

**WATERSHED RESTORATION ACTION STRATEGY
(WRAS)**

**FOR THE
POTEAU RIVER / LAKE WISTER WATERSHED**

Prepared By:

Oklahoma Conservation Commission

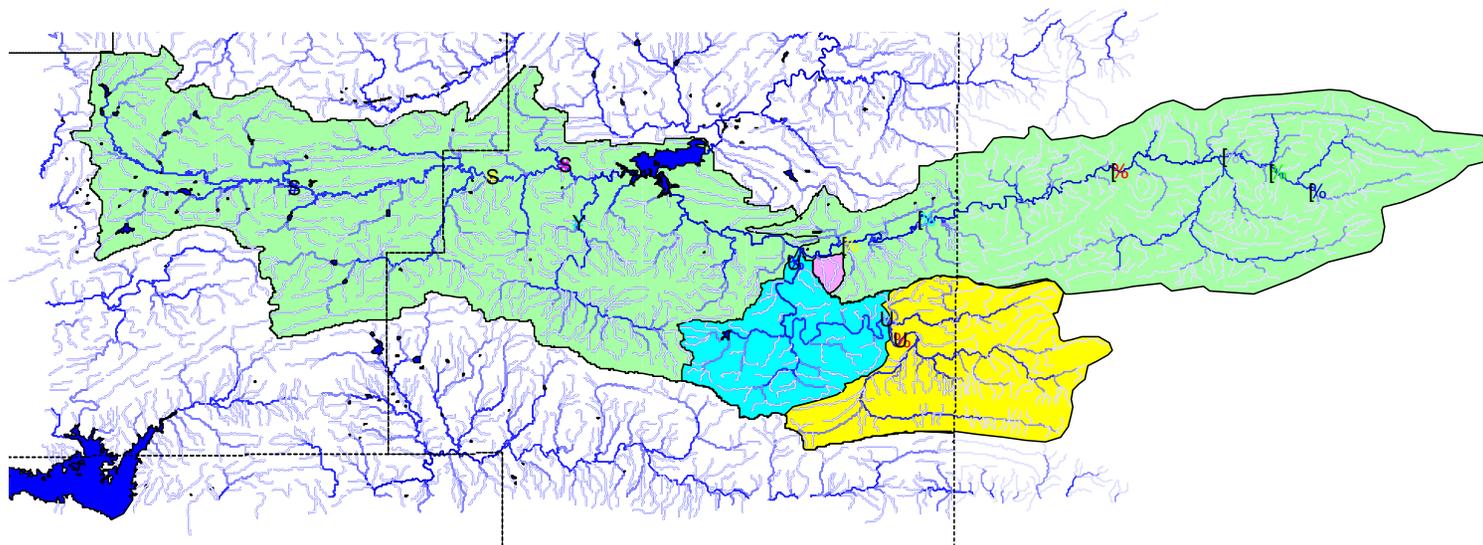
INTRODUCTION:

In keeping with the 1998 mandates of the *Clean Water Action Plan* (CWAP), which establishes goals and implementation schedules for numerous strategies dealing with pollution sources, states are required to develop a *Unified Watershed Assessment* (UWA) strategy. Oklahoma's UWA is a document that was developed and will be implemented based on directives of the state's UWA Work Group. The UWA process is intended to focus the efforts of various agencies to work more cooperatively on the most significantly impaired watersheds in the state. Through the UWA process, the Work Group identified several "Category I" watersheds in Oklahoma that are recognized as significantly impaired and in need of immediate federal and state funding to target restoration activities. The Poteau River / Lake Wister Watershed was one of these high priority watersheds.

Following the requirements of the CWAP, a *Watershed Restoration Action Strategy* (WRAS) must be developed for each of the priority watersheds. This *Watershed Restoration Action Strategy for the Poteau River / Lake Wister Watershed* will summarize the efforts necessary and mechanisms by which restoration and protection activities will be pursued in the Poteau River / Lake Wister Watershed.

Wister Lake was characterized as eutrophic in the National Eutrophication Survey (EPA 1977) and as hypereutrophic in a 1995 § 314 Clean Lakes Study (OWRB 1996) (Figure 1). The lake was also listed as partially supporting for designated uses in the Oklahoma 319 Assessment. The 319 Assessment Report lists nutrients and sediment as the major concern NPS concerns. Segments of the Poteau River, Fourche Maline Creek, and Wister Lake are listed on the 1998 303(d) list for metals, nutrients, siltation, organic enrichment/ Dissolved oxygen violations, pH, Taste and Odor, suspended solids, and flow alteration. Predominant sources of nitrogen and phosphorus appear to be associated with broiler production, a poultry processing plant, several publicly owned wastewater treatment plants, urban storm water, and private septic tank systems. Past and present sources of sediment appear to be associated with agriculture, streambank erosion, silviculture, oil and gas exploration, mining, and road development and maintenance. Point sources are known to exist at Waldron, AR and Red Oak, OK and several other locations along the Poteau River and Fourche Maline Creek. The Waldron, AR contribution includes a large poultry processing plant (OSU, 1993). Abandoned mining operations impact water quality in the system also, contributing acid runoff and heavy metals.

