Arkansas River Compact Commission 2013 Report

Compact Area

Arkansas River Compact Commission

ARKANSAS NATURAL RESOURCES COMMISSION
101 E. Capitol, Suite 350
Little Rock, Arkansas 72201
(501) 682-3986 (501) 683-3991 fax
www.arkansas.gov

OKLAHOMA WATER RESOURCES BOARD
3800 North Classen Blvd.
Oklahoma City, Oklahoma 73118
(405) 530-8800 (405) 530-8900 fax
www.owrb.ok.gov

February 5, 2015

The President
United States of America

The Honorable Mary Fallin
Governor, State of Oklahoma

The Honorable Asa Hutchinson
Governor, State of Arkansas

Dear Mr. President and Governors:

Pursuant to Article 9B(6) of the Arkansas-Oklahoma Arkansas River Compact (AOARC), submitted herewith is a copy of the report of the AOARC covering the activities of the Commission for 2013. A budget covering the anticipated expenses of the Commission for July 1, 2012 – June 30, 2013 is also included in the report.

The State of Oklahoma hosted the 2013 Annual Meeting at Monkey Island, Oklahoma. Reports of the Budget, Engineering, Environmental and Natural Resources, and Legal Committees were presented, and the Commission approved committee assignments and appointments.

Respectfully submitted,

Richard C. Seybolt
Federal Commissioner and Chairman
Arkansas-Oklahoma Arkansas River Compact Commission

RCS/mls

AOARCC 2013 Annual Report
TABLE OF CONTENTS

Contents separated by tabs:

2013 Directory

ARKANSAS-OKLAHOMA
ARKANSAS RIVER COMPACT COMMISSION
2013 DIRECTORY

FEDERAL CHAIRMAN
Richard (Dick) C. Seybolt
Chairman/Federal Commissioner
56281 East 306 Road
Monkey Island, OK 74331
PH: (620) 795-2191 Ex 18
FAX: (620) 795-4816
dseybolt@diamondcoach.com

ALTERNATE FEDERAL CHAIRMAN
David Vandergriff
Alternate Federal Commissioner
Quattlebaum, Grooms, Tull & Burrow
1111 Center Street, Suite 1900
Little Rock, AR 72201
PH: (501) 379-1780
FAX: (501) 379-3880
dbv@aqgtb.com

ARKANSAS
J. Randy Young, P. E.
Arkansas Commissioner
Executive Director
AR Natural Resources Commission
101 East Capitol, Suite 350
Little Rock, AR 72201-3823
PH: (501) 682-3986
FAX: (501) 682-3991
randy.young@arkansas.gov

Michael L. Menge
Arkansas Commissioner
172 Menge Drive
Dover, AR 72837
themenges@centurytel.net

Michael Carter, Arkansas Commissioner
P. O. Box 2407
Fort Smith, AR 72902
PH: (479) 783-4191 (Ex 263)
FAX (479) 424-1190
mcarter@stephenspro.com

OKLAHOMA
J.D. Strong, Oklahoma Commissioner
Executive Director
Oklahoma Water Resources Board
3800 N. Classen Boulevard
Oklahoma City, OK 73118
PH: (405) 530-8800
FAX: (405) 530-8900
jdstrong@owrb.ok.gov

R. Tyler Powell
Office of the Secretary of Energy
and Environment
3800 N. Classen Boulevard
Oklahoma City, OK 73118
PH: (405) 530-8995
FAX: (405) 530-8999
rtpowell@environment.ok.gov

Steve Thompson
Oklahoma Commissioner
707 North Robinson
Post Office Box 1677
Oklahoma City, OK 73101-1677
(405) 702-7163
Steve.Thompson@deq.ok.gov

Oklahoma Committee Staff

Derek Smithee, Chief
Water Quality Division
Oklahoma Water Resources Board
3800 N. Classen Boulevard
Oklahoma City, OK 73118
PH: (405) 530-8800
FAX: (405) 530-8900
drsmithee@owrb.ok.gov

Julie Cunningham, Chief
Planning and Management Division
Oklahoma Water Resources Board
3800 N. Classen Boulevard
Oklahoma City, OK 73118
PH: (405) 530-8800
FAX: (405) 530-8900
jmcunningham@owrb.ok.gov

Sara Gibson, Assistant General Counsel
Oklahoma Water Resources Board
3800 N. Classen Boulevard
Oklahoma City, OK 73118
PH: (405) 530-8800
FAX: (405) 530-8900
sdgibson@owrb.ok.gov

Mary Schooley, Executive Secretary
Oklahoma Water Resources Board
3800 N. Classen Boulevard
Oklahoma City, OK 73118
PH: (405) 530-8800
FAX: (405) 530-8900
mlschooley@owrb.ok.gov

Monty Porter
Oklahoma Water Resources Board
3800 N. Classen Boulevard
Oklahoma City, OK 73118
PH: (405) 530-8800
FAX: (405) 530-8900
maporter@owrb.ok.gov

Julie Chambers
Oklahoma Water Resources Board
3800 N. Classen Boulevard
Oklahoma City, OK 73118
PH: (405) 530-8800
FAX: (405) 530-8900
jmchambers@owrb.ok.gov

Yohanes Sugeng
Oklahoma Water Resources Board
3800 N. Classen Boulevard
Oklahoma City, OK 73118
PH: (405) 530-8800
FAX: (405) 530-8900

Arkansas Committee Staff

Laura Brown, Treasurer
AR Natural Resources Commission
101 East Capitol, Suite 350
Little Rock, AR 72201-3823
PH: (501) 682-3985
FAX: (501) 682-3991
Laura.brown@arkansas.gov

Ken Brazil
AR Natural Resources Commission
101 East Capitol, Suite 350
Little Rock, AR 72201-3823
PH: (501) 682-3985
FAX: (501) 682-3991
Ken.brazil@arkansas.gov

Edward C. Swaim, Chief, Water Management Division
AR Natural Resources Commission
101 East Capitol, Suite 350
Little Rock, AR 72201-3823
PH: (501) 682-3965
FAX: (501) 682-3991
Edward.Swaim@arkansas.gov

Chris Soller, P.E.
AR Natural Resources Commission
101 East Capitol, Suite 350
Little Rock, AR 72201-3823
PH: (501) 682-3985
FAX: (501) 682-3991
Chris.soller@arkansas.gov

Crystal Phelps, General Counsel
Arkansas Natural Resources Commission
101 East Capitol, Ste. 350
Little Rock, AR 72201
PH: (501) 682-3905
FAX: (501) 682-3991
Crystal.phelps@arkansas.gov

Representative B. G. Hendrix
2215 South 40th Street
Fort Smith, AR 72903
(479) 785-2262

Wayne Dowd Managing Attorney
Public Defenders Office
8th Judicial District
305 E. 5th, Suite 400
Texarkana, AR 71854
PH: (870) 773-6025

Ryan Benefield
ADEQ
5301 Northshore Dr.
Little Rock, AR 72118-5317
(501) 682-0959
marks@adeq.state.ar.us

INTERESTED OTHERS

NRCS Regional Water Management Center
101 East Capitol, Suite 212
Little Rock, AR 72201-3811

Randy Thurman
Arkansas Environmental Federation
1400 West Markham, Suite 250
Little Rock, AR 72201

City Desk 378-3485
Arkansas Democrat-Gazette
P .O. Box 2221
Little Rock, AR 72201

Richard A. Gordon, Jr.
Public Awareness Committee, Inc.
1145 No. 57th Place
Fort Smith, AR 72904

Brian Rosenthal
The Rose Law Firm
120 E. Fourth Street
Little Rock, AR 72201
PH: 375-9131

Alan Fortenberry
Beaver Water District
P. O. Box 400
Lowell, AR 72745
afortenberry@bwdhto.org
(479) 757-3651

Shane Khoury, Liaison
Office of the Governor
Room 120 State Capitol
Little Rock, AR 72201

Robert Smith
Arkansas Democrat-Gazette
2201 S. Thompson Street
Springdale, AR 72765
Robert-smith@adg.ardemgaz.com

Representative Mike Kenney
2109 West Tulsa Street
Siloam Springs, AR 72761

City Administrator
P. O. Box 80
Siloam Springs, AR 72761

Mr. James Moore
Parson's Engineering
2530 Elmer King Road
Belton, Texas 76513

The OKLAHOMAN
P. O. Box 25125
Oklahoma City, OK 73125-0125

Reed Green
U. S. Geological Survey, WRD
401 Hardin Road
Little Rock, AR 72211

Thomas S. Soerens, Associate Professor
University of Arkansas
Civil Engineering
Fayetteville, AR 72201

Ralph Davis
112 Ozark Hall
Fayetteville, AR 72701
PH: (479) 575-4515

Marty D. Matlock
Room 203 – Engineering Hall
University of Arkansas
Fayetteville, AR 72701

Dr. Marc A. Nelson
Director of the Water Quality Lab
700 Research Center Blvd. Chemistry 101
Fayetteville, AR 72701

2004 ADDITIONAL APPOINTMENTS BY STATES TO ENVIRONMENTAL COMMITTEE

STATE OF OKLAHOMA

Mike Thralls, Executive Director
Oklahoma Conservation Commission
2800 N. Lincoln Boulevard, Suite 168
Oklahoma City, OK 73105
(405) 521-2384

Richard Hatcher, Executive Director
Oklahoma Department of Wildlife Conservation
1801 N. Lincoln
Oklahoma City, OK 73105
(405) 521-3851

STATE OF ARKANSAS

Scott Henderson
Arkansas Game & Fish Commission
#2 Natural Resources Drive
Little Rock, AR 72205
PH: 223-6300

Anthony Fernald
Arkansas Department of Health
4815 W. Markham
Little Rock, AR 72204
PH: 661-2000

Keith Garrison
Arkansas Waterways Commission
101 E. Capitol, Suite 370
Little Rock, AR 72201
PH: 682-1173

(As corrected at 9/2013 meeting.)

2013 Meeting Agenda

AGENDA
ARKANSAS-OKLAHOMA ARKANSAS RIVER
COMPACT COMMISSION ANNUAL MEETING

September 26, 2013
9:00 a.m.
11th Floor Meeting Room
The Vista Towers @ Shangri-La Resort
57200 E. Hwy 125
Monkey Island, OK 74331

A. **Call to Order**

B. **Introductions and Announcements**

C. **Approval of Agenda**

D. **Consideration and Approval of Meeting Minutes of 2012 Annual Meeting**

E. **Report of the Chairman** –Dick Seybolt, Federal Commissioner

F. **Report of the Treasurer** – Laura Brown

G. **Report of the Commissioners**
1. Arkansas
2. Oklahoma

H. **Committee Reports**
1. Budget Committee, Julie Cunningham, Chair
2. Engineering Committee, Julie Cunningham, Chair
3. Environmental and Natural Resources, Derek Smithee, Chair
4. Legal Committee, Jerry Barnett, Chair

I. **Unfinished Business**

J. **New Business**
1. Appointments/Assignments to Committees and Selection of Chairs
   a. Budget Committee
   b. Engineering Committee
   c. Environmental and Natural Resources Committee
   d. Legal Committee
2. Election of Officers (Secretary and Treasurer)
3. 2014 Annual Meeting

K. **Federal and State Government Representative Reports**

L. **Public Comment**

M. **Adjournment**

Minutes: Annual Meeting, September 26, 2013

Minutes of the
ARKANSAS-OKLAHOMA ARKANSAS RIVER COMPACT COMMISSION
Regular Meeting

September 26, 2013
9:00 a.m.
The Vista Towers, Shangri-La Resort
57200 E. Hwy 125, Monkey Island, Oklahoma

A. CALL TO ORDER

Chairman and Federal Commissioner Richard C. Seybolt called the annual meeting of the Arkansas-Oklahoma Arkansas River Compact Commission (AOARCC) to order at 9:00 a.m. on September 26, 2013, in the meeting room of The Vista Towers, at Shangri-La Resort at Monkey Island, Oklahoma.

B. INTRODUCTIONS and ANNOUNCEMENTS

Commission members in attendance were Richard C. Seybolt, Federal Commissioner and Chairman; Oklahoma Commissioners J.D. Strong, and R. Tyler Powell, and Arkansas Commissioners Randy Young, Michael Menge, and Mike Carter. Oklahoma Commissioner Steve Thompson was absent. Chairman Seybolt asked for those in attendance to make self-introductions. (Attachment A.)

C. APPROVAL OF AGENDA

Chairman Seybolt asked for a motion to approve the agenda. There were no additions or deletions to the agenda. Commissioner Young moved that the agenda be approved, and Commissioner Strong seconded. The motion carried unanimously. (Attachment B.)

D. Consideration and Approval of Meeting Minutes of the 2012, Annual Meeting.

Chairman Seybolt stated that the minutes of the 2012 Annual Meeting had been distributed. Commissioner Strong moved to approve the minutes of the 2012 meeting, and Commissioner Carter seconded. Chairman Seybolt called for the vote, and the motion carried unanimously.

E. REPORT OF THE CHAIRMAN

Chairman Seybolt said he would make comments at a later time. He thanked everyone for attending dinner at his home the previous evening.

F. REPORT OF THE TREASURER

Mr. Ed Swaim, Arkansas Natural Resources Commission, presented the report of the Treasurer. He distributed a written report, as well as information regarding the budget. Mr. Swaim stated the Compact bank account balance is $234,867.68, which includes a $100,000.00 deposit from the Northwest Arkansas Council for the Stressor Response Study. Total income was $107,020.07, and total expenses were $4,680.00. There are pending expenses for postage and printing costs for reports as well as the stream gage the Compact pays for, that will be combined with this year's bill as the 2012 bill was lost. Commissioner Young clarified there were two-$100,000.00 deposits: one from the Northwest Arkansas Council and one from the cities in northwest Arkansas, therefore, $200,000.00 have been deposited toward financing the Stressor Response Study. He added he would like to report to the Oklahoma Commissioners the status of the funding raised on the project. Chairman Seybolt suggested that report could be made following the Treasurer Report.

Mr. Swaim continued that he would address questions. Commissioner Strong asked if the additional $100,000 had been deposited and Commissioner Young responded that it had been deposited, and that is shown in the total for the account in the report. It did not appear in the line item register; as the deposit was July 9 (the report is through June 30).

There were no other comments and Commissioner Young moved the report be accepted. Commissioner Strong seconded. The motion was unanimously approved. (Attachment C.)

Commissioner Young reported the Stressor Response Study was estimated to cost $600,000.00 and there is $200,000.00 in hand; the agreement calls for the funds to be deposited with the Compact Commission. He said the application has been made, and approval received, of a grant of $100,000.00 from the Walton Family Foundation and that money will be made available when the remaining $500,000.00 is raised. He said members of the General Assembly from northwest Arkansas whom he has talked with have pledged $220,000.00; there are seven other members he anticipated would pledge the remaining funds, and all funds should be available the month of November. The funding is from capital improvement appropriations from the last legislative session, and should come from the state treasury about November 1, so the $600,000.00 should be in the Compact account by that time.

