

Arkansas & Missouri Shared Water Resources

A Report to Arkansas Governor Mike Beebe & Missouri Governor Jay Nixon



January 31, 2010

Introduction

Arkansas and Missouri share high-quality, abundant water resources important to the environmental and economic vitality of both states. With the importance of those shared watersheds in mind, Arkansas Governor Mike Beebe and Missouri Governor Matt Blunt signed the Bi-State Memorandum of Agreement (MOA) on November 24, 2008.

The MOA is intended to enhance and promote cooperation among the Arkansas Department of Environmental Quality, the Arkansas Natural Resources Commission, and the Missouri Department of Natural Resources regarding water quality and water quantity issues of concern to both states.

Representatives of the three agencies met in August 2009 for an initial discussion of issues and priorities as set out in the MOA. Those issues and priorities include implementing plans to protect and improve water quality and water quantity in the shared watersheds, thus improving the quality of life in both states.

This report highlights the progress so far toward meeting the goals of the MOA.

A copy of the MOA is attached in Appendix A.

Agencies

The Arkansas Department of Environmental Quality (ADEQ) has the responsibility to enforce state laws that regulate or control pollution. The department's Water Division consists of four branches, all dedicated to protecting and enhancing the state's surface and groundwater quality. ADEQ's Water Division maintains the state's waters by:

- Issuing permits to control pollution of the waters of the state;
- Evaluating and enforcing permit compliance;
- Investigating citizen complaints, spills, and fish kills related to environmental causes;
- Developing standards for the state's waters;
- Surface water quality monitoring, groundwater monitoring and protection, and wasteload allocation. Water quality monitoring includes monitoring the chemical constituents in the water and sediment of rivers, streams, and lakes at more than 144 sampling stations within the State and monitoring the biological communities and physical habitat within selected waters; and
- Assessing monitoring data to determine water quality impairments.

The Arkansas Natural Resources Commission (ANRC) manages and protects water and land resources through its water development, water management, and conservation divisions. ANRC's responsibilities include:

- Protecting and managing ground water through the monitoring of aquifer water levels and water quality, designating aquifers as critical areas, enforcing the proper construction of water wells, and education;
- Administering conservation programs that encourage and facilitate development and efficient use of surface and groundwater, implementing best management practices, collecting water use reporting data, designating nutrient surplus areas, nutrient management planning for land application of dry litter, and providing assistance to Arkansas's conservation districts;
- Protecting and managing surface water through accreditation of floodplain managers, administering a dam safety program, managing tax credit programs for development, restoration, and conservation of wetlands and riparian zones, and issuing non-riparian water use permits;
- Administering the Arkansas State Water Plan, which is a guide for efficient development of land and water resources; and
- Administering various loan and grant funding sources available to entities constructing water and sewer infrastructure.

The mission of the Missouri Department of Natural Resources (MDNR) is to protect, preserve and enhance Missouri's natural, cultural, and energy resources. The department's Water Protection Program is entrusted to help ensure clean and safe water for all Missourians, including drinking water, and surface and groundwater for recreational, farming and industrial uses. To accomplish this goal, the program provides financial and technical assistance, issues permits, conducts compliance efforts, oversees construction of groundwater wells, and classifies water bodies to determine safe levels to protect their uses. The program includes the Public Drinking Water Branch, the Water Pollution Control Branch, and the Financial Assistance Center.

MDNR's Water Resources Center (WRC) assists communities, public entities, and state and federal agencies by providing expert technical assistance and guidance on issues, including interstate water management, statewide water use, planning and development, water resource monitoring, drought assessment, and flood coordination. In addition, the WRC's Dam and Reservoir Safety Program inspects and permits nonfederal earthen dams in excess of 35 feet. These responsibilities are carried out to ensure that the quantity of Missouri's water resources is adequate to support present and future needs for agriculture, municipal and industrial supplies, electric and hydroelectric utilities, commercial navigation, recreation, fish and wildlife, and other environmental, social, and economic uses.

MDNR's Soil and Water Conservation Program (SWCP) and Soil and Water Districts Commission provide leadership and support, both financial and technical, to 114 soil and water conservation districts in Missouri. SWCP staff assists the 114 soil and water conservation districts throughout the state with the implementation of practices to address soil and water conservation. SWCP staff is responsible for the administration of the Cost Share, Special Area Land Treatment, Loan Interest Share Program/Conservation Equipment Incentive, District Grant programs, and various research and planning projects.

Shared Water Resources

Arkansas and Missouri agencies worked cooperatively to define the states' shared water resources and their boundaries. Coordination of information and monitoring efforts will be prioritized and conducted on watersheds (surface water) and aquifers (groundwater) within the agreed-upon boundaries. Figures depicting the location of existing water resources monitoring stations, impaired water bodies, and outstanding resource waters are included in Appendix B.

Key Water Resource Issues

In August, representatives from each agency identified and discussed relevant water resources issues. Complete minutes from the August 20th meeting are included in Appendix C. Topics addressed during the session, by state, included:

Missouri

Nutrient Criteria

Missouri is currently seeking approval from the Environmental Protection Agency on new water quality criteria for nutrients in lakes and reservoirs. The new criteria will affect the amount of nutrients permitted for discharge to Table Rock Lake and Lake Taneycomo. Efforts are underway to propose nutrient criteria on streams within the next three years.

Concentrated Animal Feeding Operations

Missouri recently initiated rulemaking to address the changes in the federal rule governing CAFO wastewater management. State rulemaking reflecting these changes is expected to be complete in the first half of 2011. The changes are expected to result in revisions to the state's general permit for CAFOs which expires in February 2011.

319 Grant Projects

Missouri has performed or initiated 68 projects costing \$8.7 million to improve water quality in waters shared by Arkansas and Missouri. The primary pollutant being addressed is nutrients and eighty percent of the nutrient control projects focus on improving water quality within the Table Rock Lake and Lake Taneycomo watershed.

Water Quality Monitoring and Assessment

Missouri's 2008 list of impaired waters includes 285 waterbody/pollutant pairs, 20 of which lay within watersheds shared with Arkansas. Pollutants identified as the cause for impairment include nutrients, dissolved oxygen, and mercury.

Elk River Total Maximum Daily Load

Several Arkansas streams flow into the Elk River Basin in Southwest Missouri. A comprehensive strategy (or Total Maximum Daily Load) for limiting the discharge of nutrients in the Elk River watershed was written in 2004.