Considerable efforts have been made to address the sources of these water quality problems in the basin and extensive work is planned for the near future. These efforts include reductions in point source loading due to cooperation between the Oklahoma Department of Environmental Quality (ODEQ), the Arkansas Department of Pollution Control and Ecology (ADPCE), and cities of Waldron, Wilburton, and Red Oak, education programs developed by the Oklahoma Cooperative Extension Service (OCES), the Latimer and LeFlore County Conservation Districts, the Natural Resources Conservation Service (NRCS), and the Oklahoma Conservation Commission (OCC), and various



Sampling Sites

- W Blackfork Cr. (Haw Creek)
- W Blackfork Cr. (Hodgen)
- U Blackfork Cr. (slab)
- S Fourche Maline (Hwy 271)
- S Fourche Maline (Leflore)
- S Fourche Maline Cr. (Red Oak)
- Y Holson Cr.
- P/6 Poteau R. (Cauthron)
- P/6 Poteau R. (Hon)
- P/6 Poteau R. (Hontubby)
- P/6 Poteau R. (Loving)
- P/6 Poteau R. (above Waldron)
- P/6 Poteau R. (below Waldron)

- Lakes
- County or State Line
- Stream Order (Size)
- 1 (Smallest)
- 2
- 3 - 4
- 5 - 6
- 7 - 9 (Largest)

- Blackfork of the Poteau River Watershed
- Haw Creek Demo Area
- Watershed B- Unnamed Trib
- Wister Lake Watershed



Figure 1. Wister Lake Watershed (Color-coded map of the watershed and sub-watersheds).

programs to reduce nonpoint source loading from various sources in the watershed. Extensive research has been conducted to characterize pollution problems in the watershed, identifying the most significant sources and the magnitude of the problem. These programs are incorporated into the framework of the WRAS for the Poteau River / Lake Wister Watershed.

The WRAS for the Poteau River / Lake Wister Watershed has been developed as a dynamic document that will be revised, when necessary, to incorporate the latest information, address new strategies, and define new partnerships between watershed shareholders following this initial documentation. Also, it is understood that the water quality goals set forth in this WRAS, as well as the technical approach to address the goals, may not be comprehensive and it may be necessary to revise or expand them in the future.

Federal and state funding allocations for future water quality projects designed to address the Poteau River / Wister Lake Watershed problems should not be based solely upon their inclusion in this WRAS, rather the WRAS should be considered a "focal point" for initial planning and strategy development.

In order for this WRAS to become an integral part of the entire watershed restoration program, it must be amenable to revision and update. It is anticipated that at least biannual revisions may be necessary, and that the responsibility for such revisions will rest primarily with the OCC with support from the Office of the Secretary of the Environment (OSE) and the UWA Work Group.

The following six items are based upon EPA Guidance and have been designated by OSE as the essential components of each WRAS.

I. PUBLIC OUTREACH:

This section identifies agencies and organizations responsible for the development of the WRAS and implementation of the Public Outreach components. There have been several important Public Outreach programs recently implemented statewide that address animal waste nonpoint issues. There have also been several Public Outreach programs initiated within the Wister Lake Watershed by the LeFlore and Latimer County Conservation Districts, OCES, OCC, and other agencies.

The LeFlore and Latimer County Conservation Districts, partnered with the NRCS, have been among the primary agencies responsible for public outreach in the Oklahoma portion of the watershed. The districts and NRCS work one-on-one with citizens of the watershed to reduce pollution and educate about the importance of protecting water resources. The districts and NRCS have also organized or participated in a considerable number of seminars, training sessions, and meetings to interact with local people and provide technical assistance and information.

The Oklahoma Cooperative Extension Service (OCES) has also been a leader in promoting water quality education efforts in the watershed, working closely with the

conservation districts and the NRCS to promote water quality awareness. The OCES provides one-on-one meetings and education with landowners along with group presentations and other forms of technical assistance to improve awareness in the watershed. The OCES also developed a set of test plots to demonstrate production of forage in high phosphorus soils without the addition of poultry litter. The plots demonstrated how slowly normal and intensive production practices reduce soil test phosphorus levels. In addition to all-around technical assistance, OCES personnel present slide presentations or other displays on water quality to various groups. The OCES holds public meetings and workshops to educate landowners on topics such as litter management, pollution prevention during oil and gas exploration activities, and general Best Management Practices (BMPs).

Youth education is another significant effort pursued by OCES, NRCS, and the conservation districts. Most youth education activities focus on general water quality maintenance and improvement and include activities such as 4-H group water quality monitoring and education, "Earth-Day-Every-Day" activities fair where almost 1000 elementary school children and 150 parents were exposed to environmental education, and various other training sessions.

Newspaper articles and other media have also been used to educate citizens of the watershed about water quality. The OCES, Conservation Districts, and NRCS have written numerous articles that were released to local papers, covering a wide range of topics related to water quality. Many articles serve as promotions for various upcoming trainings or other events. In addition, radio spots have been produced and a logo contest was held to produce a mascot for the watershed.

Because the majority of the problem is due to the effects of nonpoint source pollution, the OCC (as the state's technical lead nonpoint source agency) will work through the Latimer and LeFlore County Conservation Districts to sustain the public outreach program throughout the watershed. Also integral in this program will be the interaction of the Watershed Advisory Group (WAG), assembled by the local conservation districts. The WAG will be made up of local shareholders in the watershed (including private citizens, representatives of local industries, and local government) who will help direct the program based on information supplied to them by technical agencies and their knowledge of the needs of the watershed residents.

The Poteau River Watershed is unique to many watersheds in the state in that it already has a functioning WAG. The Poteau River / Lake Wister Advisory Committee has been active in facilitating local involvement with a number of different environmental projects that have been ongoing in the watershed since the early 1990s. Although the WAG may need to evolve to incorporate more representatives of different industry in the watershed, it has proven to be a results-oriented, successful organization. The Poteau River Watershed has also had a technical advisory group, including representatives of the OCC, OCES, NRCS, Oklahoma State Department of Agriculture (ODA), ODEQ, Oklahoma Water Resources Board (OWRB), Oklahoma Department of Agriculture - Forestry services, the U.S. Army Corps of Engineers, The Poteau Valley Improvement Authority (PVIA) and other groups as necessary. This group functions to provide the local steering committee with input as

requested, to coordinate programs to further watershed goals, and to evaluate the success of ongoing efforts.

Another WAG exists in the Fourche Maline portion of the Watershed. This WAG was developed in conjunction with an education program in the Fourche Maline Watershed in Latimer County focusing on reducing impacts on nutrients and sediment to Fourche Maline Creek. This WAG is also made up of representatives of different interests in the watershed, and was assembled by the Latimer County Conservation District. In addition, this project has a separate ED-WAG or Education WAG that directs the education efforts of the project.

