litter storage	2	structures	34,560.00	13,130.09	47,690.09
Animal feeding/waste storage	2	structures	16,128.00	11,075.32	27,203.32
Pasture planting	7	ac	235.20	332.04	567.24
Cross fencing	18,641	ft	18,261.22	9,697.89	27,959.11
Ponds	3		3,794.40	1,830.60	5,625.00
Watering facilities	15	tanks	10,072.23	2,848.37	12,920.60
Pipeline	4,178	ft	3,269.45	2,166.26	5,435.71
Wells	4		16,921.85	5,564.17	22,486.02
Heavy use areas			8,223.70	2,985.97	11,209.67
Replacement septic systems	3		6,548.00	1,837.00	8,385.00
Totals:			125,410.65	56,215.81	181,626.46

Honey Creek BMP Funding Summary 2007

Honey Creek Fluvial Geomorphology Project Restores 400-feet of Honey Creek

2007 was the final year of this project, which redesigned a 400-foot long segment of Honey Creek located in Delaware County near Grove, Oklahoma. Prior to restoration, the stream segment was migrating laterally with a vertical bank height of 7 to 8-feet contributing excessive sediment to the stream. Previous studies showed an estimated 1500 cubic yards of material were added to the stream from this single eroding bank during the last 10 years. This interfered with reproduction of fish and insects, and diminished water quality.

Boulders, root wads, and logs were used for grade control, bank stabilization, and improved fish habitat. Erosion control matting was installed on the bank with rye grass planted as a cover crop to hold the soil. Approximately 1200 trees were planted in the riparian area including willows, green ash, hackberry, plum and silver leaf maple. As they mature, the roots of these trees are stabilizing the bank, enhancing habitat, providing shading, and filtering nutrients from overland runoff. An existing wetland feature occurring adjacent to the active channel was also enlarged and deepened.

Results of the project include increased wetlands habitat, improved conditions for fish and insects, reduced property loss and enhanced water and sediment movement. The project also served as a demonstration site for the education of private landowners, educators and agency scientists.

A landowner tour held August 2007 and a technical/agency/professional tour held in September 2007 were the final activities for this project, which ended in September. With leftover funds, work began in September 2007 on a design to restore an additional segment of Honey Creek. The design for additional restoration work will be implemented in 2008 with additional monies from partners, including OCC, USEPA, and Oklahoma Department of Wildlife Conservation.







Grand Lake

Watershed Implementation Project

Grand Lake is a 10,298 sq mi watershed in four states and two EPA regions. The Grand Lake Watershed Project uses demonstration projects, education, and volunteer monitoring to address urban nonpoint source pollution, primarily in the near-lake environment. Ultimately the project will install 8 biofilter rain gardens in Grove, OK, with education programs to demonstrate their ability to clean urban runoff from lawns and parking lots. Accomplishments in 2007, the fourth year of this project, included:



First Annual Grove Earth Day Festival Held

In April, folks came out to see the nutrient management garden, biofilter rain garden sites, an open soil pit, and to participate in enjoyable and educational activities for all ages, focusing on local water quality concerns.

Nutrient Management Garden Expanded

A native-flower garden was added to the existing vegetable and herb gardens and maintained by volunteers. This nutrient management garden demonstrates how native plants have a much lower need for fertilizer, pesticides, and watering, than do non-native species.

Biofilter Rain Gardens Constructed

Eight demonstration biofilter rain gardens were constructed in Grove, and 2 of them planted. These gardens will be used to promote the practice of cleaning runoff water from parking lots and lawns in this rapidly developing area.

Soil Profile Training and Education Held

A 5-day course trained a new group of certified soil profilers and two recertification courses were held in the Grand Lake area. Two workshops educated septic system installers and others about the soil profile method versus the percolation test for evaluating soils for septic system suitability and placement.

Volunteer Monitoring Training Held

A joint Water Watch and Blue Thumb volunteer monitoring training was held in Grove. Additional separate trainings were held in the watershed by Blue thumb (Miami) and OK Water Watch (Grove).

Project Website Expanded (check it out!)

http://www.cleargrand.glaok.com

Coming in the future:

- Soil education display at Bernice State Park Nature Center
- Nutrient Management Conference for golf
 course and park managers
- Extensive residential and commercial soil testing
- Expansion and update of the Watershed Based Plan
- Volunteer monitoring and soil profile trainings and workshops
- 2nd Annual Earth Day Celebration (April 19)
- Biofilter rain garden completion, signage, and demonstration tour.

Grand Lake 4-State Watershed Collaborative

A collaboration of university scientists and state agencies of the four states in the Grand Lake watershed: Kansas, Missouri, Arkansas, and Oklahoma, has formed to address water quality and quantity issues in the 4-state watershed area. The Collaborative is formally known as the 4-State Watershed for Grand Lake promotes:

- Exchange of scientific information regarding the water quality, quantity, and ecosystem health of Grand Lake and its tributaries.
- Education and training in support of restoring and sustaining water resources and ecosystem health throughout the watershed.
- Collaborative research among the partners.
- Communications, coordination, and collaboration among agencies, universities, and private groups operating in the four states.





• Procurement of financial and administrative support for activities identified above.