Regional Water Supply Planning

Study projections show that portions of southwest Missouri may experience future water supply shortages. The Tri-State Water Resource Coalition was formed to investigate future water supply strategies and to address concerns such as high growth rate, localized overuse of groundwater, and the potential for future overuse of surface water. The area served by the Coalition extends from Pittsburg, Kansas, and Miami, Oklahoma on the west to Springfield, Missouri on the east, Lamar on the north, and the Arkansas state line on the south.

The Coalition recently requested U.S. Army Corps of Engineers studies to reallocate storage in Stockton and Table Rock Reservoirs for water supply. In addition, the Coalition and MDNR completed a cooperative study to identify suitable locations for construction of a new reservoir(s) to serve regional needs. The Coalition has also initiated discussions with the Beaver Water District (in Northwest Arkansas) and the Grand Lake Authority (in Northeast Oklahoma) to acquire treated or raw water.

Water Resources Monitoring

MDNR has been monitoring groundwater levels throughout Missouri since the mid-1950s. The groundwater-level monitoring network consists of 157 wells that collect data from Missouri's diverse aquifers. Real-time data is served to the public on-line. Twenty-two new wells have been added in Southwest Missouri, an area with heightened groundwater availability and water quality concerns. A total of eighty new observation wells have been added to the network since 2007.

MDNR has provided funding and technical support for two groundwater modeling studies in Southwest Missouri. The objective of each study is to create a current groundwater surface elevation map and to develop a model to simulate the aquifer response to future water use scenarios. The studies are located in Greene County, (near the Springfield metro area) and in Stone and Taney Counties (near Branson). Both studies are being completed through the Corps' Planning Assistance to States program. Study results will be published in 2010.

MDNR provides funding support for over 50 stream gages that collect water quality and quantity information. This information is vital in determining stream flow needs for aquatic life, assimilative capacity, water supply and other beneficial uses. Stream gage data are also used to assess and respond to both drought and flood events. Many of the gages are located on popular recreational streams and rivers and real-time data is available to the public online. Gages are operated at Bennett Spring, Montauk, and Roaring River State Parks which are home to three of Missouri's most popular spring creek trout fisheries.

Arkansas

Nutrient Criteria

Excess nutrients, such as nitrogen and phosphorus, can degrade streams and be harmful to aquatic life. Developing limits for the amount of nutrients allowed to be discharged

into a stream, known as nutrient criteria, help keep the waterbody viable for its most common uses.

Arkansas is in the initial phase of developing nutrient criteria as the result of a pilot program on the Upper Saline watershed in the Ouachita Mountains. ADEQ plans to set criteria for streams based on dissolved oxygen, nitrogen, total phosphorus levels, and other biological indicators. General, narrative standards will be applied to ecoregions, watersheds, or on a site-specific basis.

White River Dissolved Oxygen

The White River features world-class trout fisheries in the tailwaters below dams along the White River, which flows from northwest Arkansas into southwest Missouri and back into north-central Arkansas. However, the seasonal stratification of water in each reservoir lake causes a decrease in the amount of dissolved oxygen (DO) in the water released at the base of each dam to generate electricity.

When DO levels are as low as six parts per million, trout are stressed. At four parts per million, some fish die. At two parts per million or lower, trout are likely to die. Tensions increase between the fishing industry and utilities because of the problem. In 1990, at the request of then-Governor Bill Clinton, a committee was established to discuss short-term and long-term solutions to the DO issue. The committee meets semi-annually and some steps have been taken to improve the quality of the tailwaters.

However, this has not been enough to satisfy ADEQ's water quality standards for dissolved oxygen; therefore, the White River below Bull Shoals Dam and North Fork River below Norfork Dam are listed as impaired waterbodies on a state list required by Section 303(d) of the Clean Water Act. As a result of the low DO issues and the inclusion of the White River and North Fork on the impaired waterbodies list, a Total Maximum Daily Load ("TMDL") was completed in 2009 to determine the DO levels necessary in the tailwaters to protected designated uses.

ADEQ encourages the implementation of measures near the dam that will raise DO in the tailwaters enough to meet the six-parts-per-million standard at all times. Technology is available to do so.

White River Minimum Stream Flows

ANRC revised its *Title III Rules for the Utilization of Surface Water* to include monthly minimum flow (shut-off) levels for the White River from Bull Shoals Dam to the confluence with Mississippi River. The monthly minimum stream flow levels represent conditions under which out-of-stream utilization is curtailed in order to provide a minimum level of protection for in-stream benefits.

Groundwater protection

ANRC designated portions of seven counties in northeastern Arkansas as critical groundwater areas in 2009. This designation recognizes the existence of a water quality or quantity problem and encourages local, state, and federal entities to develop a plan of

action to address these problems. Persons implementing best management practices within critical groundwater areas qualify for state tax incentives.

State Water Plan

The ANRC has requested funding to update the current State Water Plan, which was last updated in the 1980s. Components of the update will include: assessment of existing and future water supply sources, estimation of future water demands, public education and input, reallocation studies, and other water resource related analyses.

White River Comprehensive Basin Study

This study is funded through the Memphis District Corps of Engineers, with a 25% local match requirement from the non-federal study partners. The states of Arkansas and Missouri have cost-shared studies and projects in the upper White River basin. The Study has included investigations on existing federal projects (impoundments), water use, and ecosystem impacts associated with water resource activities in the basin.

Groundwater Quality Standards

ADEQ, ANRC, and the Arkansas Department of Health are collaborating to develop groundwater quality standards. The three agencies are challenged by differing and independent regulatory authorities regarding groundwater quality.

Arkansas Phosphorus Index (API)

The API is a risk assessment tool for evaluating phosphorus runoff potential from pastures fertilized with animal manure. The index is used by nutrient management plan writers for determining maximum nutrient application rates. In 2009, the ANRC amended its definition of the API to accommodate revisions proposed by the API Advisory Panel.