A. WRAS DEVELOPMENT:

Several organizations have been actively involved in development of the WRAS for the Poteau River / Wister Lake Watershed protection program. The role of each is described below:

1. Unified Watershed Assessment Work Group (UWA-WG)

This statewide work group was established by the OSE to facilitate implementation of the EPA Clean Water Action Plan and other state water quality programs, particularly with respect to non-point sources and TMDLs. The UWA-WG is providing technical support and leadership in development of all WRAS programs in the state. The UWA-WG and OSE conduct meetings, set WRAS development schedules, and assist with WRAS development guidance.

2. Oklahoma Conservation Commission (OCC)

The OCC is the primary agency responsible for development of the WRAS for the Poteau River / Lake Wister Watershed. The draft WRAS will be forwarded for peer review to members of the State's Nonpoint Source Working Group to insure its consistency with other agency programs. The OCC staff is coordinating the development of all WRAS documents for Oklahoma and will insure that all document formats are consistent and that all items are adequately addressed.

B. WRAS IMPLEMENTATION:

The success of water quality protection programs in the Poteau River / Lake Wister Watershed depends on the approval and cooperation of the local landowners and various government agencies. The Watershed Advisory Group should be the primary mechanism through which this is accomplished and its composition should be developed to insure the success of this function.

The WAG will be one of the primary mechanisms to accomplish public outreach in the Poteau River / Lake Wister Watershed. These efforts will be supplemented substantially through the activities of the Conservation Districts, NRCS, OCES, Corp. Comm., and the OCC. In addition, other state and federal programs provide public involvement and education that complement these efforts.

Considerable work has already begun through public outreach and legislative efforts to address the water quality and related concerns in the watershed. Projects are underway to educate and to reduce pollution impacts to the resource. These efforts include participation in volunteer monitoring and education programs led by Conservation Districts, OCC, OWRB, and OCES, implementation of BMPs through participation in cost-share programs, improvements in wastewater treatment for municipalities, work with oil and gas operators by Corp. Comm., and numerous efforts by integrators and poultry and swine growers to reduce the impacts of animal wastes.

A pilot program of BMP implementation to protect water quality in the watershed that included a public outreach component was the Haw Creek Area Implementation Project, completed by the LeFlore County Conservation District, NRCS, OCES, and OCC in 1998. The Haw Creek Area Project focused on BMP implementation in a small subwatershed (Blackfork Creek near Haw Creek) of the Poteau River watershed that had problems and sources typical of the remainder of the watershed. A considerable number of landowners participated in the program that should result in long-term improved water quality in Blackfork Creek. Notably, 100% of the poultry producers in the watershed participated in the program and as a result, have update farm plans and the tools to reduce impacts from their operations to the surrounding watershed. The program also provided researchers and managers with information about the sources of the problems and what activities might be effective at controlling those sources. In addition, the education effort extended during the project was successful in raising awareness about the importance of water quality and other water quality issues among watershed citizens. However, the project only implemented BMPs in a small area of the total watershed and demonstrated no discernable impact on water quality of the Poteau River. Implementation efforts will be necessary in a much greater percentage of the watershed in order to see positive effects in the Poteau River and Lake Wister.

A second demonstration effort was funded in the Potts-Fanny watershed concurrent to the Haw Creek Project. This project was funded entirely with State funds supplied by the legislature and was completed by the LeFlore County Conservation District, NRCS, and OCC. This project also targeted the poultry industry and again, 100% of the poultry operators participated in the program. Remaining monies targeted septic system

upgrades.

Most efforts to date have focused on development of reliable data to assess the extent and source of water quality-related problems in the watershed. New Public Outreach will focus more on stakeholder participation in implementation of BMPs throughout the watershed to reduce nutrient loadings and erosion in the watershed.

Many local efforts, as well as state and federal agencies and other organizations, are collectively contributing to the Public Outreach efforts in the Poteau River / Lake Wister Watershed. The roles of these groups and programs are summarized below:

1. Latimer and LeFlore County Conservation Districts and NRCS

These agencies are critical to ensuring participation of local landowners in water quality improvement programs. Local Conservation Districts and local NRCS offices are generally the most effective means to bring a large federal or state program to private citizens because the local agencies know the local people. Local agencies generally have the most accurate knowledge concerning current land management practices and

2. Total Maximum Daily Load (TMDL)

The ODEQ is developing a TMDL to protect the Poteau River and Lake Wister. This load is based, in part, on recommendations of a 1996 Clean Lakes Phase I Report on Lake Wister, which suggested at least a 41% load reduction was necessary to prevent further acceleration of eutrophication in the lake. The TMDL will set limits on the permissible nutrient load to the lake and help determine the necessary loading reductions to be contributed by point sources and nonpoint sources. The TMDL can only be implemented if local citizens and other stakeholders agree it has merit and are willing to take the necessary voluntary and mandatory steps to implement the recommended reductions.

3. Watershed Advisory Group (WAG)-

The Wister Lake WAG will provide essential guidance towards the direction of the project- a locally-led effort to solve local problems. The purpose of the WAG is to give guidance on the 319 program that the OCC will be implementing in the Poteau River Watershed. The OCC 319 program is a demonstration and implementation project that will give landowners the opportunity to implement BMPs to protect water quality. The WAG will also put into place an educational program that will take the "show and tell" approach to the public in the entire watershed. The WAG is made up of representative watershed stakeholders including various industries, civic groups, landowners, etc.

4. The Oklahoma Conservation Commission (OCC)

The OCC has devoted over \$1 million towards implementing best management practices to reduce nonpoint source pollution in the watershed. A portion of these funds will support the WAG, another portion will be devoted to monitoring the success of the program, but the majority of the funds will provide cost-share assistance to farmers to implement WAG-

approved best management practices to protect the water resources of the watershed. The OCC's main function will be to provide technical guidance to the WAG and local conservation districts for implementation of the BMPs. The OCC will also be responsible for monitoring the success and providing administrative support for the project.