A symposium for information exchange and collaboration is planned for spring 2008. The collaborative seeks to address water issues throughout the watershed and will support the Grand Lake Foundation and other entities in promoting water quality throughout the basin.

Grand Lake o' the Cherokees Watershed Alliance

The foundation, a four state (OK, KS, MO, AR) citizen's organization devoted to clean water for the entire Grand Lake Watershed, incorporates public involvement into the planning process on a large scale. The Foundation will be a source of private funding that is necessary to make water quality improvements in the watershed. It will also provide education to stakeholders and the public about matters important to water quality.

Oklahoma Water Watch Volunteer Monitoring

The Oklahoma Water Watch volunteer water quality-monitoring program, coordinated by the OWRB, began in 1992 at Grand Lake when local citizens requested assistance to help them actively protect their lake. There are currently 13 active Water Watch chapters collecting data at over 90 sites for 14 water bodies. During the 2007 reporting period OWW certified 64 new volunteers, bringing the total to 121 monitors, for whom OWRB staff provides continuous training.

Spavinaw Creek

Watershed Implementation Project

The Spavinaw Creek Watershed Project has been tremendously successful at getting northeast Oklahoma landowners to participate in protecting water quality. As of September 2007, \$1,416,366 had been spent on best management practices (BMPs) in the watershed of which \$821,000 was paid to landowners for their cost share percentages. By the end of 2007, 173 cooperators had signed up to install BMPs. The most popular practices selected include wells, watering facilities, cross fencing, riparian area management, and waste storage buildings. All BM

management, and waste storage buildings. All B bacteria flowing from land into creeks in the watershed.

Other accomplishments for 2007 include:

- Obligated all of the project funds and ranked unfunded applicants to receive contracts as additional funds become available.
- Completed all of the demonstration farm projects, including a pond, wells, watering facilities, riparian fencing for total exclusion of livestock from streams, and a stream crossing.



management, and waste storage buildings. All BMPs are selected to reduce sediment, nutrients, and



• Conducted five tours of the 196-acre demonstration farm for more than 200 poultry producers and the public.





Illinois River Project to Supplement Ongoing Efforts in the Watershed

This 2007 project expands and complements ongoing programs in the Illinois River Watershed to reduce nonpoint source pollution and restore beneficial use support to waterbodies in the watershed.

This project will allow the expansion of the Conservation Reserve Enhancement Program (CREP) in the Illinois River and Eucha Spavinaw Watersheds. The project offers landowners incentives to install CREP practices in areas ineligible for CREP funding.

Eligible BMPs for this project include:

- riparian re-establishment
- soil testing
- fencing
- off-site watering
- streambank stabilization
- stream crossings
- animal waste/winter feeding facilities

BMPs are targeted toward the critical areas identified through a watershed SWAT model developed by Oklahoma State University Department of Biosystems and Agricultural Engineering. This model will consider landuse, soil type and nutrient characteristics, distance to stream, and other factors to determine the most critical areas of the watershed to establish riparian areas. **Contracts for riparian protection** will require the practice to be maintained for at least fifteen years.

A network of automated samplers will be installed in the Illinois River Watershed in 2008 to track water quality changes over the fifteen year program.

Demand is high for the CREP program; after only a month, at least ten percent of the goal for the Illinois River has already been enrolled in the program.



Conservation Reserve Enhancement Program (CREP)

"The Conservation Reserve Enhancement Program (CREP) is a voluntary land retirement program that helps agricultural producers protect environmentally sensitive land, decrease erosion, restore wildlife habitat, and safeguard ground and surface water." (USDA Online Fact Sheet- 2003)

Success in achieving phosphorus loading reductions of at least 31% in the Beaty Creek subwatershed of the Lake Eucha Watershed and 70% in the Peacheater Creek subwatershed of the Illinois River Watershed led to the award of a \$20.6 million dollar Conservation Reserve **Enhancement Program** (CREP) from the USDA Farm Services Agency (FSA). Sign-ups for the program began June, 2007.

The program is a partnership among the FSA, Natural Resources Conservation Service, Local Conservation Districts, the Oklahoma

Scenic Rivers Commission, the City of Tulsa, the OCC, U.S. EPA, and the Office of the Secretary of Environment.

In May, a training session on the new CREP was held for agency staff involved with the program. Public outreach meetings hi-lighting CREP were held in each participating county with 91 people attending:

- Cherokee County (Tahlequah)
- Adair County (Proctor)
- Mayes County (Pryor)
- Delaware County (Jay)
- Sequoyah County (Black Gum)

Between June 1 and September 30, 2007, thirtyone producers applied for CREP within the five county area.



At the end of fiscal year 2007, no CREP contracts had been signed, and therefore, no practices were implemented or federal dollars spent. Match monies spent by the Oklahoma Scenic Rivers Commission (OSRC) included:

- \$499,545 to protect 202.9 acres in the Illinois River Watershed with 30 year lease agreements
- \$33,832.50 to protect 174 acres in the Illinois River Watershed with one year lease agreements
- Grand Total for Match by OSRC = \$533,377.50

In September, interviews were held to hire two conservation plan writers and one conservation plan writer/water quality specialist for the CREP program. Individuals were selected, hired, and will begin work on October 1, 2007. The USDA's goal is for each state to have up to 100,000 acres enrolled in CREP.