Chairman Seybolt asked and Commissioner Young spoke to the background and status of the study. Commissioner Young said about eleven years prior, the states reached an agreement regarding what the agencies in both states would do toward meeting water quality goals in the Illinois watershed in Arkansas and Oklahoma. He said last year a three-year extension to the agreement was reached, and a key provision is that the two states will work – through the appointment of three members from each state—to manage the Stressor Response Study which is the most scientific, robust way to look at what an appropriate phosphorous standard should be in order to meet the water quality goals in Oklahoma as well as in Arkansas. He said the agreement calls for the State of Arkansas to fully fund the study which was

estimated to be $600,000.00. Both Governors have appointed the three members from each state that will manage the study. Commissioner Young stated the group is likely behind schedule as the states were in legislative session at the first of the year. The six members are preparing for the first meeting which will be held within a matter of days in Tulsa. It is a two-year study and periodic reports will be provided. The Compact is handling the money, Commissioner Young said, and the Compact needs to budget the funding so that it can be expended.

Commissioner Strong added that is correct, and the Statement of Joint Study should be included in the Environmental Committee report but was not. He said it outlines the commitment and centerpiece of the study which was signed in February 2013.

G. REPORT OF THE COMMISSIONERS

1. Arkansas

Arkansas Commissioner Randy Young presented the report for the State of Arkansas. Commissioner Young said at the last meeting he reported the State had initiated a process of updating the Arkansas Water Plan and the planning is in budget and on schedule for completion in 2014. There have been a number of public meetings across the state in an effort to engage citizens to identify problems as well as identifying potential solutions to meet the gaps that are identified between availability of supply and future demand.

Mr. Swaim added that the demand phase is completed, and the final numbers should be available by the first of October. Generally, there has been a 13% gradual rise in demand to the year 2050, primarily due to crop irrigation and there has been a decline in heavy industrial use due to a decline in the paper industry. A working group will be looking at surface, groundwater, water quality, and fish and wildlife flows in October. The USGS is involved in the process and conducting a comprehensive look at the aquifers in Arkansas, both for quality and quantity. He said there is about 13.5 months remaining and once the supply side is completed, there will be a full year to work with public to identify issues and propose solutions.

Arkansas Commissioners Carter and Menge did not have any additional comments.

Oklahoma Commissioner Strong said that a large interest in the Oklahoma Water Plan process was looking at demands in oil and gas –particularly fracking use--and he asked how that effected the growth and demand in Arkansas. Mr. Swaim said public meetings revealed that people who live in the area know more about the issue than those who do not, and the farther away from it the concern changes. The agency (ANRC) put a number to it and each well takes about 4.73 million gallons and three major companies have provided numbers without going into criteria to show the forecast on what they expect to drill and fracture within the planning period to 2050. The most reliable figure is they will continue to drill wells until the area is saturated to the legal limits and they expect that within twenty years to be finished, based upon the best available information and the stakeholder process. The concern is harm that might be caused to other water uses in the area, and Mr. Swaim explained the State's nonriparian permit process and that through the water plan and increased technology the permitting process will be improved.

Commissioner Carter stated that it can be anticipated the amount that will be required and the disposal problems that will be decreased significantly due to the fewer number of wells being drilled in Arkansas. He said it can be anticipated there will be a large increase in the

demand for fresh water and disposal problems in west central and north central Oklahoma with hydraulic fracking. Commissioner Strong commented that had been anticipated in Oklahoma's planning process.

Commissioner Young concluded the Arkansas report. (Attachment D.)

2. Oklahoma

Oklahoma Commissioner J.D. Strong presented the report for the State of Oklahoma. He said that Oklahoma Commissioner Steve Thompson is retiring today after 30+ years of service to the State of Oklahoma. He noted the prepared and distributed report reviewing the drought conditions which has ended in flooding in some parts of Oklahoma. In February 2012, the Oklahoma Legislature was presented the Update of the Oklahoma Comprehensive Water Plan (OCWP) that resulted in a landmark legislative session for water – OCWP recommendations through the public's engagement in the process translated into a public eager the plan is not put on the shelf but put into action. The agency received an increase in appropriation of $2 million for water quality monitoring to build back a declining program, and to add a new statewide comprehensive Groundwater Monitoring and Assessment Program (GMAP) looking at quantity and quality of the State's aquifers. The agency was able to keep the dollars committed to the plan to be used now for stream water allocation modeling for the state's permitting process, using new tools derived through the planning process. Other OCWP recommendations that were implemented through the legislative session included the Water for 2060 Advisory Council -- the State's goal to not use more fresh water in 2060 than is used today. He noted the citizen's approved State Question 764 allowing a $300 million pledge of credit to leverage funds to meet the projected $82 billion water and wastewater financing needs; and the completed OCWP Public Water Supply Planning Guide for water providers to use to develop local planning. Other notable items in the report Commissioner Strong mentioned included the cooperative work with the Grand River Dam Authority providing additional information in regard to beneficial use monitoring; the triennial revision of the water quality standards awaiting EPA approval; the Fish and Wildlife Service final rule listing two mussels under the federal Endangered Species Act; new rules for producing mines in the central Oklahoma area; and update on the State's Financial Assistance Program exceeding the $3 billion dollar financing mark. He also noted the Legislature's approval of Senate Bill 965 in 2013 that will re-constitute the Oklahoma Water Resource Board membership as each term expires over the next 7 years—keeping nine members but their representation is now more geographically-based rather than the current five Congressional districts and at-large positions. The Legislature appropriated $3 million dollar for emergency drought relief and created a Council to administer the funds. And finally, Commissioner Strong stated that on June 13 the US Supreme Court ruled in the Board's favor unanimously in the Tarrant Case which he considered a victory for all states that have entered into interstate compacts. The Court basically said the compact says what it says, and doesn't say what it doesn't say, so it cannot be read that states can come across borders and take allocation of water unless specifically stated in the compact. He stated there is continuing litigation with the Chickasaw and Choctaw Nations which are engaged in very lengthy but productive mediation between the Tribes and the City of Oklahoma City. Commissioner Strong concluded the report stating that after 30 years of service, Mr. Dean Couch, OWRB General Counsel retired in January 2013, and Mr. Jerry Barnett who has been a staff attorney at the OWRB for nearly the same length of time oversees the Office of General Counsel and Ms. Sara Gibson (attending today) is Assistant General Counsel.

Commissioner Tyler Powell added that Secretary of Environment Sherrer resigned effective July 1, 2013. Governor Fallin realigned the Cabinet forming a new Cabinet Secretary for Energy and Environment and appointed Secretary Michael Teague, recently retired as the Tulsa District Commander of the U.S. Army Corps of Engineers. (Attachment E.)

H. COMMITTEE REPORTS

1. Budget Committee

Mr. Ed Swaim, Arkansas, presented the Budget Report on behalf of Committee Chair Julie Cunningham who was unable to attend. He directed the Commissioners to the second page of the distributed information and noted the line item for the Stressor Response Study which has a "placeholder" in the same amount of the Computation of the Annual Water Yield of $6,250, which should be increased as reflected. Commissioner Strong asked if that item needed to be changed to $600,000.00, and Mr. Swaim answered, yes.

Chairman Seybolt asked why the increase to Mr. Lamb; he thought the work would be done by the two states.

Mr. Swaim answered that is a carryover from what is being spent, pending the decision of the Commission on what it wants to do regarding the computation report this year. Commissioner Strong suggested hearing from the Engineering Committee and return to the Budget Committee. The Chairman and Commissioners agreed.

2. Engineering Committee

Mr. Yohanes Sugeng, Oklahoma, presented the Engineering Committee report on behalf of Ms. Julie Cunningham. He stated that there were four assignments from the previous year. The first assignment was to update the methodology for the calculation of yield using updated data sources and agreed-upon coefficients, gages used, calculations for ungaged areas, and other data.

He said that the Engineering Committee had finalized the written methodology entitled, "Arkansas River Basin Compact, Guidelines for the Computation of Annual Yields." He anticipated that there would be changes as the process moves along, and he referred to a spread sheet—an Excel-based annual yield analysis tool (AYAT) that was developed from the previous year (workbook). Both states used the tool this year and agreed that it is easy to use for calculations, prevents hand calculation errors, and will automatically pull the most current data from the US COE and USGS websites. He said the Committee recommended the proposed annual yield calculation methodology adheres with the compact, and it can be approved. The Committee also recommends the annual yield report could be easily compiled by the states at a substantially lower cost—both from contractor costs and time savings. Each state will retrieve the data from the USGS and the other state will independently conduct the analysis and compare the numbers which each state is now doing. The host state will prepare an executive summary quantifying any deficiencies, and prepare copies of the report.

The second assignment is to compare the result between the Engineering Committee methodology and contractor's methodologies for calculating annual yields. Last year, the Commissioners agreed to continue with Mr. Lamb's report (Hydrologic Information Services-H.I.S.) and while working on the methodology several differences were discovered. The

Committee's document, Arkansas River Basin Compact Comparison of Computed Yield Reports, provided an explanation of the major differences between the yield report created by Mr. Lamb and the calculations by the staff of the ARNRC and the OWRB. Mr. Sugeng explained the first difference regarded the compilation of runoff, the second difference regarded the drainage area used to interpolate runoff at the state line, the third regarded gages used to calculate runoff, and the fourth regarded direct diversions from the streams and reservoirs. He mentioned the contents of the report and said there are no instructions in the compact about what gages should be used to calculate the annual yield so it is up to the Committee to decide. The Committee recommended that although there were differences, no deficiencies were identified and the Committee would recommend approval of the annual report.

The third assignment regarded determining if water quality data used should be included in the Annual Yield Report or the Environmental Committee Report. Mr. Sugeng stated the last reports from Mr. Lamb consisted of copies of raw data from the USGS table with no analyses, and the Committee believed that it did not provide sufficient information. The Committee recommended doing more analysis of the raw data to provide more useful information which could be included in the Environmental Committee's report. Under the directive of the Commissioners, the parameters of the analyses need to be determined. He said if the Commissioners would like to see the raw data in the Annual Yield Report, the report could include a statement about sources of water quality information and internet links to the sources instead of multiple pages of raw data.

The fourth assignment was to discuss and propose a methodology for dispute resolution in cases of disagreement regarding the calculation of annual yield. Mr. Sugeng said that Mr. Chris Soller of Arkansas drafted a written document for the process of resolving disagreements. The Committee recommendation is the Engineering Committee will finalize this document during 2014 and ask the Legal Committee for review and comments, and prepare for approval at the next Compact meeting.

Commissioner Carter asked if Mr. Lamb had been provided an opportunity to review and respond to the Committee's recommendations. Mr. Sugeng answered there was a conversation with Mr. Lamb that the proposal agreed with the compact. Mr. Soller interjected he was not certain if Mr. Lamb actually reviewed the workbook itself. Mr. Soller said that certain coefficients and issues were discussed but he doubted that Mr. Lamb had reviewed the workbook. Commissioner Carter stated there are serious disputes between the Engineering Committee and Mr. Lamb, whose report has been accepted by the Commission for a lengthy period of time. He said as a matter of courtesy, the Engineering Committee report – which he did not question -- should be submitted to Mr. Lamb for his response, which might lend to a better idea about how to do the annual report.

Commissioner Strong stated that Mr. Lamb was on notice last year that he would do the report one more year to allow more time for the States to analyze the automated worksheet that was compiled last year. The idea was that the States would be able to independently run the numbers and compare; the engineers have agreed it is more accurate. There are only very slight differences in how runoff is calculated and how diversions are quantified between the Engineering Committee's methodology and Mr. Lamb's approach, but the Committee's methodology is more precise by using daily flow values rather than monthly mean flow values. The drainage area information is collected using more sophisticated Geographic Information System (GIS) on the computer rather than hand drawn watershed area calculations. He said the one issue that may need discussion is in regard to the Loving gage and tabulation on the Poteau River, and he would defer to the Committee. Rather than using USGS information, the States have actual water use report information to plug into the report. He said it has been

more than a year since developing the methodology, and within the last year the Committee has spent a lot of time with Mr. Lamb making sure the worksheet, and methodology is essentially the same as what Mr. Lamb has done, only more accurate. Commissioner Strong said the Committee recommendation comes from both states; the outside contract is not needed because everyone is comfortable that the States can do their own calculations. The Commission can accept Mr. Lamb's report for the last water year because it has been reviewed and compared to the methodology. The water quality data historically contained in Mr. Lamb's report can be moved to the Environmental Committee report with more water quality-related information so that the yield report is strictly water quantity-based/compliance with the Compact report. He said if there is any discrepancy that can be referred to the Legal Committee to settle the dispute. He said he is very comfortable with it and suggested the Commission try it for the next year.

Commissioner Young stated he did not disagree; he thought it is a fitting touch to Mr. Lamb's departure from service to the Compact to formally submit the Engineering report to him for review and written comments. It would be good to have that in the record, if, in the future there is a question as to why there was a change.

The Commissioners discussed that Mr. Lamb expected to do the report one more year, which may have had some pecuniary basis, and to let him comment to the Engineering Committee.

Chairman Seybolt commented that he instigated the change because of the availability of technology now, which was not available before and a lot of things have changed in 30 years which might provide more accurate information. All of the States' people have more experience than years ago and the USGS was relied upon to provide the information as the States did not have the capacity to do the work. Commissioner Young interjected that Mr. Lamb worked with the States and federal chairman when the Compact was negotiated while employed at the USGS, which is why he was contracted to do the report and why it would be good to get his comments on the changes that would be made.

Commissioner Strong said he did not mind Mr. Lamb's review of the report, but was concerned about the cost of $6,500 for a third-party review rather than compilation of the report. The Commissioners and staff discussed their understanding of Mr. Lamb's expectation of this year's work on the report (Water Year 2012), that he was retained for this year and informed it may be his last year, and the report --which is the Engineering report he was retained for this year---is the report recommended to be approved. Commissioner Strong said regarding the year going forward, perhaps not ask Mr. Lamb to do the 2013 report, but to review the methodology, spreadsheet, etc., developed by the Engineering Committee to make sure there are no deficiencies. Commissioner Young said he did not believe there are, but it would be significant value to have him on record agreeing with the Committee.

Chairman Seybolt suggested $2,000.00. Mr. Soller said the methodology created last year was a combination of Mr. Lamb's input and the compact rules; Maria (Moreno) of Oklahoma had done much of the work, and he didn't know how much she had discussed with Mr. Lamb. Commissioner Young said that all that may be needed is documentation from Mr. Lamb stating that.

Commissioner Menge asked if both states are comfortable proceeding forward and are prepared and confident that the next report will contain the information needed. Mr. Soller and Mr. Sugeng answered yes.

Commissioner Carter said if the Commission is to rely on the information it should be reviewed by an independent auditor. If Mr. Lamb does not review it, someone should, because this deals with methodology on a very serious issue.

Commissioner Strong moved to retain Mr. Lamb for the next year to analyze to provide a third party review, and to report to the Commission next year on his views of the methodology, worksheet, and process that has been developed by the Engineering Committee. Commissioner Young seconded the motion.

Chairman Seybolt called for the vote, and the motion passed unanimously.