5. Oklahoma Department of Agriculture (ODA) Hotline

The ODA established a toll-free poultry litter hotline in 1998 to match buyers and sellers of poultry litter. The hotline was established to develop mechanisms for marketing excess animal waste in the impaired watersheds to areas that can benefit from land application of litter. The ODA Litter Hotline is 1-800-583-7131. The ODA hotline is also available on Oklahoma State University's Cooperative Extension Service web site at "www.dasnr.okstate.edu/poultry/haul.htm". Poultry growers in the Arkansas portion of the watershed are encouraged to contact the ODA hotline regarding export assistance. ODA maintains information concerning Arkansas sources of litter through the voluntary assistance of private individuals, since the ODA cannot directly target Arkansas growers who may have litter to sell.

6. Oklahoma State University Cooperative Extension Service (OCES) Education Program

OCES has a website on Animal Waste Nutrient Management which provides all the background information needed for developing Nutrient Management Plans and Animal Waste Management Plans. OCES organized the High Plains Animal Waste Management Conference in March, 1999. Also to date, OCES has provided training to approximately 1200 growers as required by recent Oklahoma legislation on poultry production. The training includes general background on water quality and nonpoint source impacts as well as descriptions of BMP options and implementation resources. OCES provides technical assistance to landowners and conducts and cooperates with numerous educational programs throughout the watershed.

7. OSU Web Page for Litter Marketing

In 1998, OSU's Department of Agricultural Economics established the Oklahoma Poultry Litter Line web page. Its purpose is "... to promote better understanding of the movement and application of poultry litter in Oklahoma." This market web site is designed for agricultural producers wanting bulk amounts of poultry litter as a soil fertilizer and/or soil amendment. The web address is <http://www.dasnr.okstate.edu/poultry/haul.html>. This list includes a list of contract haulers.

8. OCES Publications and Fact Sheets

OCES has developed several fact sheets including: (1) "Using Poultry Litter as Fertilizer", (2) "Soil Quality and Animal Manure", and (3) "Manure and Raising Soil pH". Other publications include a water quality driven soil handbook, "Oklahoma Soil Fertility Handbook". Also, OCES produced a promotional video on poultry litter management and utilization that will support the marketing and export of poultry litter. Specific instances of loading, trucking, and spreading of poultry litter were covered. OCES has developed a

riparian handbook that provides information on the benefits and functions of riparian areas, as well as guidance for maintenance of effective riparian zones.

9. NRCS Local Offices - Oklahoma and Arkansas

The United States Department of Agriculture Natural Resource Conservation Service (USDA/NRCS) in Arkansas and Oklahoma have been involved with the Poteau River / Lake Wister Priority Area for the Environmental Quality Incentives Program (EQIP). This is a joint venture for Oklahoma and Arkansas. The NRCS designated the Poteau River / Lake Wister Watershed as an EQIP Priority Area for FY 1998. Funds are available through the NRCS to implement practices intended to reduce phosphorus loading to the Poteau River and Lake Wister. The Poteau River / Lake Wister watershed has also been designated a priority area. An Education Plan will be developed under EQIP, and will include: 1) development of Animal Waste Management Handbooks. (2,000 are planned); 2) purchase of a Table Top Display unit for use in educational workshops to highlight water quality and conservation practices; 3) organization of an annual tour for producers to visually see the results of best management practices and effects of proper waste application; and 4) development of a Grassland/Wildlife Handbook for use in watershed protection.

10. Oklahoma Corporation Commission (Corp. Comm.)

Corp. Comm., as the state agency with jurisdiction over oil and gas mining activities, has ongoing efforts in the watershed to identify and reduce impacts from oil and gas activities. These include efforts to identify location and severity of erosion related to well sites and pipelines, followed by cleanup by the operators and pipeline companies. Corp. Comm. wrote a 1995 handbook on oilfield pollution prevention and provided this information, along with OCES handbook on prevention and pollution control for oil and gas operators in the lake Wister Watershed. Corp. Comm. will begin additional work in the watershed to further identify problem areas in the watershed and initiate educational and other actions for site operators in order to reduce the impacts of oil and gas operations.

11. Integrators

Presently, the poultry industry is represented by officials from Okay Farms and Tyson Foods. These two integrators represent the majority of all poultry production in the Poteau River / Lake Wister Watershed. Both integrators are actively pursuing public outreach and public education initiatives through relationships with their contract growers. Both have established dialogue with their contract growers concerning Oklahoma legislative and regulatory requirements on animal production and poultry waste issues. The Integrators have agreed to fund education programs for growers as required by Oklahoma legislation. A representative of the Integrators will be included in the WAG.

12. Poultry Federation

The Poultry Federation is currently involved with education of integrators and growers about legislative and water quality issues dealing with poultry production. This organization has become an important voice for the poultry industry. The Poultry Federation relies upon

an effective education program for its members, and will be an important partner in the Poteau River / Lake Wister Watershed.

13. Oklahoma Department of Agriculture- Forestry Services Division- "Project 2000"

Forestry Services is providing assistance to "Project 2000", a water quality effort on the Fourche Maline Creek, tributary to the Poteau River. Foresters provide technical forestry assistance to landowners throughout the area, including advice on the State's forestry BMP guidelines. The Forest Stewardship Program provides requesting landowners a comprehensive written management plan developed in consultation with other natural resource specialists. Forestry Services also provides logger training across the region in cooperation with the Arkansas Timber Producers Association, with emphasis on forestry BMPs. Forestry also cooperates with the Oklahoma Forestry Association on the "Master Logger" and "Pro Logger" program which recognizes loggers who have completed training and are in compliance with industry guidelines. Forestry Services has initiated a statewide forestry BMP compliance monitoring program.

14. U.S. Army Corps of Engineers (USACE)- Wister Lake Project Office

The USACE Wister Lake Project is responsible for operations and maintenance of Wister Lake. Although Wister Lake is critical as a flood control structure in the Arkansas River Basin, the USACE also works hard to maintain the system to protect its water quality. The USACE has modified seasonal pool elevations in an attempt to optimize water quality and also conducts and sponsors investigations into methods to alleviate some of the lake's water quality problems. The USACE project office also provides a wide variety of information to lake users.