30-Year Riparian Area Easements

to Protect Water Quality in the Illinois River Watershed

This project established 30-year riparian area easements on lands enrolled for 3-5 year riparian protection by the 1999 Illinois River Watershed Project. Fourteen landowners from the 1999 project signed 30-year easements that will protect 278 acres of riparian areas for 30 years, beginning in 2007.

Five additional landowners are considering enrolling 406.4 acres in the 30-year program with incentive payments funded by a donation of one million dollars to the Oklahoma Scenic Rivers Commission. The additional 406 acres would create riparian area protection of 3% of the streams miles running through pastureland in the watershed.

The State invested \$625,000 in the 30-year easements project. This money provides match for the State's CREP in the Illinois River and Eucha/Spavinaw Watersheds. Therefore, the State's investment will enable an additional It is estimated that protecting 280 acres of riparian acres in the Illinois River Watershed for 30 years could reduce Nitrogen by 14,821 Ibs/year, Phosphorous by 1,681 Ibs/year, and sediment by 220 tons per year.

\$2,500,000 of USDA FSA dollars to be added to the program. In turn, this will allow at least 1300 additional acres to be added to the CREP program, which will increase potential loading reduction from this project to 11,830 lbs P per year, 104,280 lbs N per year, and 1545 tons sediment per year.

The 278 riparian acres protected through this project will enhance the Illinois River and its watershed by filtering pollutants from runoff and promoting streambank stabilization for 30 years. This streambank stabilization will decrease the sediment and nutrient loading into the watershed. In addition, the decrease in sediment and nutrients will enhance the instream habitat



of the Illinois River and the quality of water flowing into Lake Tenkiller.

This project reinforced that incentive programs are significantly effective in convincing landowners to protect riparian areas beyond the life of an incentive payment. In 2007, three years after the end of the 1999 project, at least 53% of the riparian areas signed under the 1999 project were still intact.

Poultry Litter Transport from the Illinois River

to Non-Nutrient Limited Watersheds

This 2002 project, which ended in 2007, heralded Oklahoma's first subsidized poultry litter transport program. The purpose of the project was to protect water quality in the Illinois River Watershed by reducing land application of poultry litter. The program provided a subsidy to litter **haulers** to help them develop the tools and clients necessary to establish a market for the litter. In addition, a subsidy was paid to the growers to help them realize some income from the litter. The total subsidy was \$10/ton where up to \$8/ton (\$0.05/mile) was paid to the hauler for litter pick-up at the farm and transport to eligible areas in Oklahoma. The remainder of the \$10 subsidy, ranging from \$2.00 up to \$6.90/ton, was paid to the arower.

Rising fuel costs continued throughout the program, but. The maximum subsidy price remained at \$10/ton and \$0.05/ton/mile. Despite this challenge, litter continued to move significant distances into central and western Oklahoma. Poultry integrators formed a company (BMPs, Inc.) to help facilitate the movement of litter out of the watershed.

- Of the 49,596 total tons of litter movement subsidized through this program, 15,459 tons originated in Arkansas' portions of the watershed, while the remaining 34,137 were from Oklahoma growers.
- Removal of 34,137 tons of litter corresponds to approximately 37% of the litter produced in the Oklahoma portion of the watershed during the project period.
- Removal of 49,596 tons of litter over a nineteen month period corresponds to removal of approximately 14% of the litter produced in the entire watershed during that time period.

Oklahoma Illinois River Litter Hauling



- Removal of 49,596 tons of litter corresponds to removal of approximately 746 tons of phosphorus from the watershed into areas of the state where it can be applied with a lower threat to water quality.
- On average, 124 buyers purchased approximately 191 tons of litter for which haulers were paid an average of \$950. Litter moved an average of 111 miles.
- In total the program paid \$245,887.49 of federal monies to haulers and \$181,756.211 of federal monies to growers. Integrators also paid a portion of the subsidy, amounting to \$199,999.95.

Subsidizing litter transport is not inexpensive. The program spent approximately \$800,000 to move 50,000 tons of litter. That amounts to \$16/ton. When administrative fees are backed out (less than \$66,000), a subsidy of approximately \$14.68/ton was provided. During that time period, litter was costing about \$24-\$28/ton to haul about 150 miles. The subsidy was therefore provided at approximately a 50% - 60% cost share. A new revamped program was launched in 2007. This litter hauling program, started in 2007, uses lessons learned from the 2002 program to help expand the litter market. Now, the buyer is eligible to receive \$0.05/ton/mile or up to \$8/ton for litter purchased from the Illinois River or Eucha / Spavinaw Watersheds. Haulers and growers are not subsidized through this program and buyers are responsible for locating their own sources and haulers of litter.