Mr. Chris Soller asked for clarification on whether the review would be for 2012, or 2013, and Commissioner Strong answered that according to his view, it would be for 2012 work that has been done, and he (Mr. Lamb) can use the next year to review and develop a memorandum to the Commission. Commissioner Young added that his review is to be consistent with the Committee recommendation today. Commissioner Menge added it is good to have Mr. Lamb's review for the historical record and for any suggestions he may make for further refinement; that the States will do the next report, and that he is being asked to review. Chairman Seybolt said for clarification that the sources of information Mr. Lamb used is the same as the sources the Engineering Committee is using, and Mr. Soller and Commissioner Strong said yes, except for the diversions and one gage on the Poteau River. Chairman Seybolt said this is a result of changes taking place over a period of time. Commissioner Young said that is not being argued, he is saying it would be good to have a third party review of the Engineering Committee recommendation on the record. Chairman Seybolt stated he would yield to those on the Commission with experience, and to the Legal Committee.

Commissioner Strong then moved to accept Mr. Lamb's report for Water Year 2012, and Commissioner Young seconded. Chairman Seybolt called for the vote, and the motion passed unanimously.

Commissioner Menge thanked the Engineering Committee for its work this year.

Following the recommendations by the Committee, Commissioner Strong then moved that all water quality-related data be housed in the Environmental Committee report rather than the Engineering Committee report. Commissioner Young seconded. Chairman Seybolt called for the vote, and the motion passed unanimously.

And regarding the fourth recommendation, Commissioner Strong then moved that any disputes between the States as they wrap up the Water Year 2013 Engineering Report be referred to the Legal Committee for review and analysis in advance of next year's Compact Commission report.

Ms. Gibson asked if the Legal Committee would be reviewing the methodology for dispute resolution.

Commissioner Strong removed his motion to clarify that the Engineering Committee has a recommendation for dispute resolution process which the Legal Committee has not reviewed, and staff said that is correct. Commissioner Strong then changed his motion and moved that the recommended dispute resolution process from the Engineering Committee be reviewed by the Legal Committee over the course of the next year for any refinement they may want to recommend at next year's Compact meeting. The Legal Committee will be analyzing the dispute resolution process, not the data and calculations. Commissioner Carter seconded the motion. Chairman Seybolt called for the vote, and the motion carried unanimously. (Attachment F.)

Return to Budget Committee

Chairman Seybolt asked the Commission to return to discussion on the Budget Committee report.

Mr. Ed Swaim asked if the Stressor Response Study money is paid out over the course of the study and Commissioner Young answered yes. The Commissioners discussed when the money is in the bank and when it is to be paid, and suggested the budget should footnote the total is $600,000.00 to be paid over 2013-2014-2015.

Mr. Swaim asked about budgeting for Mr. Lamb to conduct the review of the report. Currently, $6,550 is budgeted for FY 2015. Commissioner Young suggested an amount not to exceed $2,000 for the next fiscal year, then zero the following year. Commissioner Strong clarified the review would be in FY2014, and Mr. Swaim said that would be within the budgeted amount of $6,250.00 and only $4,000 has been spent on the report presented today, so the budget figure of $6,250.00 for FY 2014 can remain. There was discussion about how to reflect the budget changes and if the Engineering Committee required any funding for their work.

Commissioner Young moved to approve the budget with those two changes, and Commissioner Strong seconded. Chairman Seybolt called for the vote, and the motion passed unanimously. (Attachment G.)

3. Environmental and Natural Resources Committee

Ms. Julie Chambers, Oklahoma, presented the report of the Environmental and Natural Resources Committee. Mr. Derek Smithee was unable to attend. Ms. Chambers stated the Committee's assignments from last year was to make the report for both states more comparable, add page numbers on the report, as well as Commissioner Young asked the data be presented in a way so that the average citizen could understand if a trend reduction is seen in the .037 phosphorous criterion. She said the format of the report is very similar as in the past, but slightly different, and she distributed the draft "Water Quality Monitoring Report for the Illinois River Basin." Ms. Chambers stated all the gaging information had been combined onto one page for each of the gages in the state, and the first two pages are the traditional bar graphs showing the loading in kilograms per year. The charts on the remaining pages illustrated the information for each gage all on one page with the table across the top showing the 5-year rolling average as well as the bar chart, and the longer one on the side of the page is the annual flow for phosphorous content from 1999-2012, as well as the phosphorous criterion, and the geometric mean for all eight gages, four for each state.

Ms. Chambers noted that for 2012 the flow across all the gages is the lowest they have been since 2003, and in some cases half as much as the previous year, if not more than half. On the five-year rolling chart, two of the four Oklahoma stations are below 40% reduction goal (Watts and Baron Fork), but stations at Tahlequah and Flint Creek tend to be above; however, Flint Creek is going down somewhat most likely due to new the wastewater treatment plant at Siloam Springs going online in 2011.

Commissioner Young stated that rainfall runoff has a tremendous impact from phosphorous loading, and he asked if there was a way to separate that data so the progress could be seen. Mr. Chris Soller stated that comparing 2012 to 2003 the numbers are almost the same, but the phosphorous loading is one-third what it was in 2003 showing an improvement in the watershed. Commissioner Strong said there is a way to show flow separated phosphorous values and report that in the Environment Committee report. In the Oklahoma report, the chart

showing trends illustrates where higher flow data and lower flow data are separated showing the significance of upward and downward trends, as an example, and giving a better picture of the point source data and the nonpoint source reduction effort in the watershed. He suggested that next year the Committee could develop an agreeable way to report that information. Also, Commissioner Strong said the phosphorous concentration trend graphs in the report are useful but the multiple lines on one graph can be confusing. The linear depiction on one graph could show the linear period of record trend in one line indicating the long-term trend. Statisticians say this is a linear regression fit to parametric data but in actuality to look at a statistically significant trend there should be a nonparametric analysis. He said the point is it is useful to look at the linear trend and have the period of record trend on the graph and then look at the more detailed analysis of true statistical trend (5-year, 10-year, etc.). Ms. Chambers discussed available graphics related to the data that includes the high flows as well the low flows; she said this graph does show the general trend by using the one-year regression, and other charts removed the 5-year and 10-year line making the picture a bit clearer.

Ms. Chambers continued the Committee report reviewing with the Commissioners the document containing the traditional information provided by Oklahoma, "Arkansas-Oklahoma Arkansas River Compact Commission Draft Environmental Committee Report." (report with color tabs) Ms. Chambers noted the snapshot of information regarding the 2010 303(d) list (2012 has not been approved). Following, is the information regarding trends at the different flow regimes showing that Flint Creek is the only one with a highly significant upward trend for both and conversely, the Illinois River shows a highly significant trend downward at Watts and Tahlequah, and Barron Fork is no significant trend. She said the 1999-2012 data stations show a highly significant downward trend except Flint Creek is showing no significant trend. A new component to the table compares the data to the .037 (arrows) indicating that all stations except Flint Creek show a highly significant downward trend for use assessment using the geometric mean; Flint Creek is no significant trend.

Ms. Chambers reviewed the section regarding the Beneficial Use Monitoring Program (BUMP) lakes and rivers summary pages from the BUMP report for the entire Compact area, and is followed by the 2010 Integrated Report. She noted the brief report on the Water Quality Standards update, there were some editorial changes and human health criteria, copies of the Statement of Joint Principles and Actions 2003 and the current document which includes the Stressor Study. The Department of Environmental Quality provided the completed list of TMDLs within the Compact area. The report included the traditional Oklahoma portion, updates on the Oklahoma Water Resources Board agency program activities within the Compact area, and the Oklahoma Conservation Commission activities report.

Commissioner Young thanked the Committee for its response to his request, and said he is pleased with the result.

Commissioner Strong added that the report (top of Table 1) contains information that is useful in that it summarizes the geometric mean of phosphorous for the period of 1999-2012 plus just the last five years, for example the Illinois River near Watts shows a drop to 94% showing progress in those values at the water quality stations. He said he would like to see that in the joint report for all the stations in addition to the line graph that shows trends in the period of record and the last five years to see if there is progress in the geometric means of phosphorous value as well. Commissioner Young agreed.

Commissioner Young moved to accept the report, and Commissioner Powell seconded. Chairman Seybolt called for the vote, and the motion passed unanimously.
(Attachment H.)

4. Legal Committee

Ms. Sara Gibson, Oklahoma, said to the Commissioners the Legal Committee did not have any assignments, so there is no Legal Committee Report.

I. UNFINISHED BUSINESS

There were no items of unfinished business brought before the Commission for consideration.

J. NEW BUSINESS

1. Appointments/Assignments to Committee and Selection of Chairs

Chairman Seybolt said the Committee Chairs will move to Arkansas. The Committees will be as they are currently comprised:

a. Budget Committee
b. Engineering Committee
c. Environmental and Natural Resources Committee
d. Legal Committee

2. Election of Officers (Secretary and Treasurer)

Chairman Seybolt said the Secretary and Treasurer are for election. Commissioner Young moved that Laura Brown be elected as Secretary and Treasurer. Commissioner Strong seconded. The motion was approved unanimously.

3. 2014 Annual Meeting

Chairman Seybolt said the 2014 meeting will be hosted by the State of Arkansas at a location of their choice.

Commissioner Young, as a matter of clarification, asked for guidance in regard to authorizing the Treasurer to pay the bills for the Stressor Study. There was discussion about writing the check in compliance with the budget, that it should take two Commission members from each state to take binding action, and whether there are bylaws for such action. Mr. Ed Swaim suggested the two Commissioners who are agency directors could through some written documentation review and approve the bills electronically. He said he and Commissioner Young are two additional signatories on the check, so it does require two signatures. It was agreed that Commissioner Young would send Commissioner Strong the bill via email, and he could then review the bill and concur payment.

K. FEDERAL AND STATE GOVERNMENT REPRESENTATIVE REPORTS

There were no Federal Agency Reports.

L. PUBLIC COMMENT

Mr. Tom Myers, City of Siloam Springs, stated he is pleased the State of Oklahoma has recognized the reuse of wastewater reclamation and has set guidelines. The State of Arkansas has not and the City has been approached by a local university to provide reuse from wastewater, and he encouraged Arkansas to do so. Chairman Seybolt commented about the pond on the golf course that contains wastewater from Monkey Island that is used for irrigation and does not go to the lake. Commissioner Young said Arkansas does have reuse reclamation of wastewater, and he asked specifically what was referred to. Mr. Myers said the university asked to use reuse reclamation for its soccer field, and when the ADEQ was approached it was receptive. However, the ADH said it did not meet fecal coliform requirement of 3 or less, and there is no provision in the law to proceed. Commissioner Young stated the ANRC and the ADEQ can work with the ADH.

Commissioner Strong said he appreciated the comments, reuse reclamation was in the Oklahoma Water Plan process, but it has been a struggle in Oklahoma to get wastewater reuse and reclamation rules and regulations.

There was no other public comment.

M. ADJOURNMENT

There being no further business, Federal Commissioner and Chairman Richard C. Seybolt thanked everyone for their attendance. Chairman Seybolt adjourned the 2013 annual meeting of the Arkansas-Oklahoma Arkansas River Compact Commission at 11:05 a.m., September 26, 2013.

Richard C. Seybolt
Federal Commissioner and Chairman

10/30/2014
Date

Mary Schooley

Mary Schooley, 2013 Commission Secretary

Meeting Attendees List

PLEASE WRITE CLEARLY AND FURNISH COMPLETE MAILING ADDRESS

ATTENDANCE

MEETING: **ARKANSAS-OKLAHOMA ARKANSAS RIVER COMPACT COMMISSION**

LOCATION: **Vista Towers 11th Floor Meeting Room**
57200 E. Highway 125, Monkey Island, OK

DATE: **September 26, 2013** **TIME: 9:00 a.m.**

NAME	MAILING ADDRESS/Email address	REPRESENTING
ED FITE	ed.fite@osrc.ok.gov	Scenic Rivers
Ryan Benefield	Benefield@ADEQ.STATE.AR.US	ADEQ
Kirby Smith	Kirby.Smith@ag.ok.gov	OK Dept of Ag
GARY UTLEY	Gary.Utley@OK.USDA.GOV	USDA-NRCS-OK
Yohanes Sugeng	Ypsugeng@owrb.ok.gov	OWRB
Jason Lewis	jmlewis@usgs.gov	USGS
Dave Freiwald	frewald@usgs.gov	USGS
Jayson Funkhouser	jefunkho@usgs.gov	"
Crystal Phelps	crystal.phelps@arkansas.gov	ANRC
EDWARD SWAIM	EDWARD.SWAIM@ARKANSAS.GOV	ANRC
Tom Myers	tmyers@siloamsprings.com	City Siloam Springs

ATTENDEES

ARKANSAS-OKLAHOMA ARKANSAS RIVER COMPACT COMMISSION

SEPTEMBER 26, 2013, MONKEY ISLAND, OKLAHOMA

Dick Seybolt, Federal Commissioner

J.D. Strong, Oklahoma Commissioner

Tyler Powell, Oklahoma Commissioner

Randy Young, Arkansas Commissioner

Michael Menge, Arkansas Commissioner

Mike Carter, Arkansas Commissioner

Julie Chambers, OK Water Resources Board

Ed Swaim, AR Natural Resources Commission

Chris Soller, AR Natural Resources Commission

Crystal Phelps, AR Natural Resources Commission

Sara Gibson, OK Water Resources Board

Ryan Benefield, AR Department of Wildlife Conservation

Gary Utley, USDA-NRCS, Oklahoma

Kirby Smith, OK Department of Agriculture

Jaysson Funkhouser, USGS Arkansas

Jason Lewis, USGS Oklahoma

Ed Fite, Oklahoma Scenic Rivers Commission

Charlie Harm, guest, Arkansas

Tom Myers, City of Siloam Springs

Dave Freiwald, USGS Arkansas

Yohanes Sugeng, Oklahoma Water Resources Board

Mary Schooley, Oklahoma Water Resources Board

Treasurer's Report
& Budget Report

Report of the Treasurer

Arkansas Oklahoma Arkansas River Compact Commission

September 26, 2013

The 2013 Year-end Financial Report covering July 1, 2012 through June 30, 2013 details income and expenses.

Regions Bank Balance on July 1, 2012	$ 21,548.46
Total Income	$ 107,020.07
Total Expenses	$ 4,680.00
NET TOTAL	$ 102,340.07

Regions Bank Balance June 29, 2013	$123,888.53
Certificate of Deposit Balance June 30, 2013	$ 10,970.54

Most Recent Account Balances

Regions Bank Balance July 31, 2013	$223,897.14
Certificate of Deposit Balance June 30, 2013	$ 10,970.54
TOTAL	**$234,867.68**

Assessments for both states are current.