II. MONITORING / EVALUATION ACTIVITIES:

This section describes the water quality goals and expected outcomes for the watershed. All monitoring and data collection completed by OCC will be done according to formal quality assurance planning. All data used to evaluate the effectiveness of the implementation efforts will be collected under EPA-approved Quality Assurance Project Plans. All watershed activities will have detailed budget information provided to OCC and the WAG, and all project outputs and milestones will be submitted to EPA. The OCC will maintain a database of OCC data that will be used to track the progress of all watershed activities, including fund allocations and sources, milestones, and accomplishments. The OCC will prepare periodic summaries of this database for management and make project information available to the public, to all work groups, and to government agencies and private companies, as requested. The Office of the Secretary of the Environment will oversee coordination of the various monitoring efforts ongoing in the basin.

A. GOALS AND OUTCOMES:

The following Goals (in no specific order of importance) have been established for the Poteau River / Wister Lake Watershed Program. These goals are directed at preserving and protecting not only the beneficial uses of the water resources, but at protecting the

value of the resource as a whole, including natural, cultural, and socioeconomic resources. Many of these Goals have already been met or are presently being addressed by multiple agencies and interest groups.

1. Establish **Data Quality Objectives** and draft **Quality Assurance Project Plans** for all monitoring efforts.
2. Reduce **non-point source nutrient loadings** to Poteau River watershed and Lake Wister by supporting and implementing appropriate nutrient and sediment management strategies and Public Outreach initiatives.
3. Develop a **TMDL** for nutrients for the Poteau River Watershed based upon results from current water quality studies, and recommend future TMDL strategies after completion of the preliminary TMDL.
4. Modify **municipal NPDES permit allocations**, as necessary, for nutrients.
5. **Coordinate monitoring efforts** in the basin to better meet the needs of all water quality agencies and maximize quantity and quality of data that can be obtained in the watershed.
6. Support collection of **soils and land use data** for use with water quality assessments and development of Animal Waste and Nutrient Management Plans.
7. Create a **common database** for all water quality data and other information, provide backup to all databases, and link all data geospatially into a GIS system.
8. Establish a water quality **Trend Monitoring Program** after completion of intensive studies.
9. Develop a **Comprehensive Watershed Management Plan** or other similar watershed planning tool (e.g. WRAS) to establish water quality improvement goals, schedules, activities, milestones, outputs, funding and resource options, participants, and education goals.
10. Establish a **Watershed Advisory Group** to advise on which BMPs will most effectively reduce NPS pollution in the watershed, and provide other directives to facilitate cost-share-assisted programs. The WAG will be formed by combining the two existing WAGs (Poteau River and Fourche Maline) and should consist of members from each of the following groups: Poultry Producer, Poultry Integrator, Resident Homeowner, Cattle Beef/Dairy Producer, CD Board Member Latimer County, CD Board Member LeFlore County, Representative of Oil and Gas Industry, Silviculture Industry, Minority Representative(s) (tribal), City Of Red Oak, City of Heavener, City of Wilburton, Poteau Valley Improvement Authority, Environmental Association, Forest Landowner, a representative of the mining industry, and a representative of the U.S. Army Corps of Engineers.
11. Implement **Best Management Practices** (BMPs) and other Point Source and Non-Point Source control strategies to control nutrients and reduce erosion in the watershed and

reduce delivery to Lake Wister.

12. Implement an effective **Riparian Management Plan** to develop, manage, and protect riparian zones in the watershed that function as nutrient filters and reduce streambank erosion. This plan will include efforts to minimize impacts of development and construction in the floodplain, promote riparian buffer development and protection, and evaluate streambank destabilization and efforts to reduce streambank erosion.
13. Support **nutrient management** activities in the watershed, such as construction of cake-out storage structures in poultry operations to protect water quality, supporting development of water quality based Animal Waste Management Plans, investigating options for controlling nutrient levels in litter (e.g. by increasing use of phytase and alum and reductions in phosphorus in feed), supporting incentive payments through EQIP programs, development of market-based litter uses as a value-added product, creation of effective litter availability hotlines and other communication venues, cultivating commercial enterprises that use litter as a raw material, and support of other programs as they become viable.
14. Develop and support **Public Outreach** and **Education** programs in the watershed to promote implementation of nutrient and sediment management strategies, awareness of water quality issues, and overall protection of the resource.
15. Promote remedial and mitigative actions on abandoned mines to reduce acid and metal contamination in the watershed.
16. Promote remedial actions to reduce adverse impacts from oil and gas operations.
17. Evaluate mechanisms to provide the local community with a long-term source of quality drinking water.

B. ASSESSING PROGRESS:

Multiple efforts conducted by multiple agencies, funded by several sources are concurrently ongoing in both states of the Poteau River / Lake Wister Watershed. All projects have the same ultimate goal, protecting water resources, but the various jurisdictional responsibilities of the various agencies lends itself to less than optimal expenditures of effort and resources. Effective communication is one of the most difficult problems of managing multiple projects being conducted concurrently by different organizations. A number of avenues are being established by the OCC and various other agencies to help relieve this potential problem.

1. Frequent meetings of the Poteau River / Lake Wister WAG.
2. Central Database Management by OCC and ultimate internet availability.

3. Frequent written reports and technical presentations to the WAG and the Oklahoma State Water Quality Monitoring Council.
4. Reports to and review by the State Nonpoint Source Working Group.

III. CLEARLY DEFINE WATER QUALITY PROBLEMS:

A. PROBLEMS:

The Poteau River and Lake Wister are the sole drinking water source for surrounding communities in a tri-county area in southeastern Oklahoma, serving over 40,000 customers. However, it has been recognized since the early 1990's that the Poteau River and Lake Wister were experiencing water quality degradation, primarily resulting in increased treatment costs and taste and odor problems. As substantial research indicated that these perceptions were based on actual problems, efforts began to focus on the perceived sources of the problems.