The new program works through Conservation Districts that help a buyer insure that they have completed the correct steps in order to receive the subsidy. Buyers must prove to conservation districts that:

- litter was purchased from one of the two watersheds (can be from the Arkansas portion, but subsidy only pays mileage from the state line),
- litter was applied by a certified applicator to land outside a nutrient limited watershed in Oklahoma,
- 3. litter was applied based on litter and soil nutrient analysis according to State regulations, and

Converting Poultry Waste to Energy

A Demonstration of Process Technology

The purpose of this project is to find alternative uses for poultry litter by converting the litter into concentrated liquid fertilizer with the potential of using it to produce electricity. During 2007 construction continued on the demonstration plant site, which is located approximately 9 miles east of Jay, Oklahoma. The plant is located to access litter from both the Eucha/Spavinaw and Illinois River Watersheds in both Oklahoma and Arkansas. When completed, the project will test the conversion process on approximately 10,000 tons of poultry litter and document the economic feasibility of such a process. Construction is anticipated to be completed in 2008.

4. the buyer had obtained or had at least applied for a Nutrient Management Plan from NRCS or the State of Oklahoma.

Conservation Districts who support the program are eligible to receive up to \$1.00/ton for the litter that moves to their district. In return for these administrative fees, Conservation Districts process claims and advertise the program. It is believed that this subsidy will help encourage Districts, almost all of which operate on shoe-string budgets, to strongly endorse the use of poultry litter as an alternative to commercial fertilizer. Many one-time users of litter become repeat users; therefore the intent of these subsidy programs is to get producers hooked on litter such that they will continue to purchase it beyond the life of the subsidy.

In its first three months, the program has moved more than 3900 tons of litter from these watersheds to 12 participants in three Conservation Districts in central Oklahoma. Many of these participants are new to the program and additional participants and Districts are expected in 2008.

Bacteria Source Tracking

Identifying Fecal Bacterial Sources in Two Delaware County Streams

This investigation focused on using bacterial source tracking, or DNA fingerprinting, to determine the dominant source of fecal pollution in Spavinaw Creek and Flint Creek in Delaware County, Oklahoma. Three fecal sources were tested for this project: cattle (beef and dairy), poultry (broilers and layers), and humans (septic systems). The source fecal samples were analyzed to create a DNA library of Escherichia coliform (E. coli). Genetic fingerprinting in the form of ribotyping was used to determine the source of E. coli (fecal bacteria) within the streams. E. coli is a type of fecal coliform that is found in the intestines of animals and humans. It is an indicator of contamination from sewage or animal waste.

Efforts to build a robust reference library met with varied success. The overall goal was to achieve 500 *E. coli* isolates from each of the suspected sources, poultry, cattle, and human. In total, 785 source samples were collected comprising 408 cattle, 209 human, and 117 chicken fecal samples. The program relied on voluntary access to complete sampling activities. Poultry growers were understandably leery of cooperating due to status of at least two lawsuits focusing on the impacts of the poultry industry.

The study successfully identified the presence and at least partial sources of *E. coli* in both creeks. Ribotyping efforts matched the greatest number of isolates to cattle sources for both study locations. Few isolates were derived from poultry samples, which can be partially attributed to the limited number and quality of

BUTTON STATES	Andrea
A LA MALES	
Anonymous cow.	

source samples submitted for ribotyping. However, as a result of the incomplete reference library, the project could not determine whether cattle were the most significant source, nor could the project conclude that poultry litter does not contribute significantly. The project could merely determine that cattle, septage and other sources contribute bacteria loading to these streams.

Fecal contamination is a growing concern in many Oklahoma streams. The Nonpoint Source Pollution (NPS) Program focuses on finding sources of pollution including fecal contamination in waterbodies. Once identified, the results from this diagnostic monitoring can be used to create a plan to reduce bacterial pollution loading to streams.

Flint Creek	No. of Isolates Matched	%
Cattle	47	29
Septage	9	5
Chicken	0	0
Non Match	73	45
Mixed	35	21
Total	164	100

Spavinaw Creek	No. of Isolates Matched	%
Cattle	14	20
Septage	8	12
Chicken	0	0
Non Match	38	55
Mixed	9	13
Total	69	100

Assessment of Oil Field Activities, Non-Point Source Pollution & Water Quality

in the Spring Creek Watershed & the City of Edmond Municipal Well Field

Water Softeners Likely Cause of Salinity in some Edmond Wells

2007 was the final year of this five year project, which identified and eliminated likely sources of salt occurring in wells in an Edmond, OK neighborhood.

Ground water samples collected by the Oklahoma Corporation Commission in 1999 confirmed that at least 22 domestic water wells in the Thunderhead Hills Addition were degraded by saline water at concentrations exceeding the USEPA Secondary Maximum Contaminant Level (SMCL) of 250 mg/L for chloride in drinking water.

For this project, oil field activities and past land uses were assessed by the OK Ground Water Protection Council to delineate the extent of saltwater intrusion and to identify or rule out source(s) of non-point source (NPS) pollution.

A review of historical land uses and site specific conditions ruled out the likelihood of agricultural practices, road deicing applications or mixing with deeper formation brines as the source of salt in the wells. It was shown through geochemical modeling that the accumulated effects of continued water softener cycling are the likely principal source of salt pollution within the Thunderhead Hills Addition.

Individual domestic water softeners use salt to soften "hard" water. These systems are backwashed annually into a home's septic system, which conveys the salt underground where it accumulates into a slowly moving plume of saltwater that can encounter and contaminate well water. Data from this study also suggest that at least one saline plume may be a combination of water softener backwash and oilfield brine. Consequently, additional work needs to be performed to evaluate this condition.