Register Report

7/1/2012 through 6/30/2013

Date	Account	Num	Description	Memo	Category	Clr	Amount
BALANCE 6/30/2012							**21,548.46**
7/31/2012	AOARCC	DEP	Regions Bank	July 2012	Div Income	R	0.94
8/31/2012	AOARCC	DEP	Regions Bank	August 2012	Div Income	R	0.91
9/5/2012	AOARCC	1153	Terrance Lamb	Water Year ...	Yield Report	R	-4,000.00
9/28/2012	AOARCC	DEP	Regions Bank	September 2...	Div Income	R	0.73
10/5/2012	AOARCC	1154	Chairman Sey...		Mtg. Expense	R	-405.00
10/31/2012	AOARCC	DEP	Regions Bank	October 2012	Div Income	R	0.78
11/30/2012	AOARCC	DEP	Regions Bank	November 2...	Div Income	R	0.70
12/14/2012	AOARCC	1155	Johnson, Bun...	2010 - 2012 ...	Audit	R	-275.00
12/31/2012	AOARCC	DEP	Regions Bank	December 2...	Div Income	R	0.72
1/31/2013	AOARCC	DEP	Regions Bank	January 2013	Div Income	R	0.72
1/31/2013	AOARCC	DEP	Arkansas-Okl...	2013 Assess...	Assessments ...	R	7,000.00
2/28/2013	AOARCC	DEP	Regions Bank	February 2013	Div Income	R	0.92
3/29/2013	AOARCC	DEP	Regions Bank	March 2013	Div Income	R	0.95
4/18/2013	AOARCC	DEP	NW AR Regio...	April 18, 2013	Stressor Resp...	R	100,000.00
4/30/2013	AOARCC	DEP	Regions Bank	April 2013	Div Income	R	2.69
5/31/2013	AOARCC	DEP	Regions Bank	May 2013	Div Income	R	5.26
6/28/2013	AOARCC	DEP	Regions Bank	June 2013	Div Income	R	4.75
7/1/2012 - 6/30/2013							**102,340.07**
BALANCE 6/30/2013							**123,888.53**

TOTAL INFLOWS	**107,020.07**
TOTAL OUTFLOWS	-4,680.00
NET TOTAL	**102,340.07**

Register Report:2

7/1/2012 through 6/30/2013

Date	Account	Num	Description	Memo	Category	Clr	Amount
BALANCE 6/30/2012							**10,874.84**
8/29/2012	CD AOARCC	DEP	Metropolitan ...	8/30/12	Certificate Of ...	R	26.32
9/30/2012	CD AOARCC	DEP	Metropolitan ...	9/27/12	Certificate Of ...	R	8.89
12/30/2012	CD AOARCC	DEP	Metropolitan ...	12/27/2012	Certificate Of ...	R	20.12
3/30/2013	CD AOARCC	DEP	Metropolitan ...	3/28/2013	Certificate Of ...	R	19.95
6/30/2013	CD AOARCC	DEP	Metropolitan ...	6/27/13	Certificate Of ...	R	20.42
7/1/2012 - 6/30/2013							**95.70**
BALANCE 6/30/2013							**10,970.54**

TOTAL INFLOWS	**95.70**
TOTAL OUTFLOWS	**0.00**
NET TOTAL	**95.70**

ARKANSAS-OKLAHOMA ARKANSAS RIVER COMPACT COMMISSION

BUDGET

7/1/2012 - 6/30/2016

ITEM	(ACTUAL EXPENSES) FY - 2013 7/1/2012 6/30/2013	(BUDGET) FY - 2014 7/1/2013 6/30/2014	(ACTUAL EXPENSES) FY - 2014 7/1/2013 ***9/23/2013***	(BUDGET) FY-2015 7/1/2014 6/30/2015	(PROPOSED) FY - 2016 7/1/2015 6/30/2016
Chairman Hosts Sept. 2012	$ 405.00	**$ 500.00**		$ 500.00	$ 500.00
Postage		$ 60.00		$ 60.00	$ 60.00
Stationery		$ 75.00		$ 75.00	$ 75.00
Printing & Reproduction		$ 1,000.00		$ 1,000.00	$ 1,000.00
Personnel Service & Office Expenses		$ 120.00		$ 120.00	$ 120.00
Biennial Audit	$ 275.00			$ 275.00	
Meeting Place		$ 800.00		$ 800.00	$ 800.00
Security Bond		$ 250.00		$ 250.00	$ 250.00
Contingency		$ 420.00		$ 420.00	$ 420.00
Computation of Annual Water Yield	$ 4,000.00	$ 6,250.00	$ 4,000.00	**$ 6,550.00**	$ 6,550.00
Stressor Response Study -Illinois River		$ 6,250.00		$ 6,250.00	$ 6,250.00
TOTALS:	**$ 4,275.00**	**$ 15,725.00**	**$ 4,000.00**	**$ 16,300.00**	**$ 16,025.00**
1/2 Annual budget to be paid by each state		**$ 3,500.00**		**$ 3,500.00**	**$ 3,500.00**

Statement of Cash Receipts and Disbursements (July 1, 2012- June 30, 2013

ARKANSAS - OKLAHOMA
ARKANSAS RIVER COMPACT COMMISSION
Statement of Cash Receipts and Disbursements
July 1, 2012 through June 30, 2013
and
July 1, 2013 through June 30, 2014

Arkansas - Oklahoma Arkansas River Compact Commission

Statements of Cash Receipts and Disbursements
For the Period July 1, 2012 through June 30, 2013
and
For the Period July 1, 2013 through June 30, 2014

Cash in bank, checking as of July 1, 2012	$	21,549
Cash receipts		
Member assessments		7,000
Special projects		100,000
Interest income		20
Total cash receipts	$	107,020
Cash disbursements		
Accounting		275
Conference expense		405
Yield report		4,000
Total cash disbursements	$	4,680
Cash in bank, checking as of June 30, 2013	$	123,889
Cash in certificate of deposit as of June 30, 2013		10,950
Cash and cash equivalents as of June 30, 2013	$	134,839
Cash in bank, checking as of July 1, 2013	$	123,889
Cash receipts		
Member assessments		3,500
Special projects		500,000
Interest income		216
Total cash receipts	$	503,716
Cash disbursements		
Printing & reproduction		851
Conference expense		488
Postage		57
Bond costs		685
Yield report		4,000
Total cash disbursements	$	6,081
Cash in bank, checking as of June 30, 2014	$	621,524
Cash in certificate of deposit as of July 1, 2012		10,875
Interest income certificate of deposit		146
Cash in certificate of deposit as of June 30, 2014	$	11,021
Cash and cash equivalents as of June 30, 2014	$	632,545

Commissioners Reports

Arkansas

2013
Report of Arkansas Commissioners
To
Arkansas-Oklahoma Arkansas River Compact Commission

Arkansas Water Plan Update

The update of the Arkansas Water Plan will conclude in November of 2014. We have engaged water users, organizations, agencies, and the general public in the process. Volunteers have helped our planning team and contractors, CDM Smith and FTN Associates, determine the best data sources, the preferred assessment and forecasting methods, and policy goals. Public meetings have been well attended, and we expect this engagement will be successful.

Nonpoint Source Management Program

The Arkansas Natural Resources Commission continues to utilize 319(h) program to fund water quality projects in the Illinois and Upper White River watersheds. Projects updates and of interest include: the Illinois River Watershed Partnership (IRWP) - development of a comprehensive Watershed Management Plan and development and implementation of rain gardens.

Illinois River Conservation Reserve Program

Changes to the program to encourage participation have been made. We are optimistic that signups will increase.

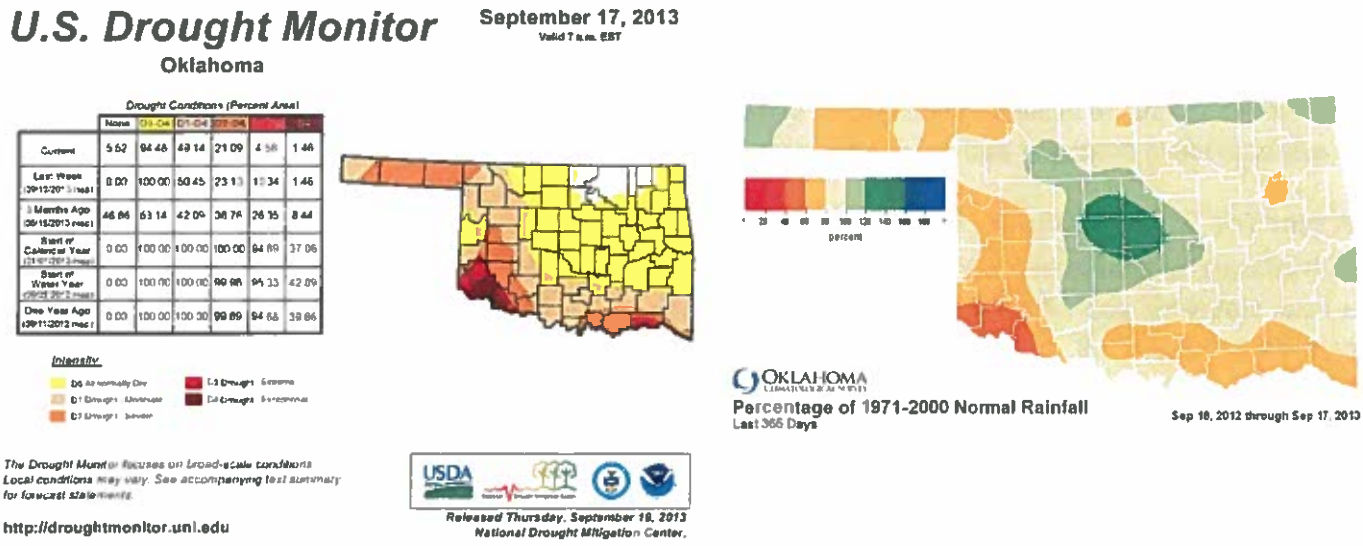
Oklahoma

OKLAHOMA COMMISSIONERS' REPORT

Arkansas – Oklahoma
Arkansas River Compact Commission
Shangri-La Resort @ Grand Lake, Oklahoma
September 26, 2013

CLIMATE

Following a period of drought improvement, the last month has been extremely dry in Oklahoma. However, widespread precipitation over the last week or so will provide significant relief from the multi-year drought impacting Oklahoma, especially in the west. According to the most recent U.S. Drought Monitor, almost half the state is considered in "moderate drought," with about 21 percent of the state's area in "severe" drought and more than four percent classified as "extreme." While rainfall over the past year is slightly below normal, the East Central and Northeast climate divisions have received only about eight and 26 percent of normal precipitation over the last 30 days.



OKLAHOMA COMPREHENSIVE WATER PLAN

State Legislative leaders responded positively to the 2012 Update of the Oklahoma Comprehensive Water Plan, which was released early in 2012. With both substantive water policy legislation and funding for implementation, the OWRB and related agencies now possess both the directive and tools necessary to meet Oklahoma's water challenges through revitalized and innovative water management and protection programs. In all, accomplishments from the 2012 legislative session will accelerate implementation of at least half of the eight priority recommendations included in the 2012 OCWP Update (Water Quality and Quantity Monitoring; Water Supply Reliability; Water Conservation, Efficiency, Recycling and Reuse; and Water Project and Infrastructure Funding). Additional legislation providing for improved enforcement of water well drilling regulations and enhanced floodplain management rules address at least two OCWP supporting recommendations.

Regional Reports - were mailed to all identified water systems in the state. A similar guide for wastewater systems is in development.

WATER RESOURCES STUDIES

Surface Water Studies

Stream water allocation models for stream systems in Oklahoma provide the OWRB and its partners with an integral planning and water rights management tool. Allocation models have been developed for the Blue River; Muddy Boggy River and Clear Boggy Creek; Kiamichi River; Little River (state line); Upper Canadian; Deep Red, Cache Creek, and Beaver Creek; and Middle Canadian, Lower Canadian and Little River (central Oklahoma) basins. Hydrologic investigations for these basins are also being completed. Models are currently being developed for basins in the Washita River, Verdigris River, Deep Fork of the Red River, and North Canadian River systems.

The OWRB and Bureau of Reclamation are cooperating on a study of western Oklahoma's Upper Washita River Basin. The study will augment an ongoing hydrologic investigation of the Rush-Springs aquifer and ongoing development of the Washita surface water allocation model. Reclamation will directly contribute to the study by identifying the water supply impacts posed by climate variability scenarios as well as formulating options to augment the ability of Foss and Fort Cobb Master Conservancy Districts to satisfy the region's growing water needs.

Groundwater Studies

The OWRB recently commenced the 20-year update of the Enid Isolated Terrace aquifer, an 81-square-mile deposit located in north central Oklahoma in the western half of Garfield County. Primary uses of the aquifer are for ranching, farming, oil refining and municipal use by the City of Enid. Goals of the study include 1) updating the saturated thickness, formation thickness, and potentiometric surface; 2) compiling water use from the aquifer; and 3) incorporating Oklahoma Comprehensive Water Plan projections for management purposes. The study is scheduled to be completed by the end of 2014.

The Garber-Wellington Water Management Study was initiated in June 2008 to address growing concerns about the future of water availability in central Oklahoma. While the OWRB will use information obtained from the investigation to determine the Maximum Annual Yield of the aquifer, a groundwater-flow model will also be used to anticipate the impacts of long-term groundwater withdrawals on the aquifer as well as simulate water management strategies. A draft of the USGS Scientific Investigations Report is currently under review. The report is scheduled to be finalized by the end of 2013. The study was funded with state monies through the Oklahoma Comprehensive Water Plan and federal funds through the Bureau of Reclamation and U.S. Geological Survey.

The OWRB initiated a study on the Rush Springs aquifer in west central Oklahoma in October 2011 and will be collecting groundwater and surface water information to better understand the groundwater-flow system. The goals of the project are to 1) better define the aquifer boundaries; 2) develop a groundwater-flow model; and 3) determine the Maximum Annual Yield of the aquifer. The groundwater-flow model will be used to simulate water management scenarios, project current use impacts, and assess climate variability utilizing available climate modeling information. The OWRB will be working with the Bureau of Reclamation–under the WaterSMART Program–on the Washita Basin River Basin Water Supply Study. The project is scheduled to be complete by the end of 2015.

- Confirmatory stream and reservoir monitoring to assess Water Quality Standards beneficial use attainment status;
- Monitoring for the Grand River Dam Authority to assist GRDA in management of their reservoirs for ecosystem support;
- Completing cooperative work for ODAFF to investigate pesticides in certain Oklahoma streams.

BENEFICIAL USE MONITORING PROGRAM

OWRB staff continue to monitor water quality conditions and trends statewide through the Beneficial Use Monitoring Program (BUMP). The BUMP, recognized by EPA as one of the finest state-run monitoring programs in the nation, facilitates science-based decision-making concerning impaired waters. In 2011, BUMP lake sampling underwent a thorough reevaluation and modification to incorporate a probabilistic sampling approach to maximize benefits and efficiencies in the program while reducing expenses. Monitoring staff partnered with EPA to conduct the National Lakes Assessment and are currently partnering with EPA on the National Rivers and Streams Assessment with field work initiating this summer. These national studies are designed to establish comparable lake, river and stream parameters between states to facilitate standardized assessment.

OKLAHOMA WATER QUALITY STANDARDS

Oklahoma's Water Quality Standards amendments have become effective as state law and were certified by the Oklahoma Attorney General on September 3, 2013. They now await EPA review and approval.