Initial research concluded that the watershed was impacted by excess nutrients and sediment, and suggested that sources might include point sources from both Arkansas and Oklahoma, as well as nonpoint sources such as the poultry industry, oil and gas exploration, and various other agricultural sources. Later research confirmed that the poultry industry was likely having a negative impact, but upland and streambank erosion due to loss of riparian zones and poor pasture maintenance, road development and maintenance, silviculture, and improperly sized or maintained septic systems were also impacting the water resources. Much of the research concluded that watersheds with the most intense landuse (primarily those with the greatest concentration of pastureland) were the greatest contributors to the water quality problems. These included the following subwatersheds: Poteau River above Cauthron, Poteau River between the Loving and the headwaters of Lake Wister, Fourche Maline Creek above Red Oak, and Fourche Maline between Red Oak and LeFlore.

The following principal water quality problems that must be addressed by the WRAS:

1. Eutrophication and sedimentation in the Poteau River / Lake Wister.
2. Excess nutrient loadings from watershed (principally phosphorus and nitrogen).
3. Excessive streambank and upland erosion in the Fourche Maline Watershed, resulting in alteration of stream geomorphology to less stable forms and increased sediment load to Lake Wister.
4. Loss of aquatic habitat in streams due to sedimentation.
5. Continued decline in water quality (e.g. dissolved oxygen problems, turbidity, aesthetics, productivity, eutrophication) in Poteau River and its tributaries, Fourche Maline Creek, and Lake Wister.

6. Acid runoff and metals contamination from abandoned mine drainage.

B. SOURCES AND THEIR CONTRIBUTIONS:

The extensive research in the basin identified various sources as having potential impacts on the water resources of the basin. Although it is recognized that some sources have less substantial impacts than others, it is believed that substantial effort is necessary on the part of all potential sources to protect the resource and insure its longevity. Efforts are already underway to control some of these sources, nevertheless, additional work will be necessary. The following potential sources (in no particular order) have been identified as contributors to the excess nutrients and sedimentation in the watershed:

1. Poultry litter and poultry production.
2. Production of other livestock (cattle, hogs).
3. Reduced or poorly maintained riparian zones.
4. Streambank erosion.
5. Poorly functioning private septic systems.
6. Municipal permitted point source dischargers.
7. Nutrient and sediment loadings from soil erosion.
8. Pasture maintenance.
9. Oil and gas exploration activities, plus erosion along pipelines and lease roads and around production pads.
10. Silviculture and related road building.
11. County road maintenance.
12. Acid mine drainage

IV. SPECIFY ACTION PLAN AND WATER QUALITY GOALS:

A number of studies and programs have been conducted or are planned or underway to address the water quality problems discussed above. The ODEQ is finalizing a TMDL to protect the resource. The USGS, OWRB, OCC, Corp. Comm., and conservation districts continue to monitor streamflow and water quality in the basin. The OCC and conservation districts have demonstrated remedial activities to reduce the impacts of acid mine drainage.

In addition, the OCC and NRCS have begun studies under federal funding to address nutrient management in the watershed. These studies are described in Item VI and address the following action items:

- A. Characterize NPS contributions from poultry, other livestock, septic systems and background contributions.
- B. Evaluate nutrient and sediment impacts and dynamics in the watershed.
- C. Evaluate nutrient and sediment impacts and dynamics in Lake Wister.
- D. Evaluate point source discharger contributions.
- E. Conduct soil sampling to: 1) determine the best relationship between phosphorus in soils and runoff and 2) reduce phosphorus runoff due to litter application to phosphorus-saturated soils.
- F. Develop public education and outreach programs for both the general public and ones targeted to specific operators and land users in the watershed.
- G. Designate priority areas and practices for implementation based on contribution to overall water quality problems.
- H. Develop a TMDL and Phosphorus Target Values for the Poteau River and Lake Wister.
- I. Develop overall nutrient management programs.
- J. Establish riparian management and implementation programs. Included in this program will be an effort to encourage proper floodplain management.
- K. Develop implementation programs to reduce the effects of nonpoint source pollution associated with pasture management.
- L. Evaluate the effects of streambank erosion in the watershed and implement programs to reduce those effects.
- M. Evaluate the impacts of acid mine drainage and develop effective mechanisms to reduce those impacts.
- N. Evaluate the impacts of oil and gas exploration and develop effective mechanisms to reduce those impacts.
- O. Evaluate the impacts of road maintenance and develop effective mechanisms to reduce those impacts.
- P. Evaluate sediment loading to the watershed and develop programs to reduce that loading.

- Q. Evaluate the need for septic system upgrades and establish support funding.
- R. Evaluate the impacts of silviculture in the watershed and develop effective mechanisms to reduce those impacts.
- S. Encourage adoption of state and federal legislation, as needed, to protect the watershed.
- T. Implement a Comprehensive Watershed Management Plan or WRAS to manage the watershed.
- U. Establish long-term water quality trend monitoring programs.
- V. Evaluate long-term options for drinking water for local communities, either by lake water quality manipulation, increased treatment of intake water, or alternative water sources.

V. IMPLEMENTATION SCHEDULE

The following table provides a summary of projects that have been completed, are currently underway or are being considered for the near future. This is not an exhaustive list, but focuses on the major problems and sources in the watershed. Included in the table is a reference to which specific goal listed in section IV the particular study addresses.