Issues Identified for Future Coordination

The agencies recognize the numerous water resource issues and challenges that face the states. Moving forward, the states agreed to continue discussions on the following topics:

- Structuring the water quality standards between the states to enhance the management of shared waters.
- Coordinating water quality monitoring plans: The states have the opportunity to share data on shared waters and coordinate water quality studies and biological assessments in the watersheds.
- Coordinating water quality assessments and assessment methodologies: The states will promote closer interstate coordination on assessment methods used to determine water impairments in each state and to identify impaired waterbodies, known as 303(d) lists. This coordination should improve the continuity between the states' listings and consequently enhance the overall water quality management efforts on shared waters.
- Collaborative development of nutrient criteria for lakes within the White River Basin: ADEQ will propose site-specific nutrient criteria for Beaver Lake during a

2010 review of water quality standards. The agency will use the model for that proposal, as well as other extensive scientific modeling, to consider appropriate criteria on other lakes and reservoirs in the state.

- Addressing TMDL success within the Elk River Basin. The states will share water quality data and exchange thoughts on the effectiveness of on-going water quality improvement efforts in shared waters within the Elk River Basin.
- Addressing the differences in management and functionality of multiple jurisdictions within the area defined by the MOA. For example, the two states are parts of different EPA regions and multiple Army Corps of Engineers districts and divisions.

Conclusion

The initial meeting highlighted numerous opportunities for collaboration on water issues important to the health and beauty of the states' shared resources. The agencies will continue to work to address minimum stream flows, nutrient criteria, water use, and water quality reporting and other items that will be mutually beneficial.

The challenging work that has already begun will continue with a meeting this year in Missouri. The agencies understand the core focus of the MOA and, as such, are committed to protecting the water quality and preserving the water supply of an important, growing region.

The MOA requires a minimum of one general coordination meeting per year. Additional meetings to address specific issues will be conducted as warranted. The State of Missouri will host the second annual general coordination meeting in 2010.

Appendix A



January 31, 2010

Resolution as Redrafted 11/03/08**Bi-State Memorandum of Agreement between Arkansas and Missouri
Regarding Cooperation on Water Quality and Water Quantity Issues
In the States' Shared Water Resources****PURPOSE**

This Memorandum of Agreement ("MOA") is entered into by and between the Governor of Arkansas and the Governor of Missouri for the purpose of enhancing and promoting cooperation among the state agencies which address water quality and water quantity issues involving surface and ground water resources in the two states. These shared water resources are important economically and environmentally to Missouri and Arkansas. As this region continues to grow and develop, we must act collectively to ensure that we maintain our abundant supply of water and protect and improve our historically high quality waters, which have long characterized the region. This MOA is intended to formalize the resolve of both states to cooperate in addressing these water issues of common concern. The shared water resources covered by this MOA are delineated in the attached maps.

RESOLUTION

WHEREAS the Governor of the State of Arkansas and Governor of the State of Missouri have pledged their support to protect the environment and economic welfare of the shared water resources for the benefit of the citizens of both states; and

WHEREAS the relevant agencies of both states have pledged to cooperate in an effort to protect water quality and quantity and ensure the use of the shared water resources for the economic benefit of both states; and

WHEREAS both states have mutual concerns and responsibilities for the stewardship of their shared water resources,

NOW, THEREFORE, to enhance and promote cooperation in the management of water quality and water quantity between the states, the Governor of Arkansas and the Governor of Missouri do hereby agree jointly and cooperatively to direct their respective natural resource agencies, the Arkansas Department of Environmental Quality ("ADEQ"), the Arkansas Natural Resources Commission ("ANRC") and the Missouri Department of Natural Resources ("MDNR") to:

1. Work together to develop a common hydrologic definition of the shared water resources and implement coordinated plans to protect and improve water quality, water quantity, and the quality of life;

2. **Work together to develop, implement, and share bi-state monitoring and modeling of water quality and water quantity in the shared water resources;**
3. **Identify joint water quality or water quantity studies and water quality or water quantity projects in the shared waters to be conducted on a bi-state basis;**
4. **Work together to develop and prioritize a set of clear objectives for implementing those studies and projects;**
5. **Meet at least annually and additionally as necessary to review the progress of these cooperative efforts, identify problems in achieving current objectives, plan the coordination of tasks and revise plans as necessary to achieve the objectives from paragraph four above; and**
6. **Report biennially to the Governors of the two states on the status of this agreement beginning with the first such report by January 31, 2010.**

Meetings are to be rotated annually between the two states with the first to be scheduled in Arkansas during 2009. Additional meetings will be scheduled by mutual agreement of the states. The Directors of the state agencies involved, or their representatives, will coordinate the meeting schedules and agendas.

THE PARTIES FURTHER AGREE THAT:

1. **This Bi-State MOA shall become effective on the date of the final signature set forth below and shall continue in effect unless modified by mutual written consent of both parties or termination by either party upon a ninety day written notice to the other party.**
2. **Nothing in this MOA shall be construed as restricting or limiting in any way state sovereignty or the statutory authority or jurisdiction of ADEQ, ANRC, MDNR or any other Arkansas or Missouri state agencies assisting with these efforts.**
3. **Amendments to this MOA may be proposed by either party and shall become effective upon the approval of both parties.**

IN WITNESS WHEREOF, the Governors of the State of Arkansas and the State of Missouri have hereunto set their hands.