Revision topics included modification to regulatory default flows for implementing the Agricultural Beneficial Use; removal of the numeric criteria for color; clarification of the applicability of Seasonal Temperatures for calculating BOD load; restoring language determining the applicability of the Fish Consumption Beneficial Use; updates to WBID numbers and editorial changes in Appendices A.1 through A.7; changes to the Beneficial Uses of certain segments of Canadian River, Rush Creek and Wewoka Creek in Appendix A; ; updates to Numerical Human Health Criteria in Appendix G; and additions to Appendix H regarding Beneficial Use Designations for Certain Limited Areas of Groundwater.

A Joint Phosphorus Criteria Study is also underway to determine the Total Phosphorus threshold response level at which any statistically significant shift occurs in algal species composition or algal biomass production resulting in undesirable aesthetic or water quality conditions in Oklahoma's designated Scenic Rivers. The study will be managed by a committee of six individuals appointed by the Governors of Oklahoma and Arkansas. The Joint Study Committee will establish a reasonable schedule of project deliverables including at least two interim written reports and at least one public meeting each year with stakeholders. The final report and all data collected or reviewed during the Joint Study will be available to the public.

ENDANGERED SPECIES ACT

On September 17, 2013, the U.S. Fish and Wildlife Service published a final rule announcing the listing of two freshwater mussel species—the Neosho mucket (Lampsilis rafinesqueana) as endangered and the rabbitsfoot (Quadrula cylindrica cylindrica) as threatened—under the federal Endangered Species Act. Both species exist in eastern Oklahoma streams, particularly northeastern watersheds like the Illinois River.

WATER RESOURCES FINANCING

The OWRB administers the State Financial Assistance Program (FAP), backed by the Statewide Water Development Revolving Fund, which awards loans and grants for the construction and improvement of water and sewer facilities. In all, through the OWRB's five primary financing programs—which provide Bond, CWSRF and DWSRF loans and REAP, Emergency and Drought Response grants—more than $3 billion has been awarded for water and sewer projects in Oklahoma with a total estimated savings of more than $1 billion to Oklahoma communities. In 2012, the Board approved approximately $300,000 in grants to provide drought-related emergency aid for rural and municipal water facilities.

OKLAHOMA STATE LEGISLATURE

While the 2013 legislative session, which concluded in FebruaryMay, was relatively uneventful compared to last year's flood of landmark water legislation, there were a few measures of note:

- HB 2193 outlines procedures for the OWRB to properly administer the new Water Infrastructure Credit Enhancement Reserve Fund. The Fund, authorized through passage of State Question 764 lastin November, enables 2012, will provide means for Oklahoma to meet its projected $82 billion water and wastewater infrastructure needs through 2060, a priority initiative of the 2012 Update of the Oklahoma Comprehensive Water Plan.
- SB 965, which transitions the nine-member OWRB Board from its long-standing Congressional District and at-large representation to a new regional scheme, passed by one vote just before the Legislature adjourned on May 24. This change loosely mirrors the eight 1995 OCWP planning regions plus a ninth in the Panhandle. The measure takes effect in 2014 and will be slowly phased in over the coming years.
- A new Emergency Drought Relief Fund, enabled through HB 1923, includes $3 million for future drought mitigation and projects. While details have yet to be resolved, in the event of a gubernatorial drought declaration, expenditures will be approved through an Emergency Drought Commission consisting of the Secretary of Agriculture and Executive Directors of the OWRB and Oklahoma Conservation Commission.

While no bills were passed to implement a true regional water planning program, the most popular recommendation of the OCWP and the only priority initiative yet to be implemented, last year's increased appropriations to implement OCWP priorities were left intact. And not only were efforts to repeal the Water for 2060 Act soundly rejected, all appointments have now been made to the Advisory Council envisioned under that legislation, passed last year.. Lastly, all of the OWRB's new rules adopted in 2013, including those to implement the new mining pit water regulations in the Arbuckle-Simpsonsensitive sole source groundwater basins, were approved by the Governor and Legislature.

LEGAL MATTERS

Tarrant Regional Water District v. Herrmann

Oklahoma won a historic legal victory on June 13. The U.S. Supreme Court unanimously upheld certain Oklahoma laws controlling state water against a challenge from the Tarrant Regional Water District, which serves a large area in north Texas. In 2007, Tarrant applied for a permit to take water from the Kiamichi River in southeastern Oklahoma and simultaneously filed a federal lawsuit against OWRB members and several Oklahoma statutes that place restrictions on the use of stream water out-of-state. After Oklahoma's legal team had won victories in U.S. District Court and again in the Court of Appeals, the Supreme Court definitively ruled that Tarrant has no right to cross the state border and take water from Oklahoma because (1) Oklahoma laws are within the state's authority and rights to control its waters under the Red River Compact (a Congressionally-

Committee Reports

Engineering Report

Arkansas - Oklahoma Compact Commission Meeting September 26, 2013

Engineering Committee Meeting Report-Out

The Engineering committee has been discussing the honing the annual yield calculation methodology for several months and met by conference call on September 17th.

4 assignments from 2012 and past meetings:

1. *Update the methodology for the calculation of yield using updated data sources and agreed-upon coefficients, gages used, calculations for ungaged areas, and other data.*

   I am pleased to say the engineering committee has finalized this written methodology which includes agreed-upon coefficients, gages, calculations for ungaged areas, and data sources. In addition, we have finalized changes on an Excel-based annual yield analysis tool (AYAT) that the OWRB created last year. Both states used the tool this year and we both agree that it will provide a transparent, easy-to-use format for calculations, prevent hand calculation errors, and automate the data retrieval by automatically pulling in the most current data from U.S. Corp of Engineers and USGS websites. In addition, it contains all data source citations and step-by-step process for each calculation (something omitted from past reports).

   Recommendation: First the committee has determined that the proposed annual yield calculation methodology adheres with the compact and that it can be approved. Secondly, the committee is recommending that the annual yield report can easily be compiled by the states at a substantially lower cost (both contractor costs and time savings by both states with the elimination of the substantial time commitment required to review and recreate the contractor's calculations and results presented in a different format). Each state would retrieve the data from USGS and from the other state, independently run the analysis and compare the numbers. Each state is already doing this same process when checking the contractor's work. The host state would prepare an executive summary quantifying any deficiencies and prepare copies of the report.

2. *Compare the result between the Engineering Committee Methodology and Contractors methodologies for calculating annual yields.*

   Last year the commissioners agreed to continue with Mr. Lamb at Hydrologic Information Services (H.I.S) for another year and have each state prepare a report separately and compare results. The committee has had the benefit of the contractor's

history with the compact to ensure that the data sources and calculations he used align with updated data sources and calculation methods (including agreed-upon coefficients, gages, methodology for extrapolating runoff area to the state line, etc.). Major difference between the excel workbook and Mr. Lamb's report are:

1. Calculation of runoff
    a. Summation of daily flow vs. using monthly mean flow to calculate yearly volume. Using monthly mean flow could leads to errors in 2012 due to being a leap year. The mean flow for February was not multiplied by the correct number of days (used 28 days instead of 29 days).
    b. Drainage area used to interpolate runoff at state line. The excel workbook calculated the drainage areas uses a more accurate GIS and spatial data to delineate the drainage area while the contractor still used manual method.
    c. Different gages used to calculate runoff on Poteau River calculation. This issue was discussed by the committee last year. There are no specific instructions in the Compact on what gages to use to calculate the annual yield. Each gage has its own strength. The gage used by the contractor (Cauthron, AR) has a longer history of data while the gage used in the workbook (Loving, OK) is closer to the state line and has a smaller interpolated area.

2. Direct diversions from streams and reservoirs.
   Both states have direct access to the most current streams and reservoirs data that could improve the annual yield computation.

Recommendation: Although there were differences, no deficiencies were identified and the committee can recommend approval of the annual yield report.

3. *Determine if water quality data should be included in the Annual Yield Report or the E*nvironmental Committee Report.
   The past reports only consists of copies of the raw data from USGS tables with no analyses reflecting trends, 'red flag' conditions, and areas of concern. The Environmental Committee Report only includes water quality analyses for the Illinois River Basin and does not cover all other basins in the compact area. The committee agreed that raw data information does not provide enough information and of little utility.

Recommendation: The committee would recommend doing more analyses of the raw data so it could provide more useful information and could be included in the

Environmental Committee's report. Under the directive of the commissioners, the parameters of the analyses need to be determined.

If the Commissioners would still like to see this raw data in the Annual Yield Report, the committee would suggest simply including a statement about sources of water quality information and internet links to those sources instead of multiple pages of raw data. This could include USGS website, OWRB and ANRC reports on-line, etc.).

4. *Discuss and propose a methodology for dispute resolution in cases of disagreement regarding calculation of annual yield.*

In cases of disagreement regarding the annual yield calculations the committee has traditionally approached the commission with a recommendation that the report either 1) not be accepted or 2) be accepted conditionally with additional time for the resolution of technical issues. During the Engineering Committee meeting last week, Mr. Chris Sollar presented a very good draft written procedure for disagreement resolution. The document outlines solutions for potential disagreement in four key areas: data sets used, methods, results, and interpretation of compact language.

Recommendation: The Engineering Committee will finalize this document during 2014 and ask the legal committee for a review and comments and be prepared to present the final document for approval at the next compact meeting.

Arkansas River Basin Compact

Written Procedure in Occurrence of Disagreements in the Calculation of Annual Yield of the Arkansas River Compact Basin

Draft 9/9/2013

1) Disagreement on Data

Since multiple sources will be used to obtain different sets of data at different times, there is a chance that the agencies in Arkansas and Oklahoma may obtain different data for the basic elements in the calculation of the compact. This could be due to timing of data collection or contact person used to obtain data. Data used in the calculations include:

1) Stream Flows (USGS)
2) Precipitation on reservoir surface (USACE)
3) Evaporation from reservoir surface (USACE)
4) Diversions from streams (OWRB and ANRC)
5) Diversions from reservoir (USACE)
6) Return flows (State's DEQ)

Solutions:

For data obtained off the internet the newest data will be used. This includes runoff, precipitation, and evaporation data. Possible conference call with agencies in charge for clarification on what changed and why if needed. For data provided by the states (diversions and return flows) the states should have free access to the other states data for review. The states should review, investigate, and possibly include historical data and averages if current year reported data is significantly different from previous years. For data obtain from individuals a conference call can be used to question the information.

2) Disagreement on Methods

Current methods used to calculate the yield have been written out in guidelines and agreed to by both state agencies. It is to be expected that changes may occur in the future as both agencies work on producing the report. These changes may include but not limited to: what gages are used, drainage areas of gages, interpolation/extrapolation areas to state line, changes in coefficients; as well as the inclusion of addition depletions not currently being incorporated (pumpage of ground water and evaporation from non-reservoirs).

Solutions:

Changes should be brought up before the engineering committee and/or Commissioners before being made to the method in the yield report. If the changes are deemed important enough to be included in the current years report a conference call with the engineering committee members can be held to discuss the topic. For inclusion of methods not currently being considered there must be a defined, agreed upon process to obtain and calculate that data before it is included in the yield report. Review of the process and the significance of results can be performed to determine the importance of new processes.

Arkansas River Basin Compact
Comparison of Computed Yield Reports

This report provides an explanation of the major differences between the yield report created by Mr. Lamb at Hydrologic Information Services (H.I.S.) and the calculations by the staff of the Arkansas Natural Resources Commission (ANRC) and the Oklahoma Water Resources Board (OWRB), with ANRC and OWRB using the Excel workbook created by Maria Moreno from OWRB. The goal of this report is to give the Commissioners of the Arkansas River Basin Compact a helpful tool for comparison and come to a consensus on the question of rather a third party entity (H.I.S.) should continue to create the report or if the agencies of Arkansas and Oklahoma can duplicate and/or improve the report that H.I.S. produces.

The major differences are:

1) Calculation of Runoff
    a. Summation of daily flow vs using monthly mean flow to calculate yearly volume.
    b. Drainage area used to interpolate/extrapolate runoff at state line.
    c. Gages used to calculate runoff. ~ Poteau @ Cauthron / Loving
2) Direct diversions from streams and reservoirs

The workbook sums the recorded daily flows to arrive at the yearly volume while H.I.S. uses monthly mean flows to calculate the yearly volume. The monthly mean is multiply by the number of days in a month and then added together to get the yearly volume. This leads to errors in the H.I.S. report due to 2012 being a leap year. The mean flow for February was not multiplied by the correct number of days (used 28 instead of 29 days). Even when adjusted by using the correct number of days the monthly mean method and daily flow method did not produce the same yearly volume, even though it should. This is probably due to rounding of the monthly mean.

The next major difference is the drainage areas used to interpolate and extrapolate the runoff to the state line. H.I.S. report uses areas delineated by hand. The workbook uses GIS and spatial data to delineate the drainage not included in the gage readings. While it is obvious that the GIS method is an improvement on the hand delineation it is noted that ANRC does not completely agree with some of the areas. These will be worked on in the coming year for a final value.

Different gages used to calculate the flow can be seen on the Poteau River calculations (page 5). This has been discussed by the engineering committee before. There are no specific instructions in the compact on what gages to use so that determination is dependent on the individual. Each gage has its own strengths. The gage used by H.I.S. (Cauthron, AR) has a longer history of data while the gage used in the workbook (Loving, OK) is closer to the state line and has a smaller interpolated area.

The last difference is the diversions from the streams and reservoirs. This aspect both agencies knew they could improve upon. Having direct access to the data collected by the agencies and the GIS means to insure that all diversions points in the compact region are counted improves the quality of this aspect of the calculations.

Comparison of Spavinaw and Lee Creek Sub-basins

2012 WY	Spavinaw nr Syca. DA=135	Spavinaw Basin DA=133
Oct	25.0	24.6
Nov	78.9	77.7
Dec	73.6	72.5
Jan	48.8	48.1
Feb	64.4	63.4
Mar	205	202.0
Apr	74.3	73.2
May	40.1	39.5
Jun	28.9	28.5
Jul	8.89	8.76
Aug	5.62	5.54
Sep	13.8	13.6
Mean ft^3/s	55.6	54.8
acre-ft	40,260	39,663

Table 2: Calculated runoff for Spavinaw basin from H.I.S. worksheet.

SPAVINAW SUB-BASIN		
Total Runoff	**36,854**	**acre-feet**

USGS 07191220		
Spavinaw Creek near Sycamore, OK		
Drainage area:	133	sq.mi
Measured	20,366	cfs
	40,395	acre-feet
Adjusted to State Line		
Drainage Area:	121.34	sq.mi
Estimated	18,580	cfs
	36,854	**acre-feet**

Table 1: Calculated runoff for Spavinaw Basin from workbook.

Comment: ANRC agrees the drainage difference is closer to 11 sq miles than 2 sq miles. Per USGS data, the drainage at the gage should be 133 sq. miles noted in the workbook.

2012 WY	Lee nr Sho DA=420	Lee @ SL DA=426
Oct	12.1	12.3
Nov	1,071	1,086
Dec	1,082	1,097
Jan	909	922
Feb	597	606
Mar	1,549	1,571
Apr	245	249
May	27.2	27.6
Jun	7.69	7.80
Jul	1.20	1.22
Aug	0.48	0.49
Sep	7.98	8.09
Mean ft^3/s	459	466
acre-ft	332,581	337,333

Table 4: Calculated Runoff for Lee Creek Subbasin from H.I.S. worksheet.