Lead Agency (ies)	Project(s)	Duration	Section IV Goal(s) Reference	Status
Oklahoma State University (OSU) and OCC	Wister Lake Watershed Project	1992 - 1993	A, B, D, T	Completed
OWRB, USGS, OCC	Sampling and testing water for water quality studies	1990 -	A, B, T	Ongoing
OWRB and OSU	Clean Lakes Study on Lake Wister	1992 – 1996	A, B, C, D, H	Completed
Oklahoma Corporation Commission (Corp. Comm.)	Identifying Excess Sediment Impacts to Streams in the Lake Wister Watershed, and Ameliorating Oil and Gas Field Related Causes	2000-2003	B, L, N	Begin 2001
OWRB	Water Quality Monitoring to Evaluate Beneficial Use Support	1998 -	B, C, H, T	Ongoing
OSU, OCC	Poteau River Comprehensive Watershed Management Program: TMDL Component	1994 - 1999	A, B, C, D, G, H, N	Completed
OWRB, U.S. Army Corps of Engineers (USACE)	Implementation of NPS BMPs to Protect the Fourche Maline Arm of Lake Wister	1997-2001	C, P	Ongoing
Corp. Comm., OCC, NRCS, OCES	Lake Wister Watershed Soil Erosion Project	1994-1995	B, F, G, K, L, N, O, P, R	Completed
Corp Comm, OWRB	Investigation of Excess Turbidity in City of Tahina Water Supply related to oil and gas sites	1998	B, F, G, H, N, O, P	Completed
OCC, Latimer and LeFlore County Conservation Districts (CDs)	Poteau River and Wister Lake Watershed Implementation Program	2000-2005	A, B, E, F, I, J, K, Q, S	Planned
OCC, University of Oklahoma (OU)	Remediation of Underground Mine Areas Through the Treatment with Fly Ash	1993-2000	G, M	Completed
LeFlore and Latimer Co. CDs, OCES, and OCC	Water Quality Education Programs	1992 -	F, I, J, K, L, M, N, O, R	Ongoing
OCC	Poultry Litter Hotline, public	1997 -	F, I	Ongoing

	education, rules development and enforcement			
Oklahoma Department of Environmental Quality (ODEQ)	Develop TMDL	1998 -	H, Q	Ongoing
OCES, NRCS	Publications (fact-sheets, job sheets, handbooks, videos, web-sites); Provide waste management training for growers; Provide demonstration projects on the benefits of poultry litter	1998 -	F, I	Ongoing
LeFlore Co. CD, NRCS, OCC	Potts/Fanny Implementation Project	1997-1999	A, B, E, F, G, I, J, K, P, Q, S	Completed
LeFlore Co. CD, OCES	Haw Creek Mini- Watershed Project: to determine correlation between high soil phosphorus concentrations and concentrations in runoff	1996 – present	A, B, E, F, G, I,	Ongoing
LeFlore Co. CD, Oklahoma Grazing Land Association	GLCI Mini- Watershed Project to study hay production and quality of nitrate vs. litter fertilized hayland.	1999-present	A, B, F, G, I, K	Ongoing
Latimer Co. CD, OCES, and NRCS	Riparian Area Demonstration Project	1999-present	B, F, J, K, L, P, R	Ongoing
Latimer Co. CD, Eastern Oklahoma State College (EOSC), NRCS	Demonstration Area on Agro-Forestry Alley Cropping	2001	B, F, J, L, P, R	Planned
LeFlore Co. CD	Future Mini-Watershed Project-to demonstrate correlation between soil types and phosphorus movement through those soils	2001	A, B, E, F, G, I, K	Planned
OCC, Department of Energy,	Use of a Staged Wetland System to Treat Acid Mine Drainage	2000-	G, M	Planned
OCC, OU	Use of Staged Wetlands for Mitigation of Acid Mine Drainage	1995-present	G, M	Nearing Completion

Oklahoma Department of Agriculture (ODA)– Forestry Services Division	“Project 2000”, A Water Quality Effort on the Fourche Maline Creek		B, F, G, J, R, T	Ongoing
OCC, OU	Organic Waste as a Treatment for Acid Mine Drainage	1995 – present	G, M	Nearing Completion
ODA- Forestry Services	Forest Stewardship Planning and Forestry BMP Monitoring Program		B, F, G, J, R, T	Ongoing
OSU, OCC	Develop GIS database of point and nonpoint sources for the Wister Lake Watershed. Provide quality assurance and technical support relating to water quality.	1992 -	A, B, D, E, G, H, M, N, O, Q, R, T, U	Nearing Completion
USDA/NRCS -AR & OK	Environmental Quality Incentives Program (EQIP): Poteau River / Lake Wister Area	1997	I, J, K	Ongoing
United States Geological Survey	Historical and real time water quality data and stream flow data		A, B, H, T	Ongoing
Latimer Co. CD, OCC, NRCS	Fourche Maline Watershed Education Project: Education Through Demonstration of Best Management Practices to Reduce Sediment Loading to the Fourche Maline Creek and Lake Wister	1997-present	B, F, G, J, K, L, N, O, P, S, T	Ongoing
USACE	Water Quality Monitoring and Management of Lake Wister		C, S, T	Ongoing

VI. FUNDING NEEDS:

The information presented below pertains to recently completed, existing and proposed contracts for water quality projects in the Poteau River / Wister Lake Watershed that support the WRAS goals. A brief outline of each contract's purpose is presented in Section V above. An extensive amount of effort has already been expended in the watershed that is not reflected below. Countless studies and millions of dollars have been expended towards support of goals that have been summarized in this WRAS.

1. Water Quality Sampling for Beneficial Use Monitoring and Lake Wister Assessment Monitoring- Annual Budget (OWRB) (Ongoing)

Task	Federal	State	Total
Beneficial Use Monitoring- Rivers	-0-	\$13,000	\$13,000
Beneficial Use Monitoring- Lakes Assessment Sampling- quarterly	-0-	\$6,000	\$6,000

2. Identifying Excess Sediment Impacts to Streams in the Lake Wister Watershed, and Ameliorating Oil and Gas Field Related Causes-(OK Corporation Commission) (Planned Project)

Item	Total	
Personnel	Coodinator/Hydrologist	\$10,000
	Administrative Support	\$1,900
Fringe Benefits	\$3,689	
Travel Expenses, Vehicle Use, and Mileage	\$4,000	
Meters, Batteries, and Related Supplies	\$5,411	
Total	\$25,000	

3. Poteau River and Lake Wister Watershed Implementation Project (OCC)
 (Planned Project)

Task	Federal	State Cost Share Funds	Total
On-Site Coordinator	\$218,750		\$218,750
Part-time Clerical Support	\$75,000		\$75,000
WAG Committee Support	\$25,000		\$25,000
Implementation	\$512,450	\$762,573	\$1,275,023
OK Corp Comm. Project (detailed in #2)	\$25,000		\$25,000
Vehicles	\$60,000		\$60,000
Supplies & Copier	\$72,000		\$72,000
Education	\$155,660		\$155,660
Total	\$1,143,860	\$762,573	\$1,906,433