Based on the results of this study, recommendations have been made to the City of Edmond on how to alleviate and prevent similar problems from occurring in the future.



Monitoring Edge of Field Phosphorous Loss

to Validate a Phosphorous Loss Index for the Spavinaw Creek Watershed

New Tool Helps Select Best BMPs for Local Conditions

The final report for this project was submitted to the EPA in 2007. The primary objective of the project was to put the predictive power of one of our

A P Index is an assessment tool for use by planners and land users to assess the risk for phosphorous leaving a site and traveling toward a water body.

This project simplified the application of the complex Soil and Water Assessment Tool (SWAT) model and integrated it with a traditional Phosphorous Index to form PPM Plus, which can be used by conservation planners with little or no trainina.

best hydrologic water quality models into the hands of people who make daily farm management decisions that impact water quality.

This project validated PPM Plus, a phosphorous management tool that combines the ease of use of traditional phosphorous indices with the accuracy and flexibility of an existing processbased hydrologic and water quality model, such as SWAT.

Developed for use by Comprehensive Nutrient Management Plan planners and Conservation

District personnel, PPM Plus is useful for selecting and evaluating the most effective soil and water conservation best management practices (BMP) based on local conditions. At the same time, the total reduction in P loss provided by BMP implementation can be quantified. PPM Plus could significantly improve both BMP selection and water quality program evaluation in Oklahoma. PPM Plus simplifies the operation of SWAT by translating plain language inputs into SWAT parameters. Decisions and assumptions generally made by a modeler are built into the interface and the user is insulated from the complexity of the model. This work simplifies the application of the SWAT model, not the SWAT model itself.

PPM Plus can make accurate prediction of P losses from agricultural fields within the state of Oklahoma. This project extensively evaluated PPM Plus against measured field P loss data with excellent results.

Developed by the Oklahoma State University Department of Biosystems and Agricultural Engineering, PPM Plus can be used as a P Index or BMP evaluation tool. A tremendous amount of data was used in the validation (283 field years).



Features of the Phosphorous Management Tool "PPM Plus"

- Predicts the amount of phosphorous (P) and sediment delivered to the nearest stream from a single agricultural field. It can make predictions under a myriad of management options.
- Used to develop conservation and nutrient management plans that specifically address off-site surface water quality concerns.
- Used to easily evaluate many management scenarios to identify the proper management, or best management practices (BMPs), for a particular field.
- Includes many BMPs that may reduce sediment and P losses. The effectiveness of a BMP varies depending upon local conditions like soil type, slope, field management and proximity to streams. A BMP which is very effective at one site may not be effective at another.
- Used to identify appropriate BMPs for a particular field, and determine the total P lost both before and after BMP implementation.

PPM+ Alpha Version 0.5 - For Demonstration Purposes Only-				
Field Information Field Information Field Characteristics Field Owner Dale Dribble Plan Developer Rusty Shackelford Field Description South 40 Legal Description south Half T21 R15 UTM Coords. I5648 F UTM Coords. I5648 F Date mm/dd/yyyy 02/14/2007 Datum Distance to stream (ft) Climate © Choose Basin © Choose Climate and Ecoregion Climate § Map Soil Type Ecoregion Duachita Mountains Map	BMPs Drainage BMPs Manure Application Setback Planting and Terracing BMPs Buffer BMPs Alum Ammended Wastes Non-Simulated BMPS Drainage BMPs Fraction Draining to Pond or Wetland (%) D			
Pasture Management Forage Type Animal Manure Application History Bermudagrass Applied most years Not typically applied Over Utilized Over Utilized Moderate Overgrazing Allowed Severe Overgrazing Allowed Pertilization Grazing Forage Romoval Delete Date Operation Description 01/01 Grazing Continious Grazing .2 Animal Units per Acre for 364 Days (With suplemental feed as needed.) 04/05 Fertilization Fertilization with 3000 lb/acre of Poulty (Broiler) Litter	Simulation Status and Warnings Ready DEV Tools Load Save Edit Note About PPM			

PPM Plus User Interface

Monitoring

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.



Use of Monitoring Data

Oklahoma removed four streams from the 303(d) List of impaired waters from 2002 to 2006 as a direct result of watershed projects implemented since 1999.

In 2007 data analysis began for the 2008 Integrated Report, which details the current water quality status of all waters in Oklahoma. In the upcoming 2008 report, OCC expects to classify additional priority watershed streams as meeting water quality standards and remove them from the 303(d) List of impaired waters. To aid in determining the status of Oklahoma waters, the OCC analyzes all of its available water quality data every two years as required by the Clean Water Act. Streams that are not meeting Oklahoma water quality standards are placed on the 303(d) List of impaired waters and remain there until collected data show a stream meets the standards. While watershed projects last from 2 to 5 years, it can take up to 10 years before significant improvements in water quality are statistically evident by monitoring.