STATE OF ARKANSAS

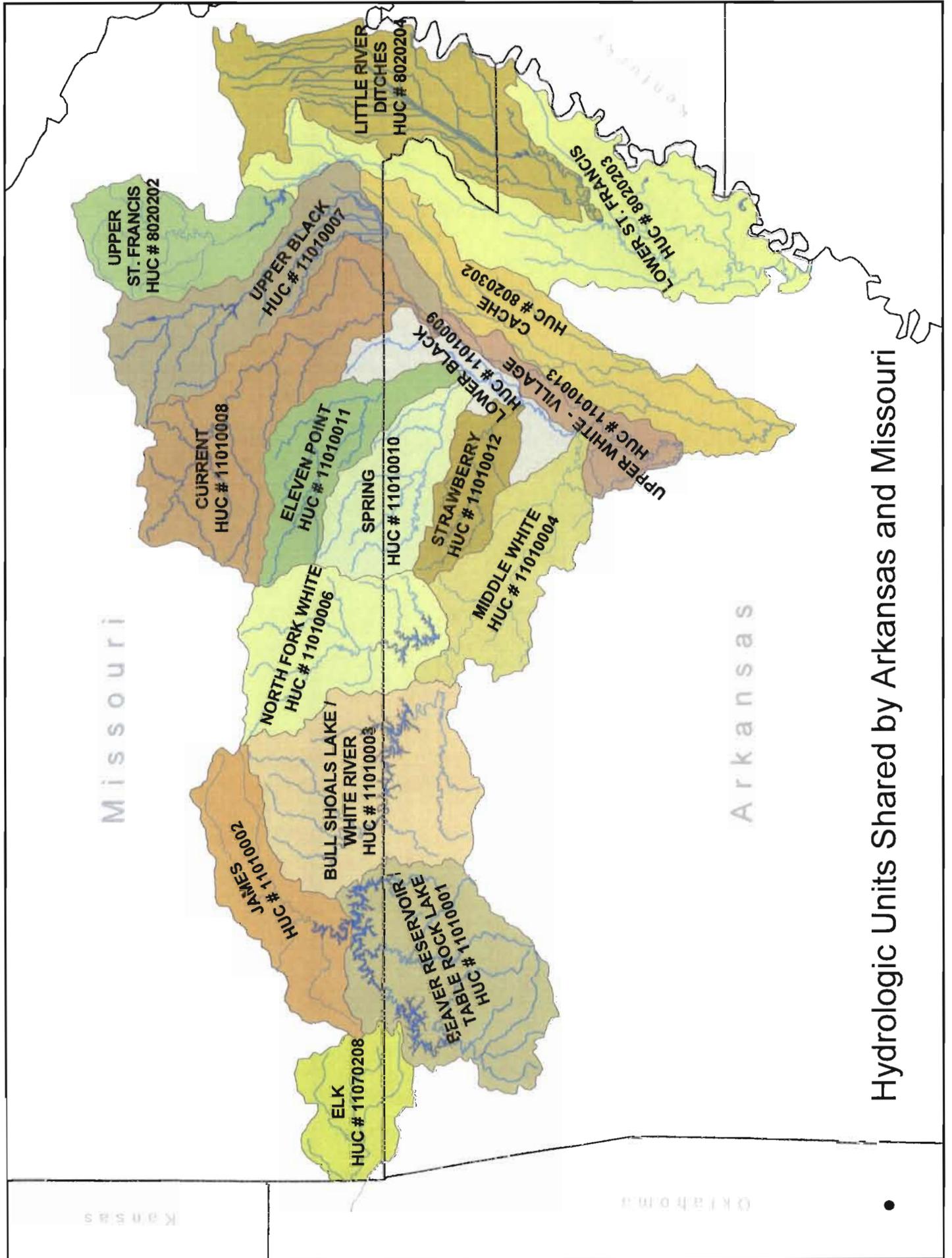

Mike Beebe

11 - 24 - 08
Date

STATE OF MISSOURI


Matt Blunt

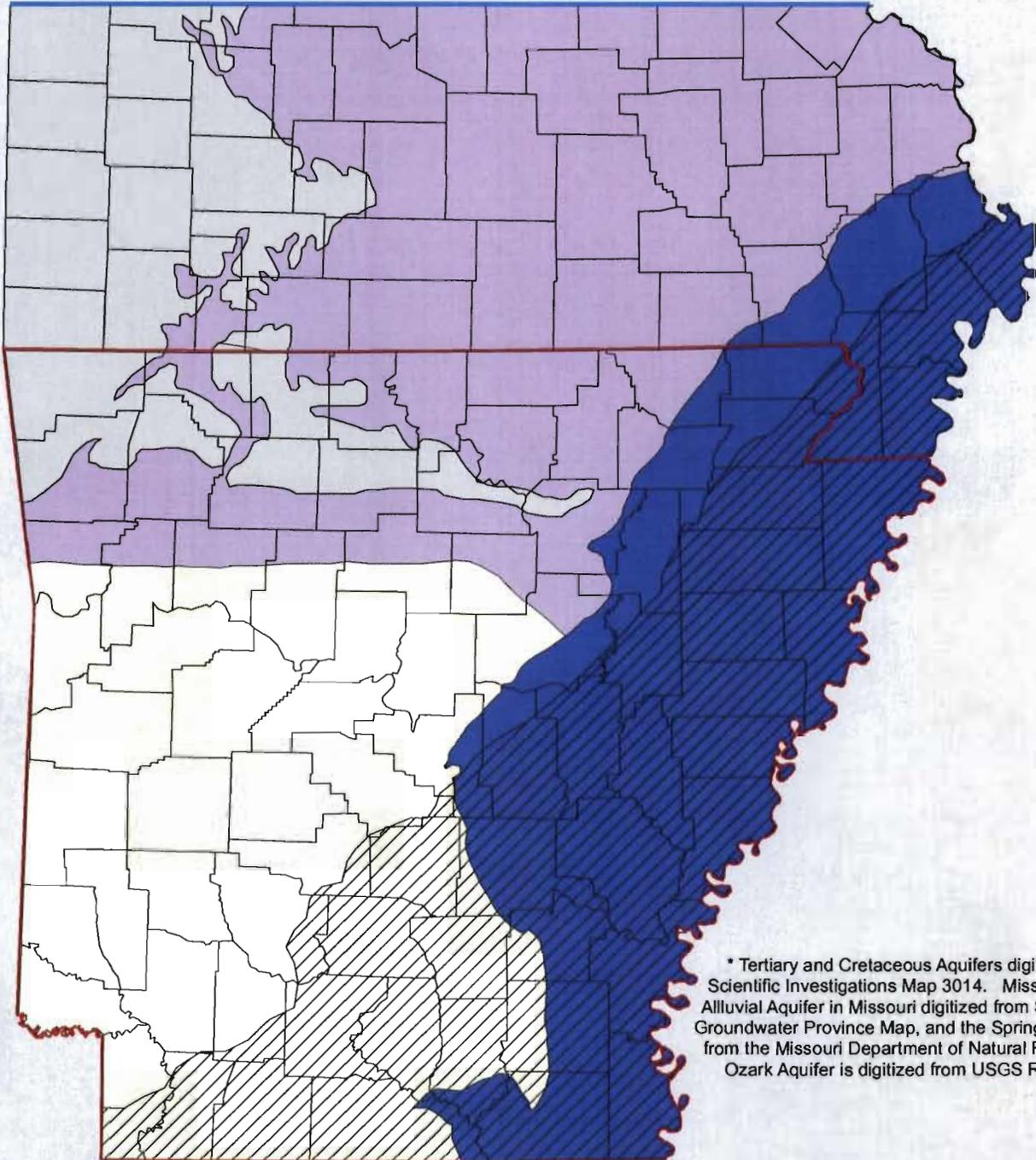
24 November 2008
Date



Hydrologic Units Shared by Arkansas and Missouri

Generalization of Aquifers Shared by Arkansas and Missouri

Northern Extent of Shared Aquifers



* Tertiary and Cretaceous Aquifers digitized from USGS Scientific Investigations Map 3014. Mississippi River Valley Alluvial Aquifer in Missouri digitized from Southeast Lowlands Groundwater Province Map, and the Springfield Plateau Aquifer from the Missouri Department of Natural Resources web site. Ozark Aquifer is digitized from USGS Report 2008-5137.