LEE CREEK SUB-BASIN		
Total Runoff	**338,575**	**acre-feet**

USGS 07249800		
Lee Creek at Short, OK		
Drainage area:	420	sq.mi
Measured	168,292	cfs
	333,806	acre-feet
Adjusted to StateLine		
Drainage Area:	426	sq.mi
Estimated	170,695.82	cfs
	338,575.15	**acre-feet**

Table 3: Calculated runoff for Lee Creek Subbasin from the workbook.

Comment: Due to a miss understanding of the compact the extrapolated area of 426 sq. miles may not be a final number.

Comparison of Poteau River Sub-basin

POTEAU RIVER BASIN		
Total Runoff	**430,603**	**acre-feet**

USGS 07247015		
Poteau River at Loving, OK		
Drainage area:	269	sq.mi
Measured	148.265	cfs
	293,965	acre-feet
Adjusted to StateLine		
Drainage Area:	261.6	sq.mi
Estimated	144.128	cfs
	285,879	**acre-feet**

USGS 07247250		
Black Fork below Big Creek nr Page, OK		
Drainage area:	74.4	sq.mi
Measured	69.474	cfs
	137,801	acre-feet
Adjusted to StateLine		
Drainage Area:	17.62	sq.mi
Estimated	16.453	cfs
	32,635	**acre-feet**

USGS 07247250		
James Fork near Hackett, AR		
Drainage area:	147	sq.mi
Measured	53.165	cfs
	105,453	acre-feet
Adjusted to StateLine		
Drainage Area:	156.25	sq.mi
Estimated	56.511	cfs
	112,089	**acre-feet**

Comment: The major differences between the two reports on the Poteau River sub-basin are the different gages. This was discussed in previous engineering committee meetings. The gage at Cauthron has a longer history of data while the gage at Loving has a smaller interpolated area back to the state line. ANRC agrees that the gage at Loving should be used.

The workbook uses a gage on Black Fork that Mr. Lamb does not. Black Fork starts in AR and crosses the state line and joins Poteau River upstream of Wister Lake. This gage should be included.

Mr. Lamb includes ungaged tributaries to James Fork and Poteau River. ANRC agrees that there are tributaries that starts in Arkansas and flow into James Fork and the Poteau River that are not included in the gage flow. Since the workbook uses the gage on Black Fork the ungaged section for the Poteau River is smaller but it should still be considered. ANRC review of the ungaged sections on James Fork delineated an area of 35.2 sq. miles.

Table 7: Calculated runoff for Poteau River Subbasin from the workbook.

2012 WY	Poteau @ Cauthron DA=203	Poteau @ State Line DA=254	Poteau Ungaged DA=89.2	James Fk Hackett DA=147	James Fk State Line DA=157	James Fk Ungaged DA=36.1	Poteau R Basin DA=536
Oct	2.1	2.6	0.9	3.6	3.8	0.9	8.2
Nov	1,071.0	1,340.1	470.6	254.0	271.3	62.4	2,144.3
Dec	807.0	1,009.7	354.6	335.0	357.8	82.3	1,804.4
Jan	565.0	706.9	248.3	350.0	373.8	86.0	1,415.0
Feb	311.0	389.1	136.7	228.0	243.5	56.0	825.3
Mar	841.0	1,052.3	369.5	499.0	532.9	122.5	2,077.3
Apr	43.4	54.3	19.1	32.7	34.9	8.0	116.3
May	3.6	4.5	1.6	14.5	15.5	3.6	25.1
Jun	1.0	1.3	0.4	4.1	4.4	1.0	7.2
Jul	6.5	8.1	2.8	17.6	18.8	4.3	34.0
Aug	3.5	4.3	1.5	1.1	1.2	0.3	7.3
Sep	19.4	24.3	8.5	1.2	1.2	0.3	34.3
Mean ft^3/s	306	383	135	145	155	36	709
acre-ft	221,829	277,559	97,473	105,101	112,250	25,810	513,093

Table 8: Calculated runoff for Poteau River Subbasin from H.I.S. worksheet.

Comparison of Depletions by Major Reservoirs

Table 1. Annual Depletion by Major Reservoirs in the Compact Area

ANNUAL DEPLETIONS BY MAJOR RESERVOIRS IN ACRE-FEET (AF)

RESERVOIR	CHANGE IN STORAGE	PRECIPITATION (P)	RUNOFF (R)	EVAPORATION (E)	PERMITTED DIVERSIONS (D)	RELEASES (O)	INFLOW (I)	DEPLETIONS (X)
Webber Falls	114	35,825	6,448	51,142	-	4,716,781	4,738,661	21,880
Tenkiller Ferry	(42,093)	39,571	7,123	40,928	3,022	751,675	721,085	(30,591)
Robert S. Kerr	10,344	135,128	24,323	192,869	-	12,380,138	12,472,547	92,409
Wister	4,915	36,575	6,584	29,649	11,982	897,962	914,517	16,555
						ANNUAL DEPLETIONS:		100,253

Figure 3: Depletion by reservoirs from workbook (using same diversions as H.I.S. report).

Table 3.—Annual depletion caused by major reservoirs for the 2012 water year
[acre-ft = acre-feet; ft³/s = cubic feet per second]

Reservoir	Year-end contents (acre-feet)	Change in contents in water year (acre-feet)	[a]Precipitation on reservoir surface (inches)	[b]Evaporation from reservoir (inches)	[a]Diversions (acre-feet)	Depletion (acre-feet)	Depletion (ft³/s)
Webbers Falls	166,582	114	37.06	52.91	0	21,880	30.22
Tenkiller Ferry	552,044	-42,093	36.81	38.07	3,022	-30,591	-42.25
Robert S. Kerr	519,653	10,344	38.70	55.24	0	92,409	127.6
Wister	42,062	4,915	57.00	46.21	11,982	16,555	22.9

[a] From U.S. Army Corps of Engineers, Tulsa District.
[b] Adjusted for pan coefficient of 0.70 (from Wisler and Brater, 1949).

Figure 3: Depletion by reservoirs from H.I.S. report.

Comment: Using the same area of Webbers Falls and the same volume for diversions the depletions caused by reservoirs are the same in both reports.

Conclusion

The Engineering Committee believes that the agencies of both states can and should produce the report in the future. While there are differences between the reports this was to be expected.

There are still a few issues to be resolved. These are:

a. Agreement on the delineated areas and any ungaged tributaries.
b. Create a procedure in the case of discrepancies between the reports or disagreements on methods, procedure, or changes to future reports.
c. Create a method of transferring data between agencies or provide access to data so that each state has their own means of obtaining data from the other state.
d. Write and finalize a report to replace the report created by H.I.S.

The Engineering Committee will work on solutions to these issues in the coming year and plans on having a complete report for the next yield report if instructed by the Commissioners.

ARKANSAS RIVER BASIN COMPACT

Guidelines for the Computation of Annual Yields

Draft – September 18, 2013

This document provides details on the data sources and methods required for computation of the annual yields for the Spavinaw Creek, Illinois River, Lee Creek, Poteau River and Arkansas River Sub-basins of the Oklahoma-Arkansas River Compact.

Computation of Annual Yields

The Oklahoma-Arkansas River Compact states the required determinations for computation of annual yields (Appendix I, page 116), as follows:

1. **Measurement or computation of actual runoff from each Sub-basin**
2. **Computation of total depletions or accretions in each of the respective Sub-basins**
3. Sum of items (1) and (2) to obtain the "annual yield" for each basin
4. Multiply item (3) by 100 minus the percent depletion allowed in Article IV of the Compact
5. Compute deficiency, if any, by comparing item (4) to (1)

Items 1 and 2 are explained in this document, as these involve interpretation of the Compact, data collection and application of appropriate methods for computation of runoff, accretions, and depletions. Items 3 to 5 are not included herein as these are self-explanatory.

1. Measurement or Computation of Actual Runoff from each Sub-basin

- Runoff from the Sub-basins should be computed using the areas defined by the Compact in Article II (page 93), and further comments of the Committee presented in Appendix I, Item 1 (page 117-118). Active USGS streamflow gauges should be used to retrieve measured runoff as available. Since most gauges are not located right on the Oklahoma-Arkansas state border, estimates of runoff should account for the ungauged flows generated in the drainage area above or below the selected gauge.

  In the case of the Spavinaw Creek, Illinois River, Lee Creek and Poteau River Sub-basins, the runoff measured at the gauges needs to be adjusted using simple linear interpolation, as follows:

$$R = R_M * \left[\frac{A_T}{A_G}\right] \qquad \textbf{(Eq. 1)}$$

Where,

***R** = Actual runoff at the OK-ARK state line*

***R_M** = Measured runoff at the gauge*

***A_G** = Contributing area at the gauge*

***A_U** = Area ungauged above or below gauge*

***A_T** = Total area including ungauged portion. Because water from these Sub-basins originates in the state of Arkansas, then:*

- *If gauge is located on the Oklahoma side: $A_T = A_G - A_U$*
- *If gauge is located on Arkansas side: $A_T = A_G + A_U$*

Data obtained from the eleven (11) above listed gauges is sufficient to accurately compute actual runoff from the Sub-basins but different gages could be used for the computation of runoff.

- Review of the Poteau River Sub-basin indicates that there are large portions of runoff that originates in Arkansas but is not included in the gaging. Calculations should be completed to estimate the runoff for these areas using the following equation.

$$R_U = R_M * \left[\frac{A_U}{A_G}\right] \qquad \textbf{(Eq. 3)}$$

(Eq. 3)

Where,
R_U*= Calculated runoff at the OK-AR state line from ungauged contributing streams*
R_M *= Measured runoff at the gauge*
A_G *= Contributing area at the gauge*
A_U *= Area contributing runoff for ungauged streams*

- Actual runoff should be computed on an annual basis, and monthly values should be included as appendices, instead of the daily time series that have been included in previous reports. Units should be consistent, preferably in Acre-feet (AF).Flows originated from outside the Compact area should not be included in the computation of actual runoff, unless specified in the Compact. Article II of the Compact defines the drainage areas for each Sub-basin as waters originating in the Compact area. In previous reports, return flows from the White River Basin have been removed from the flow originating in the Arkansas River Basin since the water is being transferred in from another basin. The return flow data is obtained from the water department/utilities for the Cities of Fayetteville, Rogers, and Springdale, AR.

2. Computation of Total Depletions or Accretions in each of the respective Sub-basins

In Supplement No. 1, Appendix I, Item 2, the Compact states that *"The total annual depletion in each sub-basin will be the sum of the following:* ***(a)*** *Total stream diversions minus return flows.* ***(b)*** *Depletions and/or accretions by major reservoirs.* ***(c)*** *Evaporation losses from other than major reservoirs.* ***(d)*** *Pumpage of ground water alluvium aquifers".* Data sources and procedures suggested for computation of these items are described as follows:

a) Total stream diversions minus return flows

Diversions over the Oklahoma side of the Compact, i.e. the Arkansas Sub-basin and the Oklahoma portion of the Lee Creek Sub-basin, should be estimated using information from the OWRB. Likewise, diversions over the Arkansas side of the Compact should be obtained from ANRC. These agencies manage the surface water rights of their areas, and can provide information on the type of uses, allocated amounts, annual reported use, and estimates of return flows. Values of annual diversions for each sub-basin should be included in the report, along with a brief description of the methods and assumptions used in the calculation of return flows.

get hot with the sun, and while light penetration in a pan is essentially uniform, light penetration in natural bodies of water will decrease as depth increases. Pan coefficients can vary depending on a number of different variables, including ground cover, levels of relative humidity, and 24 hour wind speed. Previous reports have used a pan coefficient of 0.70 for correlation between reservoir evaporation and pan evaporation.

Further discussion as to the coefficient value that should be used is required by the engineering committee.

- **Direct Diversions from reservoir surface (D)**

  Direct diversions from reservoir storage, not included in the outflow, can be computed using information from the OWRB water rights database. Previous reports only used data from the USACE, but did not include description of details such as the type of use, the year of the data, and if any return flows had been included in the computation.

c) Evaporation losses from other than major reservoirs

This item has not been addressed in previous reports. The Compact states that *"Evaporation from small lakes, such as those not designed for water supply, including flood-detentions structures, farm ponds, and recreation lakes, may be estimated on basis of average water surface area and appropriate data from evaporation-pan records"* (Appendix I, Item 2, page 119).

Further discussion about the data sources and feasibility of including this item in the computation of depletions needs to be discussed by the Engineering Committee. Inclusion of this item in the computation of depletions will be determined by the Engineering Committee.

d) Pumpage of ground water from alluvium aquifers

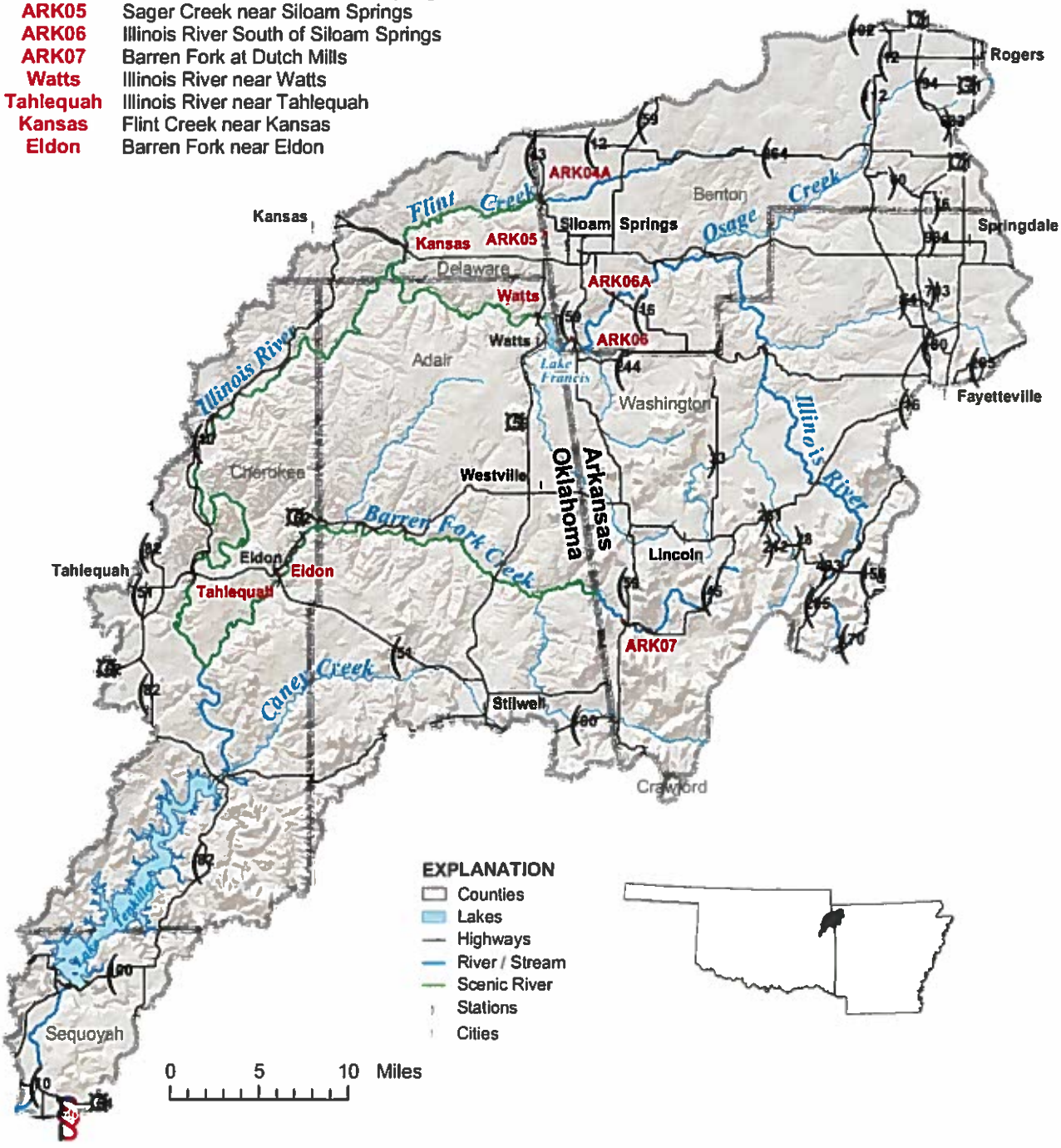
This item has not been included in previous reports. The Compact states that *Pumpage from stream alluviums may cause appreciable depletions in the stream flow. This is not believed to be a factor at the present (1969) time, but could conceivably be in the future for some stream reaches"* (Appendix I, Item 2, page 119).