Rotating Basin Monitoring Program

In 2007, OCC conducted water quality monitoring on approximately 147 rotating basin sites in the Lower Red, Neosho-Grand, Upper Canadian, Upper Arkansas, and Cimarron River Basins. Each basin is monitored for two years every four years. Biological collections (fish and macro-invertebrate) and habitat assessments were completed on 70 rotating basin project sites. 2007 was the final year in the second rotation of monitoring on the Upper Canadian and Neosho watersheds. 2007 was the first year of the second rotation of monitoring in the Upper Canadian, Upper Arkansas, and Cimarron River Basins. The final report summarizing data for streams in the Washita and Upper Red Basins was submitted to EPA in 2007.

Rotating Basin Schedule Year 1 Year 2 Year 3 Year 6 Year 6

Planning Basins

OCC completed water quality, periphyton, macro-invertebrate, fish and habitat data collection on 24 probabilistic project sites in partnership with the Oklahoma Water Resources Board (OWRB).

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

- Allows the state to make a statistically valid assessment of the condition of all of Oklahoma's streams/rivers. This assessment of condition is required under Section 305(b) of the Clean Water Act (CWA).
- Assists in long- and short-range planning and resource allocation. When integrated with fixed-station networks, it will assist in identifying local areas of concern.
- Allows for the assessment of the Fish & Wildlife Propagation beneficial use on more waters of the state under the guidelines of the Integrated Listing Methodology. Although currently limited to certain beneficial uses

Rotating Basin monitoring data are used to:

- determine if waters meet their designated uses
- gather information on sources of pollution
- evaluate success of past and current projects
- plan and implement future watershed project
- observe water quality trends over time

Probabilistic Monitoring Program

JTUDY YEAR (SY)	Planning Basin	Sites
SV 2005 (1)	Lower Red River	27
51-2005 (1)	Statewide Stations	15
	Grand-Neosho River	15
SY-2006 (2)	Upper North Canadian River	5
	Upper Canadian River	7
	Statewide Stations	15
	Upper Arkansas River	10
SY-2007 (3)	Lower Canadian River	6
	Cimarron River	11
	Statewide Stations	15
SY-2006-2004	Total Stations	126

and associated criteria, the impairment status of more waters can be determined.

To date, 2 CWA Section 104(b) 3 grants and state monies have supported the study. Each of the three study years includes at least 1 of Oklahoma's 11 planning basins (27 sites) plus 15 statewide sites (Table). The study collected a wide a range of chemical, physical, biological, and habitat data. The study was conducted with the cooperation of the OWRB, Oklahoma Conservation Commission and Office of the Secretary of the Environment.

Illinois River Watershed Probabilistic Sampling Project



The OWRB is conducting a probabilistic sampling study in the Illinois River subbasin. From 2007-2009, randomly chosen sites will be sampled to characterize the biological, chemical and physical properties of the water. Specifically, OWRB water quality monitoring staff will collect fish, benthic macroinvertebrates, habitat, algae, bacteria, and nutrient samples during a series of site visits. Data will be used to determine the biotic integrity of the watershed prior to full implementation of the OWRB's scenic river total phosphorus criterion.

Priority Watershed Project Water Quality Monitoring

In 2007, water quality monitoring was conducted on the Eucha/Spavinaw and Honey Creek Project sites utilizing automated water samplers installed by OCC staff. Winter and summer macro-invertebrate collections and summer fish collections were also completed on these project sites. Monitoring results will be used to determine the effects on water quality resulting from best management practices installed during the projects. Volunteer monitoring is a component of some projects.



Monitoring for the Grand Lake Watershed Project

The Grand Lake 319 Nonpoint Source Pollution Project involves the development and implementation of total phosphorus, total nitrogen and chlorophyll-a monitoring in the Grand Lake basin and is expected to be completed in June 2008. Total phosphorus and total nitrogen samples were collected by profile sampling at 12 inlake sites, packaged by Oklahoma Water Watch (OWW) staff and then analyzed by the state Department of Environmental Quality (DEQ) environmental laboratory. Chlorophyll samples will be collected by OWW staff, filtered and processed by Grand Lake Water Watch (GLWW) staff and analyzed by the state DEQ laboratory. Samples were collected approximately every five weeks for a 6 month period during the recreational season beginning in May and ending in November 2007. The GLWW Chapter, with 49 active sites, was initiated in 1992.

Monitoring for the Spavinaw Creek Watershed Project

Oklahoma Water Watch (OWW) is utilizing volunteers to collect chlorophyll-a samples in addition to routine OWW parameters to assist in determining impacts from eutrophication in Eucha Lake. An OWW volunteer from Kansas High School monitors 5 in-lake sites on Eucha Lake monthly. These sites coincide with sites already on the OWRB BUMP sampling schedule. The volunteer enters all data collected into the OWW online database monthly. Parameters monitored include air and water temperature, Secchi disk depth, dissolved oxygen, pH levels, site observations, nitrate nitrogen, ammonia nitrogen, ortho-phosphorus and chlorophyll-a. This project will conclude September 2008.

Red River Chloride Control Project

To augment water supplies in southwestern Oklahoma, including the Lugert-Altus Irrigation District, the OWRB is participating in the evaluation of a 115-acre detention reservoir to collect diverted brine water and remove about 80 percent of the estimated 510 tons of chlorides deposited each day into the Elm Fork of the Red River. OWRB staff currently maintain six data collection platforms in the North Fork of the Red River watershed, measuring conductivity and water temperature. Staff also visit the monitoring stations biweekly to collect chloride and selenium samples for analysis by the State Environmental Laboratory.