0 15 30 60 90 120 Miles

Legend

-  Mississippi River Valley Alluvial Aquifer
-  Tertiary and Cretaceous Aquifers
-  Springfield Plateau Aquifer
-  Ozark Aquifer
-  State of Arkansas
-  County Boundaries

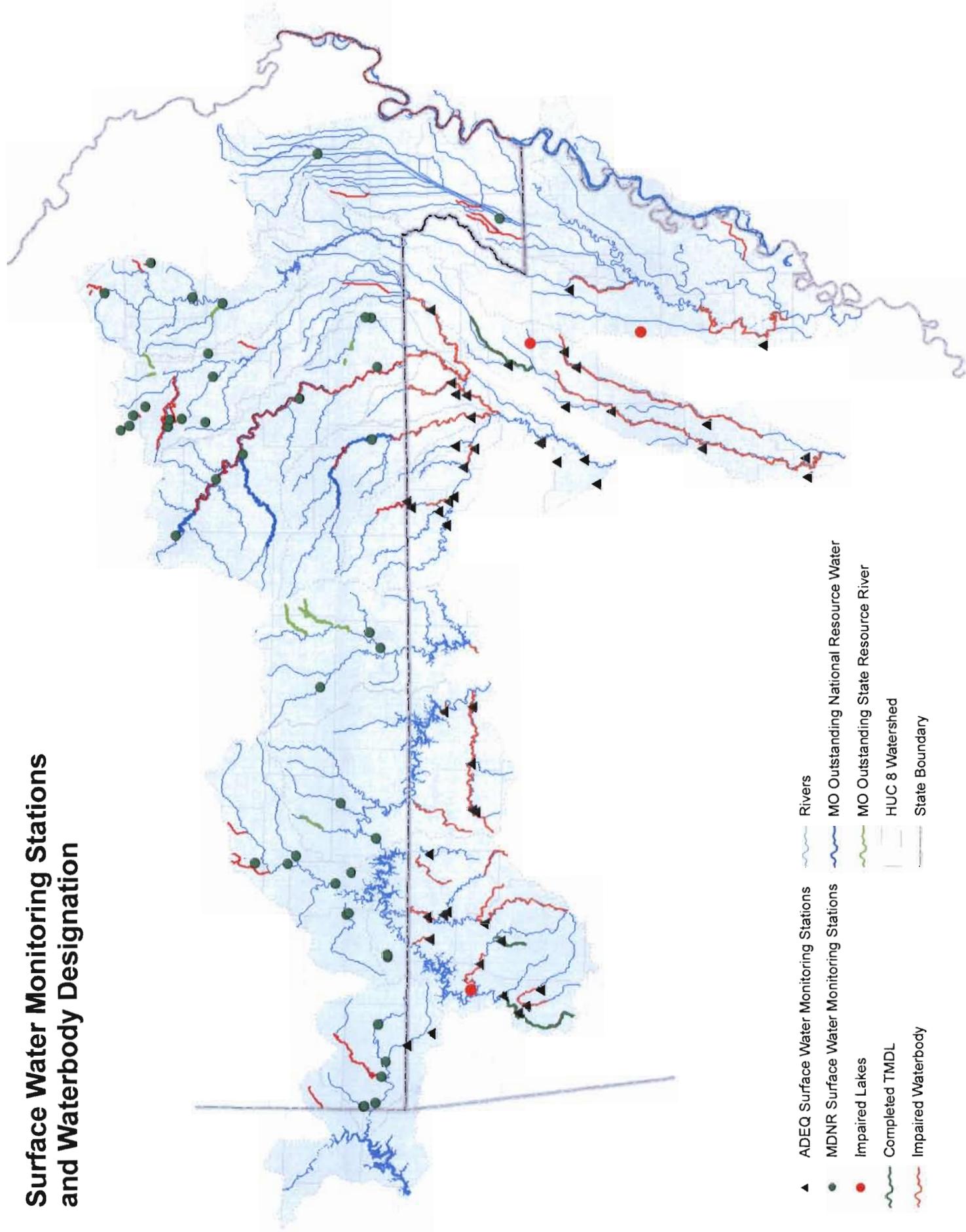


Appendix B

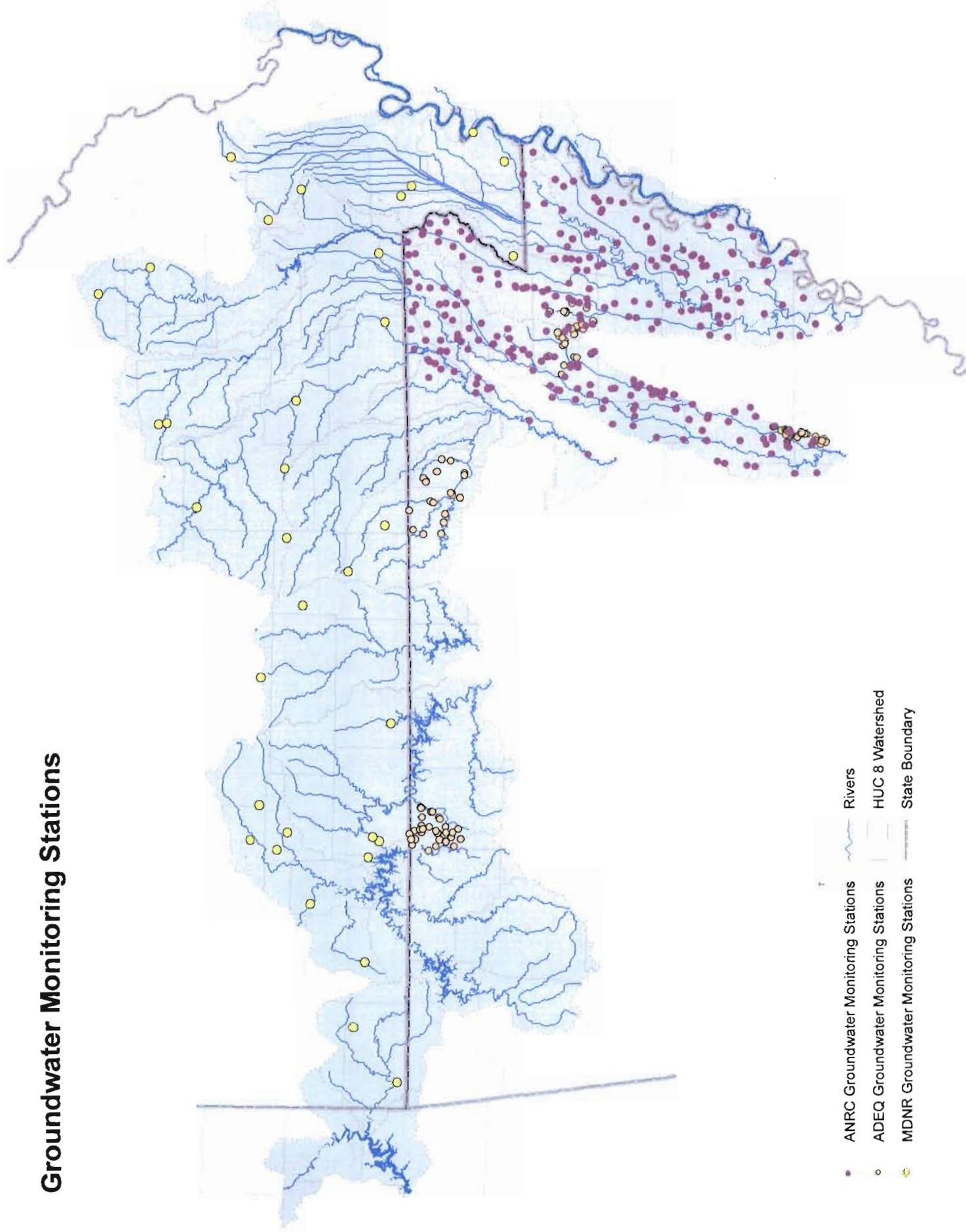


January 31, 2010

Surface Water Monitoring Stations and Waterbody Designation



Groundwater Monitoring Stations



Appendix C



January 31, 2010

August 20 Meeting
Lowell, Arkansas

Attendees: Mike Wells, Randy Young, Crystal Phelps, Todd Fugitt, Sarah Clem, Teresa Marks, Ryan Benefield, Dan Schuette, Phil Schroeder, Ken Brazil, Steve Drown, Ryan Mueller, Ellen Carpenter

I. Missouri Report

Nutrient Criteria

Missouri representatives discussed the nutrient criteria for lakes, which were just completed and include criteria for Table Rock Lake and Taneycomo (both are in our shared watersheds). The criteria are expected to become effective at the end of October. In developing the criteria for reservoirs, the state was divided into three different regions. Looked at reference lakes (least disturbed) in each region and took a percentile of the reference values for total phosphorus, nitrogen, and chlorophyll. Some lakes need site-specific criteria. If the percentile reference values can't be met, then a predictive model is used. Missouri has found a good correlation on residence time, depth, and watershed characteristics.

For 2010 water quality assessments, Missouri expects to compare the lake results to the new criteria.

Missouri will start developing nutrient criteria for streams, but will need more data to boost the analysis of how nutrients affect uses.

EPA just issued new guidance on the development of nutrient criteria in August 2009, which promotes further analysis of the cause and effect between nutrients and water use.

Biological criteria are not as well defined as they should be, and Missouri is looking at incorporating the "biological condition gradient" into the standards as a way of better defining tiered aquatic life uses.

Missouri has effluent regulations for total phosphorus for lakes, including Table Rock and Taneycomo. The effluent limit established for NPDES permitted discharges to lakes is 0.5 mg/l. This limit appears to be having a positive effect on water quality.

CAFOs

Federal requirements are for permits where operations are planning to have discharges. Most permitted operations in Missouri are covered by a general permit, which expires in 2011. Missouri systems are designed for no discharge. Where open air lagoons are used, there can be discharge under emergency conditions, but how would limits be placed on emergency discharges?