Inclusion of this item in the computation of depletions will be determined by the Engineering Committee.

Environmental Report

Arkansas-Oklahoma Arkansas River Compact Commission Environmental Committee Report

ARK04A	Flint Creek near West Siloam Springs
ARK05	Sager Creek near Siloam Springs
ARK06	Illinois River South of Siloam Springs
ARK07	Barren Fork at Dutch Mills
Watts	Illinois River near Watts
Tahlequah	Illinois River near Tahlequah
Kansas	Flint Creek near Kansas
Eldon	Barren Fork near Eldon



September 26, 2013

Table 1. Comparison of geometric means to the Oklahoma Scenic River total phosphorus criterion calculated from 1999-2012 and 2008-2012.

Station (see footnotes)	1999-2012 (3-month GM'S)			2008-2012 (3-month GM'S)		
	N (Period)	N< 0.037	% Exceeding 0.037	N (Period)	N< 0.037	% Exceeding 0.037
Illinois River near Watts*	255	5	98%	85	5	94%
Illinois River near Tahlequah*	255	9	96%	83	4	95%
Flint Creek near Kansas*	246	0	100%	77	0	100%
Barren Fork near Eldon*	246	133	46%	80	43	46%
Little Lee Creek near Nicut	NA	NA	NA	54	52	4%
Lee Creek near Short	167	166	< 1%	80	80	0%
Mountain Fork River near Smithville	139	113	19%	54	39	28%

* Dataset meets USAP data requirements

Table 2. Waters Listed on Oklahoma's 2010 303(d) List

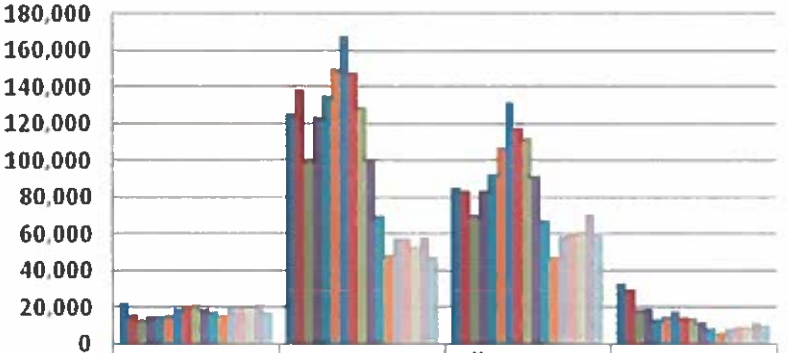
Impaired Waters in the Illinois River Basin

OKWBID	Name	Listed on 303(d) for Impairments
121700020020	Tenkiller Ferry Lake	Dissolved Oxygen, TP
121700020110	Chicken Creek	Fish Bioassessment
121700020220	Tenkiller Ferry Lake, Illinois River Arm	Dissolved Oxygen, chlorophyll-a,
121700030010	Illinois River – Tahlequah	TP
121700030040	Tahlequah Creek (Town Branch)	*Eschericia coli*
121700030080	Illinois River	TP, Lead, *Eschericia coli,* Fecal Coliform
121700030280	Illinois River – Chewey Bridge	TP, *Escherichia coli.* Turbidity
121700030290	Flint Creek	TP,Dissolved Oxygen
121700030350	Illinois River – Watts	TP, Turbidity, Enterococcus, *Escherichia coli*
121700030370	Ballard Creek	Enterococcus
121700040010	Caney Creek	Enterococcus
121700050010	Illinois River - Baron Fork	TP, Sedimentation/Siltation
121700050090	Tyner Creek	Enterococcus
121700050120	Peacheater Creek	Enterococcus
121700060010	Flint Creek	TP,Enterococcus
121700060040	Battle Creek (Battle Branch)	Enterococcus
121700060080	Sager Creek	Enterococcus, Nitrates, Thallium

Other Notable Impaired Waters in the Compact Area

OKWBID	Name	Listed on 303(d) for Impairements
220100010010	Poteau River (Below Wister)	Silver, Cadmium, Copper, Lead, Selenium, Turbidty, Enterococcus
220100020020	Wister Lake	Chlorophyll-a, pH, Dissolved Oxygen, Turbidity TP, Color, listed as an NLW in the OWQS
220200050010	Lee Creek	Lead, Total Phosphorus, Enterococcus
220200050040	Little Lee Creek	Total Phosphorus, Enterococcus

Average Annual Total P Loading in Kilograms per Year (excluding targeted high flows)



	Flint Creek near Kansas	Illinois River near Watts	Illinois River near Tahlequah	Barren Fork near Eldon
Total P 80-93	22,279	124,832	85,235	33,001
Total P 93-97	15,705	138,508	83,799	29,482
Total P 94-98	12,986	99,898	70,546	19,163
Total P 95-99	14,949	123,581	83,632	19,257
Total P 96-00	15,103	134,986	92,876	13,163
Total P 97-01	15,992	149,927	106,797	14,548
Total P 98-02	19,259	167,987	131,491	17,603
Total P 99-03	20,620	148,151	117,524	14,059
Total P 00-04	21,004	129,533	112,341	13,685
Total P 01-05	19,098	100,347	91,325	11,465
Total P 02-06	17,415	69,482	67,345	8,500
Total P 03-07	15,977	48,448	47,216	5,716
Total P 04-08	19,356	56,951	58,605	8,574
Total P 05-09	19,586	57,275	60,827	9,195
Total P 06-10	19,818	53,127	61,131	9,335
Total P 07-11	21,672	58,371	70,241	11,256
Total P 08-12	17,473	47,785	60,776	9,894

Values represent all available data, which is routinely collected and excludes targeted high flow events.

Water Quality Trends at Different Flow Regimes

Trend analyses were performed for total phosphorus concentrations use assessment geometric means at four BUMP permanent monitoring stations in the Arkansas River Compact area (Table 1). Using a Seasonal Kendall test, a series of trends was calculated for each station including all total phosphorus data from both 1993-2012 and 1999-2012, total phosphorus concentrations measured at both higher and lower flows from 1999-2012, and use assessment geometric means from 1999-2012. Furthermore, for each concentration data set, a trend was calculated using both unadjusted and flow-adjusted total phosphorus data. Graphical representations of these trends are not presented but may be obtained by contacting Monty Porter with the OWRB at 405-530-8933. Some general conclusions may be drawn from the data set.

1. When considering all total phosphorus data with a period of record (POR) beginning in 1993, only Flint Creek demonstrated a highly significant upward trend for both tests. Conversely, the Illinois River had a highly significant downward trend at Watts and Tahlequah. The Barren Fork River demonstrated no significant trend.
2. Likewise, when all data from 1999-2012 are analyzed, all stations but Flint Creek show a highly significant downward trend. The Flint Creek data demonstrate no significant trend.
3. All stations but Flint Creek show some significant downward trend when only higher flow total phosphorus concentrations are considered. The Kansas data demonstrate no significant trend. Unadjusted data from the Barren Fork River also show no significant trend in total phosphorus concentrations.
4. Both Illinois River stations demonstrate a highly significant downward trend in total phosphorus when only lower, or base flow data, are considered. Flint Creek data show a slightly significant upward trend, while Barren Fork River data have no significant trend.
5. All stations except Flint Creek show a highly significant downward trend for use assessment geometric means. Flint Creek demonstrates no significant trend.

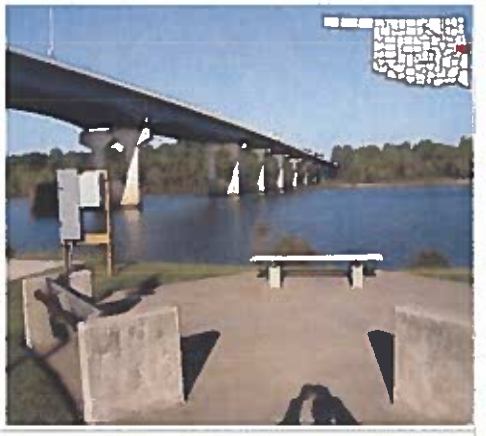
Table 1. Trends calculated for total phosphorus concentrations and use assessment geometric means at certain BUMP permanent monitoring stations in the Compact area. (Boxes shaded in yellow represent changes from the 2012 report, and 2012 results are in superscript.)

Station	All Data (1993-2012)		All Data (1999-2012)		Higher Flow Data (1999-2012)		Lower Flow Data (1999-2012)		Geometric Mean for Assessment (1999-2012)
	Unadj	Flow Adj	Unadj	Flow Adj	Unadj	Flow Adj	Unadj	Flow Adj	Unadj
Illinois River near Watts	↓↓↓	↓↓↓	↓↓↓	↓↓↓	↓↓	↓↓↓	↓↓↓	↓↓↓	↓↓↓
Illinois River near Tahlequah	↓↓↓$^{(↓)}$	↓↓↓	↓↓↓	↓↓↓	↓	↓↓↓	↓↓↓	↓↓↓	↓↓↓
Flint Creek near Kansas	↑↑↑	↑↑↑	NT$^{(↑↑↑)}$	NT$^{(↑↑↑)}$	NT$^{(↑)}$	NT	↑$^{(↑↑↑)}$	↑$^{(↑↑↑)}$	NT
Barren Fork near Eldon	NT	NT	↓↓↓$^{(NT)}$	↓↓↓	NT	↓↓↓	NT	NT	↓↓↓

↓↓↓ = Decreasing Trend at the 95% Confidence Level
↓↓ = Decreasing Trend at the 90% Confidence Level
↓ = Decreasing Trend at the 80% Confidence Level
↑↑↑ = Increasing Trend at the 95% Confidence Level
↑ = Increasing Trend at the 80% Confidence Level
NT = No Signficant Trend

TREND ANALYSIS IN THE ILLINOIS RIVER BASIN AT VARIOUS FLOW REGIMES

Arkansas River at Moffett



Sample Record	Times Visited	Station ID
November 1998 - Current	79	220200010010-001AT

Stream Data

County	Sequoyah	View Site Data
Location	East of the Town of Moffett on State Highway 64	
Latitude/Longitude	35.39242903, -94.43267795	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110104)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	51	19.45	19.99	5.42/30.93	13.03/27	
	Turbidity (NTU)	54	38.20	21.50	7/194	15/45.3	
	pH (units)	51	7.88	7.85	6.87/8.79	7.71/8.1	
	Dissolved Oxygen (ppm)	51	8.83	8.75	5.35/13.58	7.26/10.08	
Minerals	Hardness (ppm)	51	174.70	150.00	39/658	125/190	
	Total Dissolved Solids (ppm)	54	396.20	368.00	127/833.1	294/477.7	16.3% of values> OWQS of 620
	Specific Conductivity (uS/cm)	50	631.60	604.00	195/1333	476.9/746.5	
	Chloride (ppm)	55	110.80	105.00	13.4/293	66/144	
	Sulfate (ppm)	55	58.10	54.60	22.3/116	41.8/73.5	
Nutrients	Total Phosphorus (ppm)	55	0.13	0.11	0.054/0.33	0.095/0.139	
	Total Nitrogen (ppm)	54	0.94	0.82	0.45/2.82	0.628/1.128	
	Nitrate/Nitrite (ppm)	55	0.32	0.26	<0.050/1.145	0.11/0.49	
	Chlorophyll A (mg/m^3)	13	9.90	8.00	<0.10/34.7	5.05/12.35	TSI=54.4
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	18	1270.10	<10.0	<10.0/12000	<10.0/55.8	Mean> OWQS of 33
	E. Coli (cfu/100ml)(*-Geo. Mn.)	18	185.40	<10.0	<10.0/2035	<10.0/32.8	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment
Fish & Wildlife Propagation	S	S	S	S						S	S	S
Aesthetics												NEI
Agriculture					S		S	NS				
Primary Body Contact Recreation									NS			
Public & Private Water Supply				S		S			S			
Fish Consumption				NS								

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes *Fish Consumption not supporting for Thallium*

Sampling and Assessment by the **Oklahoma Water Resources Board** – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

Arkansas River at Muskogee

Sample Record	Times Visited	Station ID
November 1998 - Current	145	121400010260-001AT

Stream Data

County	Muskogee	View Site Data
Location	East of the Town of Muskogee on State Highway 62	
Latitude/Longitude	35.77016066, -95.30031102	
Planning Watershed	Middle Arkansas (8-digit HUC - 11110102)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	100	17.7	17.4	3.5/32.4	10.8/24.5	
	Turbidity (NTU)	101	46	25	6/387	17/46	
	pH (units)	98	8.05	8.02	7.22/9.48	7.74/8.32	
	Dissolved Oxygen (ppm)	100	8.71	8.53	4.20/13.88	7.13/10.44	
	Hardness (ppm)	98	192.1	175.0	92.0/418.0	145.4/222.5	
Minerals	Total Dissolved Solids (ppm)	105	578.2	486.0	160.7/1759.0	307.5/703.5	35.7% of values>OWQS of 516
	Specific Conductivity (uS/cm)	100	966.4	861.7	231.1/2746.0	481.7/1255.5	
	Chloride (ppm)	89	179.1	154.0	11.3/713.0	84.2/219.0	40.0% of Values>OWQS of 135
	Sulfate (ppm)	90	79.3	74.0	28.5/202.0	45.9/104.0	
Nutrients	Total Phosphorus (ppm)	103	0.167	0.144	0.053/0.705	0.116/0.178	
	Total Nitrogen (ppm)	103	1.139	1.080	<0.100/3.875	0.890/1.340	
	Nitrate/Nitrite (ppm)	99	0.464	0.465	<0.050/1.210	0.220/0.660	
	Chlorophyll A (mg/m^3)	25	10.8	13.7	0.1/90.0	8.3/25.4	TSI=60.3
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	18	5815.56	50.00	10/75000	10/200	Mean> OWQS of 33
	E. Coli (cfu/100ml)(*-Geo. Mn.)	18	608.28	31.00	10/5492	10/74	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment
Fish & Wildlife Propagation	S	S	S	S						S	S	S
Aesthetics												S
Agriculture					S		NS	NS				
Primary Body Contact Recreation									NS			
Public & Private Water Supply				S		S			S			
Fish Consumption				NS								