Monitoring with Autosamplers

In 2007, OCC installed and activated autosamplers on 5 Conservation Reserve Enhancement Project sites in the Illinois River Basin. The OCC developed continuous flowweighted sampling 8 years ago to answer questions and overcome limitations on how to characterize phosphorus loading in streams.

Previous monitoring methods and data provided snapshots of a stream's condition. Usually occurring weekly, monthly, or yearly, this type of monitoring can take up to 10 years to build a large enough data set for accurate statistical analysis to determine water quality improvements. By contrast, autosamplers provide continuous data of enough quantity and quality to show statistical significance within a short period of 2 to 3 years. Collected data are used to assess changes in water quality resulting from installation of best management practices during watershed projects.



Beneficial Use Monitoring Program (BUMP)

The BUMP continues 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 including a phosphorus and nitrogen series, dissolved solids (total, chlorides, and sulfates), chlorophyll-a (some locations and all lakes sites), turbidity, color (lakes), hardness, alkalinity, dissolved oxygen, water temperature, and pH, as well as occasionally sampling for toxicants such as metals and pesticides. 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 monitored. Future reporting will also include comprehensive

trend analysis.

Agricultural BMPs Predicted a Success in the Peacheater Creek Watershed!

Tyner Creel Watershed

(control)

This project assessed the effect of BMPs on reduction of pollutant loads and streambank erosion in the Illinois River Watershed using a paired watershed design. BMPs were implemented in the Peacheater Creek watershed from 1998 through 2002, and water quality was compared to that of the Tyner Creek watershed, a similar, adjacent watershed which received no BMPs. Water quality data from both watersheds was compared using a model that corrected for weather to predict what the water auality would have been if the BMPs had not been installed in the Peacheater Watershed. Modeled comparisons between pre-project and post-project monitoring periods revealed the following expected improvements due to implementation of BMPs in the Peacheater Creek watershed:

Decreased phosphorus concentrations and **loading in Peacheater** Creek

Phosphorus concentrations decreased approximately 9%

Phosphorus loading decreased approximately 71%

Decreased nitrogen concentrations and loading in Peacheater Creek

Nitrate concentrations decreased approximately 23%

Total Kjeldahl nitrogen (TKN) concentrations decreased approximately 21%

Total nitrogen loading decreased approximately 58%

Total cost = \$800,000an average of only about

eacheater Creek

Watershed

(treatment)

Monitoring Sites

Cooperator's Land Autosamplers

\$220 per acre of implementation

Improved habitat and water quality in the Peacheater watershed.

> Significantly decreased streambank erosion in Peacheater Creek

This project demonstrated that, in small agricultural watersheds, water quality improvement is possible with a relatively low investment in BMPs. The total cost of this project was approximately \$800,000, an average of only about \$220 per acre of implementation. The predicted nutrient reductions that resulted from implementation of BMPs in the Peacheater Creek watershed indicate that practices implemented at a similar intensity throughout the laraer Illinois River watershed might provide significant reductions in loading to downstream Lake Tenkiller. BMPs installed by 11 landowners in the Peacheater watershed included riparian buffers, alternative water supplies for cattle, heavy use areas for feeding and storing waste, poultry litter transport, pasture management, and septic tank installation or repair.



Landowner participation is critical to the success of watershed projects and to the goal of protecting and improving water quality.

Education

Blue Thumb Water Pollution Education Program

The Blue Thumb Water Pollution Education Program protects Oklahoma's waterbodies by helping citizens understand how they can help reduce water pollution. An important aspect of the Blue Thumb Program is volunteers. In 2007 volunteers participated in public education, stream monitoring, and groundwater screenings



Blue Thumb Data Interpretation Workshops

Blue Thumb staff members began leading volunteers through the process of data interpretation in December of 2006. Two workshops were held (Tulsa and Oklahoma City) and volunteers from various parts of the state came to gain more insight into their stream by learning what their collected data—chemical, physical, and biological means for their stream. The volunteers then wrote their own data interpretations. The workshops are an excellent way for volunteers to get a deeper understanding of their stream. Sixteen volunteers took part in this first series of workshops.



Volunteers collect water samples.





BMP Farm Tours

Blue Thumb worked with the Spavinaw Creek and Honey Creek Projects in northeastern Oklahoma this year to introduce hundreds of citizens to best management practices that reduce erosion and nutrients flowing into streams. One important tour brought City of Tulsa leaders and citizens to the Spavinaw Demonstration Farm in Jay, OK, to learn what practices are being installed on rural lands to protect water quality. The educational tour also included information on how urbanites can reduce nonpoint source pollution from their homes and yards.

Blue Thumb Leadership Summits

Three Blue Thumb Leadership Summits were held over the summer of 2007 to get volunteer input into how the Blue Thumb program can more effectively protect water resources in Oklahoma. The summits were held in various locations and two were held on weekends to better meet the volunteers' scheduling needs. Over forty volunteers attended the summits to offer their input. Now these volunteers are serving on committees, continuing to infuse Blue Thumb with fresh ideas and energy to move toward needed changes.