Under the federal regulations, CAFOs have greater public participation requirements. Missouri public notices the template only. Under the federal regulations, nutrient management plans are specific for each site and each plan requires public notice. This practice would make Missouri's general permits moot.

Under the CFR, states have one year to get rules in place for CAFO regulation under the federal requirements (December 2009).

Missouri is looking at permitting requirements for Class II facilities.

In Arkansas, ADEQ issues state permits for liquid waste systems. If farms are handling dry litter, they are not permitted by ADEQ. ANRC requires nutrient management plans to be developed in nutrient surplus areas, but these plans are being implemented throughout Arkansas. Funding is provided to Conservation Districts to write the plans and conduct inspections. Plan writers and applicators are required to be certified. Approved nutrient management plans are deemed permits.

In Arkansas, litter haulers are tracked. In the Eucha/Spavinaw 70% of the litter is transported out of the watershed.

Missouri is considering a program to permit contract haulers. Knowing where litter is going is an issue MDNR is looking at, which might be addressed with legislation. Missouri requires technicians to be certified.

319 Projects

Missouri has 68 projects totaling \$8.7 million within the shared watersheds. Eighty percent of the nutrient control projects target the southwest corner of the state, including primarily Table Rock Lake and the White River watershed. Missouri is working with county soil conservation agents to leverage grants to provide more intensive watershed efforts.

Missouri has a dedicated sales tax for soil & water conservation districts to fund special area land treatment programs. The tax couldn't be used to target priority areas because funding of projects depends on how active the districts are.

Missouri has a pilot project involving three watersheds. A restoration plan is to be developed for addressing the issues in each watershed. 319 grants would be used for staffing, monitoring, and planning activities and state funding (from the special area land treatment programs) would be used for implementing the restoration plan. The district boards are agreeable. The State is (and has been) working with EPA on using the 106 funding for monitoring.