4. Poteau River Comprehensive Watershed Management Program (OCC, Latimer and LeFlore County Conservation Districts, OCES, OSU, NRCS) (Completed Report)

Task	Federal	State	Total
Select priority watersheds, estimate pre- and post-implementation pollutant loadings from sub-watersheds. Estimate total loading of N, P, and sediment to Wister Lake and evaluate the impact of project on water quality	\$250,927	\$167,285	\$418,212
Implement cost-share program. Provide educational and technical assistance.	\$85,000	\$56,667	\$141,667
Conduct workshops, public meetings, field trips, and tours to demonstrate BMPs. Sample soils and poultry litter in priority watersheds	\$156,073	\$104,049	\$260,122
Evaluate educational impact through follow-up surveys.	\$3,000	\$2,000	\$5,000
Prepare final report.	\$5,000	\$3,333	\$8,333
Total	\$500,000	\$333,334	\$833,334

5. TMDL Development (ODEQ)
 (Ongoing Project)

Task	Total
Tetra-Tech Contract for TMDL Development	*\$120,000 (estimate)

*Does not include direct costs to ODEQ for TMDL development (unknown).

6. Fourche Maline Watershed Education Project: Education Through Demonstration of BMPs to Reduce Sediment Loading to the Fourche Maline Creek and Lake Wister (Latimer County CD, OCC, NRCS) (Ongoing Program)

Task	Federal	State	Total
Administration/ Watershed Advisory Group	\$21,000	\$14,000	\$35,000
Identification of NP Sources*		unknown	
Monitoring	\$6,000	\$4,000	\$10,000
Education and Outreach	\$60,600	\$39,400	\$101,000
Demonstration	\$55,400	\$36,934	\$92,334
Total	\$143,000	\$95,334	\$238,334

*not eligible for funding under this project, but necessary for completion, nonetheless. Funding will be provided by Eastern Oklahoma State University and Latimer County.

7. Mini-watershed Demonstration Projects (LeFlore County Conservation District, Latimer County Conservation District, OCES, EOSC, and NRCS) (Ongoing and Future Program)

Watershed Project	Local	Federal	State	Total
Haw Creek		\$2,000		\$2,000
Riparian Area Project			\$2,000	\$2,000
GLCI	\$2,000	\$2,500	\$2,000	\$6,500
Agro-Forestry Alley Cropping		\$3,000	\$2,500	\$5,500
Future Projects	\$5,000		\$2,000	\$7,000

8. USDA / NRCS Environmental Quality Incentive Program (EQIP) for Poteau River / Lake Wister Watershed (Ongoing Program)

Year	Federal	Producers / Landowners	Total
1997	\$89,234	\$35,694	\$124,928
1998	\$99,545	\$49,772*	\$149,318
1999	\$188,459	\$75,384	\$263,843
2000	\$231,519	\$92,608	\$324,127

*- estimated 50% cost-share provided by producers, although many provided as much as 60% so total and producers share may be under-estimated. In addition, according to the District Conservationist, many producers are doing considerable work without cost-share funding in order to participate in the program. This extra effort is difficult to quantify.

9. Implementation of NPS BMPs to Protect the Fourche Maline Arm of Lake Wister

(OWRB, USACE) (Nearing Completion)

Task	Federal	State	Total
Determine placement and methods to reduce effective fetch	\$3,000	\$2,000	\$5,000
Determine placement of aquatic plantings	\$3,000	\$2,000	\$5,000
Implement methods and plantings	\$63,000	\$42,000	\$105,000
Monitoring	\$27,000	\$18,000	\$45,000
Evaluate Success	\$1,000	\$667	\$1,667
Total	\$100,000	\$66,667	\$166,667

10. Remediation of Underground Mine Areas Through Treatment with Fly Ash (OU, OCC) (Completed)

Task	State	Federal	Total
Site Remediation	\$120,578	\$180,866	\$301,444
Monitoring	\$23,346	\$35,018	\$58,364
Technical Assistance	\$14,076	\$21,116	\$35,192
Total	\$158,000	\$237,000	\$395,000

11. Use of a Staged Wetland System for Mitigation of Acid Mine Drainage (OU, OCC) (Nearing Completion)

Federal	State	Total
\$125,000	\$84,881	\$209,881

12. Potts/Fanny Implementation Project (LeFlore County Conservation District, NRCS, OCC) (Completed)

Task	State
Implementation	\$78,000

13. Other Potential Future Funding Needs

Task	Status	Agency(ies)	Estimated Cost
Use of a Staged Wetlands to Treat Acid Mine Drainage	Planned	OCC, DOE, CBRC	\$148,000
Project 2000- Accelerated Logger Training	Ongoing	ODA, Arkansas Timber Producers Association	\$20,000
Upgrade Heavener WWTFs		ODEQ, EPA, City of Heavener	

Upgrade Wilburton WWTF		ODEQ, EPA, City of Wilburton	
Upgrade Red Oak WWTF		ODEQ, EPA, City of Red Oak	
Historical and Real-Time Water Quality and Stream Flow Data	Ongoing	USGS	
Water Quality Monitoring and Management of Lake Wister	Ongoing	USACE	\$3,500,000
Feasibility Study on Improving Lake Wister Water Quality	Planned	USACE, OWRB	\$500,000
ODA Hotline- public education, rules development and enforcement	Ongoing	ODA	\$10,000 (est.)
BMP implementation throughout the Wister Watershed to reduce impacts of Animal Waste	Started, but not all funding secured	EPA, OCC, NRCS, etc.	\$10,000,000 (est.)
Upgrade all Septic Systems (as necessary) in the Wister Watershed	Started, but only a small portion of funding secured	EPA, ODEQ, NRCS, etc..	
Forestry Compliance Monitoring in Wister Watershed	Developing	ODA, EPA	
Forestry cost-share Program	Developing	ODA	\$250,000