Mini-Academies for High School and College Students



Blue Thumb staff members now hold training sessions especially for high school and college students whose teacher has attended a Blue Thumb Training. Previously, some teachers found it difficult to make the time to get students trained. Now Blue Thumb staff go into schools to help the students prepare for monitoring their stream. BT held miniacademies at five schools during summer and fall 2007.

Stormwater Education

Blue Thumb has continued to work with large and small cities to educate residents about protecting stormwater. Outreach included open house sessions, conservation workshops, articles in local newspapers, and curb marking. Cities with

M Okmulgee High School students stenciling local storm drains with "No Dumping—Keep Our Water Clean."

Regional Urban Stormwater Program

In November, INCOG completed a FY-02 319(h) grant program to initiate a regional urban stormwater protection program in Northeast Oklahoma. Presently there are 17 city and county stakeholders in INCOG's "Green Country Stormwater Alliance" (GCSA) working together to implement urban stormwater protection programs. Education materials and display boards were developed for public 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 guidance document for stormwater data quality and data collection. Stakeholders completed maps of their stormwater systems and began performing inspections of pollution sources. INCOG assisted

with adoption of local ordinances and implementation of inspection programs. Also, INCOG hosted a two-day training workshop on many technical aspects of



inspections and proper handling and disposal of chemicals in the workplace. INCOG completed a comprehensive website dedicated to urban stormwater protection at

<u>www.stormwaterok.net</u>. The GCSA is now sustainable through local funding by stakeholders.

INCOG's Oklahoma Stream Team

In December, INCOG completed the initial development of the Oklahoma Stream Team (OST) under a FY-04 104(b)(3) Wetlands grant. The OST provided technical assistance to the OSU Botanical Gardens to incorporate into their Master Plan a comprehensive suite of



BMP demonstration areas and research facilities showcasing Low Impact Development (LID) and Green Building techniques. The OST hosted one day stream restoration and bioremediation seminars, and provided speakers on urban water quality at the annual Resource Management Conferences in Tulsa. The Oklahoma Stream Team also held a four-day technical conference in Oklahoma City on stream restoration methods. The OST website at www.streamteamok.net will provide technical support for consultants and agencies as well as general information for the public. The OST will be sustainable in the future by INCOG commitments under related urban water quality programs. The Oklahoma Stream Team is an association of Federal, State and local environmental agencies devoted to providing communities, planners and developers with options for stream modification and stormwater management projects that protect and enhance water quality. The OST educates consults and municipal communities on the values of preserving healthy streams and riparian habitat. The OST encourages stream restoration and watershed planning by providing technical assistance in the project planning phase that will result in greater compliance with Federal and State permits under Section 404 and stormwater regulatory programs. Services of the Oklahoma Stream Team are free of charge.

Oklahoma Department of Agriculture, Food and Forestry (ODAFF)

The Oklahoma Department of Agriculture, Food and Forestry – Forestry Services Division administers Oklahoma's silvicultural non-point source management program and the forestry best management practices that protect waters from nonpoint source pollution.

BMP Demonstration and Education

As a part of the Oklahoma Conservation Commission's Spavinaw Creek Watershed project east of Jay, Forestry Services installed and maintained forest road BMPs on the demonstration farm road. These BMPs included rolling dips, water bars, check dams, ditching, turnouts and seeding, fertilizing and placing mulch on the cut banks of the road. Forestry Services participated in several tours of the property organized by the Conservation Commission, explaining the road BMPs and their benefit in reducing sediment flowing into the stream that runs through the property.

As part of the Spavinaw Creek Watershed education project, Forestry Services held one BMP workshop for loggers, landowners, and foresters and three logger and landowner "tailgate" sessions in northeast Oklahoma. Training and education on forestry best management practices was the focus at the workshop, which included presentations, discussion, videos and a field trip. The informal tailgate sessions were held on the job site, and included a review and discussion of situations the loggers and landowners were currently facing, as well as other items of interest related to BMPs and forest water quality protection.





The Forestry Best Management Practices Compliance Monitoring Project

Monitoring compliance of BMPs is valuable for identifying activities that need improvement. The Forestry Best Management Practices Compliance Monitoring Project is a tool Forestry Services uses to measure the implementation of BMPs across eastern Oklahoma's commercial forest area. The monitoring project provides an estimate of BMP compliance, and is also valuable for identifying activities that need improvement. Forestry Services then **emphasizes these activities during training**

BMP Compliance-Monitoring Results

BMP Category	2003-2004 (%)	2004-2006 (%)
Permanent Roads	86.0	90.2
Skid Trails/Temporary Roads	76.5	77.3
Stream Crossings	90.2	91.1
Streamside Management Zones	97.3	96.8
Site Preparation	92.9	89.9
Landings	96.2	97.9
Wetlands	100.0	100.0
Overall Average % Compliance	90.5	91.6

and education work with landowners, loggers, foresters and other land users. Results of the last two

compliance monitoring projects show above 90% compliance with BMPs. The next round of monitoring was initiated in September 2007.

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Protecting Oklahoma's Natural Resources