303(d) lists and TMDLs

Missouri completed a TMDL in 2004 for nutrients in the Elk River Basin. This TMDL impacts Bentonville's point source to Town Branch. Missouri has not evaluated results of establishing allocations for point sources on water quality and other sources of nutrients in Arkansas. This may be an issue for further discussion between the states. The Elk River Improvement District may include Arkansas constituents. NACA, which proposes to discharge to Osage Creek, may include Bentonville's wastewater. Both EPA and Oklahoma have commented on the draft permit.

When comparing Arkansas and Missouri's 303(d) lists for shared waterbodies, it seems that the assessments target different parameters. For example, Arkansas monitors for beryllium, Missouri does not. Arkansas has a numeric turbidity standard. Missouri has a narrative standard.

Arkansas uses a 5-year rolling time frame for determining exceedances. Missouri does not limit data collected to a certain time frame and they look at all data, but representativeness of data becomes an issue with the passage of time. Region 6 lists streams with 10% exceedances and will not consider other criteria for listing.

The 303(d) lists highlight some of the differences in the states' water quality standards. These differences might not be a practical problem because permits for point sources in both states have to meet the downstream state's standards. In other words, it is probably okay to have unique water quality standards. However, coordinating our respective monitoring plans is an area where the two states can work together to ensure that both states are monitoring for the parameters of importance or concern to each state. This coordination probably cannot begin until the 2012 assessment, but we should start talking now about how to coordinate on these issues.

It is important to note that EPA is moving to less flexibility in state standards even though this uniformity/standardization may be inconsistent with the concept of program delegation, which should allow states to tailor their programs to their own issues while ensuring that their programs are at least as stringent as the federal program. The two states should look at the differences/similarities in regulatory approaches taken by the different EPA regions and Corps of Engineers districts.

Arkansas has completed TMDL for mercury in the Ouachita River. Missouri has not completed a TMDL for mercury yet. Missouri would like to look at how Arkansas did its mercury TMDL.

Missouri participated in the development of the TMDLs for its consent decree waters pursuant to an EPA/Missouri MOU. Missouri used 106 and 319 funds to pay for the TMDL work. Both states are underfunded for TMDL work.

Missouri just completed their 2008 list. They have 273 listed stream segments, and EPA added another 17.

Water Use

Oklahoma currently has a moratorium on out-of-state water sales.

Kansas has a moratorium in southeast Kansas on putting in new wells.

Missouri favors in-basin water use options, but does not prohibit out-of-basin transfers.

The Ozark aquifer has been studied and modeled. The aquifer is a primary source of water in southwest Missouri, which may not be sustainable in the future. The study and the model used to predict how increased usage could impact the aquifer will be the subject of a public meeting in Joplin.

During the past 3 years the State of Missouri has enhanced water resources monitoring and data collection capabilities. Thirty one new fixed station stream gages have been installed in an attempt to help quantify drought impacts on stream flow. In addition, the

MDNR has provided funding for 10 gages that were considered "threatened" for discontinuation by the USGS.

MDNR also has doubled the number of groundwater level observation wells and currently operates 149 statewide. The wells collect continuous, real time data that can be accessed by the public. Approximately 30 wells exist within the area of designated shared water resources between Arkansas and Missouri.

Data collected is to be used in a model for determining safe yields from groundwater. Data collection and monitoring that Missouri is undertaking may serve as basis for a future state water plan.

Missouri's focus is on data collection and monitoring and assisting regional planning groups plan for sustainable use. For example, the Tri-State Water Coalition has undertaken a study to consider options for future use, given projected population growth and expected drought periods. The study anticipates future water shortages, and six options are being considered for addressing the shortages. These options include:

- 1) Existing Reservoirs;
- 2) Building new reservoirs-two favorable sites were identified. In the east –a dam on a tributary to the James River and on the western side of the state on Shoal Creek;
- 3) Grand Lake of Cherokees;
- 4) Re-Allocation from Corps lakes, which would require congressional support;
- 5) Although Oklahoma currently has a moratorium on out-of-state sale of water, a bill was passed in the House which would lift the moratorium on out of state water sales; and
- 6) Purchase water from the Beaver Water District.

Population growth and future water demand assessment needs further study.

Missouri water use information is largely unknown.

In Arkansas, if a well produces over 100 gallons of water a day, it must be registered. However, the Arkansas law requiring registration has no sanctions for the failure to register these wells. It is estimated that only 60% of the wells have been reported. Many are not registered.

II. Arkansas Report

White River Minimum Stream Flows

By statute, Arkansas Natural Resource Commission (ANRC) has the authority to regulate non-riparian access to streams where minimum flows are determined. ANRC has adopted rules for the Arkansas River. Rules for White River minimum stream flows will go into effect on September 1, 2009. ANRC adopts rules to stop withdrawal of water during minimum flow periods as necessary to protect in-stream uses, including aquatic life, recharge, navigation, water quality, recreational uses, etc.

Under the proposed rules, there are two categories of use: riparian and non-riparian.

Riparian use is defined as use on contiguous land and this is considered de minimis.

Non-riparian uses for agricultural and/or industrial uses is a measurable quantity/ significant diversion that can be measured and the cumulative withdrawal rate planned.

White River has three reaches from Bull Shoals to the Mississippi River. Three gages are used to record flows.

Riparian use will be restricted if the cumulative withdrawal amount reported to the Commission for riparian usage exceeds 300 cfs, and flow levels at the gages are at or below minimum stream flow amounts. Currently, reported riparian use is a third of the amount that would trigger restrictions. Riparian use would have to triple before the rules would affect riparian uses.

It is important in reporting consumptive use to identify return water in order to determine the cumulative withdrawal amount.

ANRC Groundwater Program

In 1991, ANRC started producing an annual report which focuses on water level declines and uses.

Legislation allows ANRC to identify areas where ground water levels are declining and designate these areas as critical groundwater areas.

In 1995, the Water Well Commission (a technical committee) required drillers to get a license to construct wells. There is no permitting requirement to drill wells.

(Fifteen drillers licensed in Arkansas are from Missouri.)

Water use has to be reported annually if a well produces 35 gallons per minute.

Water well contractors are required to report to the AWWCC within 90 days of construction of well.

ANRC has two water well inspectors.

As of 2001, metering is required on sustainable (deeper) aquifers (Ozark, Wilcox, etc.).

Domestic wells are exempt from the metering requirement. Also, the upper alluvial aquifers are exempt.

State Water Plan

1449 wells are monitored around the state. Groundwater levels are monitored. ANRC looks at trends, declines, cones of depression.

Two Critical Ground Water Areas have been designated – Sparta & Grand Prairie areas. Sparta is a success story. Conservation/education efforts were implemented. Diverted water use to excess surface water from Ouachita River. The water levels in the Sparta have been raised over 50' (mostly industrial users).

Arkansas is the 4th largest ground water user in the nation. Arkansas is a water rich state.

Six counties west of Crowley's Ridge petitioned to be designated a critical ground water area. The benefits of such a designation are the tax incentives for using surface water instead of ground water. Crowley's Ridge is a hydraulic barrier to alluvial aquifer associated with the Mississippi River. Cones of depression have been formed west of the Ridge and over the years these cones of depression have expanded.

ANRC will hold public hearings on the petition, and then go back to the Commission for a determination on the request.

The criteria for critical ground water designation include a significant decline in water levels (one foot per year or more decline over a 5 year period), increase in cones of depression, less than 50% saturated thickness.

Water quality trends can be used as a criterion for listing, but ANRC has not yet listed any areas on that basis.

The Grand Prairie Project is a water management plan designed to protect the alluvial and Sparta aquifers from further depletion by diverting surface water from the White River for agricultural use, instead of continuing to irrigate crops with groundwater.

White River Dissolved Oxygen (DO) Committee

This Committee was created to address the low DO levels coming out of Bull Shoals dam into White River. Arkansas, Missouri, Corps of Engineers, USGS, and Southwest Power are the primary members of the Committee. The Committee comments on monitoring data, aquatic resources (trout reproduction, stocking & collection), etc.

The Committee has discussed modifications to dam structures to help generate increased oxygen levels; however, none of those modifications will successfully maintain DO concentrations at 6mg/L, the minimum standard for the White River. Overall, there are no cheap alternatives to increase the DO levels and maintain a continuously operating system.

Southwest Power agreed to modify its generation schedule when the river is at certain DO levels downstream.

In 2004, Arkansas listed the tail waters of Bull Shoals on the 303(d) list because power generation pulls anoxic water off the bottom of the lake which does not meet the minimum DO standard of 6 mg/L. Arkansas spent \$50,000.00 for a TMDL.

COE owns lake. Southwest Power runs the power plant. They contend that overloading of organic material from the watershed is causing the anoxia condition in the lake and not the existence of the dam.

Agreements have been made to maintain DO at 4 mg/L.

The Committee is trying to find a long-term solution, but have not reached any agreement on how to increase the D.O. levels to meet the water quality standard.

The Committee operates by consensus.

Presentation on forebay diffusers is to be given by TVA.

Bottom line is, even if money was found to put in a system, the ongoing O&M would be expensive, and there is no money for that.

White River Basin Study

This is a comprehensive study to evaluate the water resource and related land uses in the Basin.

The Study is intended to address flow regime, flooding, affects on bottomland hardwood communities, agricultural and recreational uses, etc. Modeling is involved.

There was a 50% cost share for local sponsors and the study was not undertaken, but the cost share has recently been reduced to 25%, so the study is back on the table.

Ground Water Standards

Three agencies in Arkansas have regulatory authority over ground water-ANRC, ADEQ and the Arkansas Department of Health. ANRC and ADEQ are attempting to develop

ground water standards but it is an overwhelming project. Randy Young and Teresa Marks agreed a meeting of ANRC, ADEQ, and ADH is needed to develop these standards.

Phosphorus Index

This is used to write nutrient management plans (NMP) which specify the land application rates for spreading litter/manure on pastures.

Arkansas had a Eucha/Spavinaw Phosphorus Index and another Phosphorus Index for the rest of the State. In 2003, Arkansas and Oklahoma entered into the Statement of Joint Principles & Actions. Under this agreement, Arkansas and Oklahoma were to develop a joint Phosphorus Index (PI). Due to Oklahoma's poultry litigation, the joint project did not go forward, but ANRC, working with the University of Arkansas and others, developed a revised PI.

Developing the revised PI was a two year process, concluding in ANRC initiating rulemaking to adopt the recommendations of the PI working group.

The revised PI is 20% more restrictive.

ANRC will incorporate revisions to nutrient management plans based on the new PI, which is not a strictly agronomic index. Factors considered in developing the revised PI included slope, cover, and soil type.

Nutrient Criteria

EPA wants ADEQ to develop numeric nutrient criteria. For two years we have worked with EPA to develop a nutrient criteria development plan.

The plan contemplates developing a target value for Beaver Lake and taking a biological approach for streams. We received a grant from EPA for a pilot project to be conducted on the Saline River.

Three criteria will be used:

- Chemistry
- Physical characteristics of watershed
- Biological community

These criteria will be used to develop translators to correlate phosphorus, nitrogen, and biological communities to determine whether aquatic life is being adversely effected by nutrients.

Using a cause/effect basis to determine impairment.

The difficulty with this approach will be incorporating limits for nutrients into permits.

III. Next Steps

For sharing information, there will be one point of **contact for each agency**, as follows:

- Ryan Mueller, Missouri DNR
- Crystal Phelps, ANRC
- Steve Drown, ADEQ

Outline for first report to the Governors is targeted for the second week of September.

Draft report to be prepared by mid-November, identifying the opportunities for coordination and challenges to successful coordination on shared issues. Report should include a map of monitoring capabilities in each state.

Topics for continued discussion:

Modifying monitoring plans to ensure each state addresses other's concerns

Permits

TMDLs, including success of TMDLs on addressing impairments/Elk River Basin

WQS development

Rulemaking/legislation

Petition on critical groundwater area west of Crowley Ridge

Minimum stream flows

Ground water metering

Coordination of assessments/assessment methodology

Share calendars on assessment efforts

Missouri hopes to get on schedule for its 2012 assessment in order to meet the April deadline.

Goal is to coordinate assessment efforts for the 2012 assessment. Topic for discussion at next year's meeting.

Look at differences in EPA Regions and Corps' Districts.