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes *Fish Consumption not supporting for Thallium*

Sampling and Assessment by the **Oklahoma Water Resources Board** – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

Barren Fork at Eldon

Sample Record	Times Visited	Station ID
November 1998 - Current	222	121700050010-001AT

Stream Data

County	Cherokee	View Site Data
Location	South of the Town of Eldon on State Highway 51	
Latitude/Longitude	35.92173377, -94.83726494	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110103)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	107	17.4	17.9	6.1/28.6	11.6/22.9	
	Turbidity (NTU)	106	4	3	1/40	2/3	
	pH (units)	106	7.59	7.54	6.37/8.82	7.34/7.87	
	Dissolved Oxygen (ppm)	107	9.36	9.55	4.40/13.93	7.74/10.98	
Minerals	Hardness (ppm)	108	97.3	95.5	46.0/159.0	88.0/104.0	
	Total Dissolved Solids (ppm)	110	124.3	121.0	12.9/545.0	106.2/134.5	
	Specific Conductivity (uS/cm)	107	194.9	191.2	20.2/713.0	168.0/212.0	
	Chloride (ppm)	99	10.3	<10.0	<10.0/43.7	<10.0/<10.0	
	Sulfate (ppm)	99	11.1	<10.0	<10.0/40.0	<10.0/<10.0	
Nutrients	Total Phosphorus (ppm)	113	0.035	0.028	<0.005/0.217	0.023/0.035	See Notes
	Total Nitrogen (ppm)	115	1.372	1.295	<0.050/3.950	0.790/1.815	
	Nitrate/Nitrite (ppm)	116	1.205	1.193	<0.050/3.83	0.625/1.625	
	Chlorophyll A (mg/m^3)	46	11.6	1.1	0.1/11.7	0.6/1.7	TSI=36.3
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	65	211.70	20.00	<10.0/3900	<10.0/87	
	E. Coli (cfu/100ml)(*-Geo. Mn.)	65	50.90	20.00	<10.0/389	<10.0/52	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment	Total Phosphorus
Fish & Wildlife Propagation	S	S	S	S						S	S	S	
Aesthetics												NS	NS
Agriculture					S		S	S					
Primary Body Contact Recreation									S				
Public & Private Water Supply				S		S			S				
Fish Consumption				S									

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: *40.0%(22 of 55) of 3-month rolling Geo. Mean exceed OWQS criterion of 0.037 ppm*

Caney Creek at Barber

Sample Record	Times Visited	Station ID
September 1999 - Current	202	121700040010-001AT

Stream Data

County	Cherokee	View Site Data
Location	North of the Town of Barber off State Highway 100	
Latitude/Longitude	35.72381643, -94.85787184	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110103)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	99	18.1	17.6	4.1/29.3	13.0/23.3	
	Turbidity (NTU)	98	4	2	1/103	1/3	
	pH (units)	97	7.77	7.76	6.46/9.06	7.56/8.02	
	Dissolved Oxygen (mg/L)	99	9.66	9.42	3.94/15.6	8.29/11.12	
Minerals	Hardness (mg/L)	99	109.5	109.0	64.0/174.0	98.0/120.0	
	Total Dissolved Solids (mg/L)	102	140.7	139.8	78.4/254.0	128.0/155.9	
	Specific Conductivity (uS/cm)	99	219.0	218.1	122.6/391.0	200.0/243.0	
	Chloride (mg/L)	90	10.3	<10.0	<10.0/36.8	<10.0/<10.0	
	Sulfate (mg/L)	90	10.5	<10.0	<10.0/32.5	<10.0/<10.0	
Nutrients	Total Phosphorus (mg/L)	105	0.060	0.037	<0.005/1.532	0.030/0.047	
	Total Nitrogen (mg/L)	107	1.091	1.015	<0.050/7.035	0.640/1.360	
	Nitrate/Nitrite (mg/L)	108	0.920	0.858	<0.050/6.655	0.490/1.135	
	Chlorophyll A (mg/m^3)	46	13.0	0.8	0.1/12.1	0.5/1.2	TSI=34.03
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	46	94.3	20.0	<10.0/1408	<10.0/52	
	E. Coli (cfu/100ml)(*-Geo. Mn.)	46	123.9	15.0	<10.0/2382	<10.0/41	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chloride	Total Dissolved solids	Bacteria	Bio. Fish	Bio. BMI	Sediment
Fish & Wildlife Propagation	S	S	S	S						S	S	S
Aesthetics												S
Agriculture					S		S	S				
Primary Body Contact Recreation									S			
Public & Private Water Supply				S		S			S			
Fish Consumption				S								

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

Flint Creek at Flint

Sample Record	Times Visited	Station ID
November 1998 - Current	217	121700060010-001AT

Stream Data

County	Delaware	View Site Data
Location	North of the Town of Flint on county road	
Latitude/Longitude	36.1867733, -94.70680493	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110103)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	107	17.0	16.4	5.3/28.7	11.2/22.4	
In-Situ	Turbidity (NTU)	106	3	1	1/58	1/2	
In-Situ	pH (units)	106	7.64	7.64	6.44/8.79	7.37/7.88	
In-Situ	Dissolved Oxygen (mg/L)	107	9.27	9.10	4.97/14.94	7.81/10.60	
Minerals	Hardness (mg/L)	108	112.3	113.0	10.0/218.0	101.0/123.0	
Minerals	Total Dissolved Solids (mg/L)	109	187.6	188.0	97.5/552.0	158.0/211.0	
Minerals	Specific Conductivity (uS/cm)	105	288.5	290.0	152.3/452.2	248.7/320.0	
Minerals	Chloride (mg/L)	100	15.2	13.7	<10.0/43.3	<10.0/18.0	
Minerals	Sulfate (mg/L)	100	17.5	15.1	<10.0/69.0	11.4/19.9	
Nutrients	Total Phosphorus (mg/L)	114	0.213	0.166	0.074/1.450	0.143/0.200	See Notes
Nutrients	Total Nitrogen (mg/L)	116	3.006	2.935	<0.050/7.925	2.410/3.705	
Nutrients	Nitrate/Nitrite (mg/L)	117	2.768	2.695	<0.050/7.525	2.250/3.403	
Nutrients	Chlorophyll A (mg/m^3)	46	11.2	0.7	0.1/4.2	0.5/1.2	TSI=29.9
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	56	596.9	60.0	<10.0/18000	20/139.5	Mean> OWQS of 33
Bacteria	E. Coli (cfu/100ml)(*-Geo. Mn.)	56	177.1	30.5	<10.0/4611	12.5/74	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment	Total Phosphorus
Fish & Wildlife Propagation	S	S	S	S						S	S	S	
Aesthetics												S	NS
Agriculture					S		S	S					
Primary Body Contact Recreation									NS				
Public & Private Water Supply				S					S				
Fish Consumption				S									

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

100%(54 of 54) of rolling Geo. Mean exceed OWQS criterion of 0.037 ppm

Fourche-Maline Creek at Red Oak

Sample Record	Times Visited	Station ID
November 1998 - Current	149	220100040020-001AT

Stream Data

County	Latimer	View Site Data
Location	S.E. of the Town of Red Oak off US Highway 270	
Latitude/Longitude	34.91232472, -95.15608416	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110105)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	119	17.3	18.4	1.0/31.6	10.0/24.1	
	Turbidity (NTU)	119	39	28	5/390	16/43	
	pH (units)	119	7.11	7.02	5.77/8.70	6.81/7.47	
	Dissolved Oxygen (mg/L)	118	6.08	6.09	0.84/15.69	3.04/8.58	23.29% of values< OWQS of 5.00
Minerals	Hardness (mg/L)	119	51.5	46.0	10.0/212.0	32.0/62.0	
	Total Dissolved Solids (mg/L)	119	98.8	92.0	7.0/307.0	68.0/124.0	
	Specific Conductivity (uS/cm)	118	153.5	131.0	11.0/760.0	94.8/195.0	
	Chloride (mg/L)	100	10.8	<10.0	<10.0/22.3	<10.0/<10.0	
	Sulfate (mg/L)	101	21.6	21.2	<10.0/48.5	15.5/25.1	
Nutrients	Total Phosphorus (mg/L)	118	0.087	0.071	<0.005/0.867	0.048/0.096	
	Total Nitrogen (mg/L)	119	0.742	0.690	<0.050/3.460	0.500/0.920	
	Nitrate/Nitrite (mg/L)	117	0.135	0.115	<0.050/0.560	<0.050/0.195	
	Chlorophyll A (mg/m^3)	2	10.0	0.7	0.7/0.7	NEI	
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	24	537.2	97.5	<10.0/8000	45.8/242	Mean> OWQS of 33
	E. Coli (cfu/100ml)(*-Geo. Mn.)	24	168.3	79.5	<10.0/1396	20/147.5	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment
Fish & Wildlife Propagation	S	S	NS	NS						S	S	S
Aesthetics												S
Agriculture					S		S	S				
Primary Body Contact Recreation									NS			
Public & Private Water Supply				S		S			S			
Fish Consumption				NS								

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

Fish and Wildlife Propagation not supporting for Lead
Fish Consumption not supporting for Lead

Illinois River at Tahlequah

Sample Record	Times Visited	Station ID
November 1998 - Current	212	121700030010-001AT

Stream Data

County	Cherokee	View Site Data
Location	East of the town of Tahlequah on US Highway 62	
Latitude/Longitude	35.92606447, -94.92380373	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110103)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	108	17.7	17.5	5.0/31.7	11.1/23.9	
	Turbidity (NTU)	108	7	4	1/84	3/7	
	pH (units)	106	7.85	7.80	6.47/9.29	7.56/8.10	
	Dissolved Oxygen (mg/L)	108	9.77	9.87	4.66/15.88	7.61/11.68	
Minerals	Hardness (mg/L)	108	112.4	112.0	69.4/161.0	104.0/119.0	
	Total Dissolved Solids (mg/L)	111	167.0	167.0	42.0/565.0	140.0/185.0	
	Specific Conductivity (uS/cm)	107	256.9	264.0	66.0/441.0	235.0/288.1	
	Chloride (mg/L)	100	12.1	10.3	<10.0/23.5	<10.0/13.5	
	Sulfate (mg/L)	100	14.1	12.5	<10.0/47.9	10.7/14.8	
Nutrients	Total Phosphorus (mg/L)	115	0.090	0.080	<0.005/0.438	0.055/0.121	See Notes
	Total Nitrogen (mg/L)	117	1.638	1.560	<0.050/4.320	0.960/2.240	
	Nitrate/Nitrite (mg/L)	118	1.399	1.410	<0.050/3.610	0.823/1.891	
	Chlorophyll A (mg/m^3)	46	11.1	2.1	0.2/14.2	1.4/3.1	TSI=42.1
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	55	164.1	20.0	<10.0/2500	<10.0/100	
	E. Coli (cfu/100ml)(*-Geo. Mn.)	55	64.9	<10.0	<10.0/884	<10.0/41	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment	Total Phosphorus
Fish & Wildlife Propagation	S	S	S	S						S	S	S	
Aesthetics												S	NS
Agriculture					S		S	S					
Primary Body Contact Recreation									S				
Public & Private Water Supply				S									
Fish Consumption				S									

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: *93.0%(50 of 54) of 3-month rolling Geo. Mean above OWQS Criterion of 0.037 ppm*

Illinois River at Watts

Sample Record	Times Visited	Station ID
November 1998 - Current	215	121700030350-001AT

Stream Data

County	Adair	View Site Data
Location	North of the Town of Watts on US Highway 59	
Latitude/Longitude	36.12994064, -94.57151225	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110103)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	108	17.3	16.6	4.3/31.5	11.0/23.3	
In-Situ	Turbidity (NTU)	108	11	7	2/78	4/13	11.5% of values> OWQS of 10
In-Situ	pH (units)	107	7.88	7.91	6.51/9.03	7.67/8.10	
In-Situ	Dissolved Oxygen (mg/L)	108	10.38	9.89	4.51/18.88	8.56/11.76	
In-Situ	Hardness (mg/L)	109	124.9	126.0	10.0/215.0	113.0/136.0	
Minerals	Total Dissolved Solids (mg/L)	111	192.7	195.0	95.4/566.0	168.0/212.0	
Minerals	Specific Conductivity (uS/cm)	108	301.4	306.1	149.1/713.0	267.5/331.0	
Minerals	Chloride (mg/L)	99	14.1	12.6	<10.0/28.3	<10.3/16.8	
Minerals	Sulfate (mg/L)	99	16.2	14.1	<10.0/96.8	11.7/17.9	
Nutrients	Total Phosphorus (mg/L)	113	0.168	0.122	0.008/1.153	0.072/0.227	See Notes
Nutrients	Total Nitrogen (mg/L)	115	2.344	2.390	<0.050/5.035	1.900/2.830	
Nutrients	Nitrate/Nitrite (mg/L)	116	2.012	2.028	<0.050/4.615	1.556/2.498	
Nutrients	Chlorophyll A (mg/m^3)	46	11.0	2.4	0.1/13.0	1.4/3.4	TSI=39.8
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	56	603.4	20.0	<10.0/15531	<10.0/106	Mean> OWQS of 31
Bacteria	E. Coli (cfu/100ml)(*-Geo. Mn.)	56	380.7	20.0	<10.0/12997	<10.0/63	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment	Total Phosphorus
Fish & Wildlife Propagation	NS	S	S	S						S	S	S	
Aesthetics												S	NS
Agriculture					S		S	S					
Primary Body Contact Recreation									NS				
Public & Private Water Supply				S					S				
Fish Consumption				S									

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

100%(53 of 53) of rolling Geo. Mean exceed OWQS criterion of 0.037 ppm

Lee Creek at Short

Sample Record	Times Visited	Station ID
January 2003 - Present	207	220200050010-001AT

Stream Data

County	Sequoyah	View Site Data
Location	West of the town of Short on State Highway 101	
Latitude/Longitude	35.56589868, -94.53152717	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110104)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	103	17.0	16.0	0.2/32.3	10.2/24.2	
	Turbidity (NTU)	101	8.07	5.00	1/93	4/8	
	pH (units)	103	7.53	7.56	6.31/8.48	7.26/7.80	
	Dissolved Oxygen (mg/L)	103	9.23	9.04	5.23/13.94	7.37/11.08	
Minerals	Hardness (mg/L)	102	47.15	43.0	21.0/130.0	35.0/54.0	
	Total Dissolved Solids (mg/L)	103	58.45	57.0	4.0/173.0	42.9/67.0	
	Specific Conductivity (uS/cm)	103	91.14	90.0	6.3/266.0	68.0/105.0	
	Chloride (mg/L)	73	<10.0	<10.0	<10.0/<10.0	<10.0/<10.0	
	Sulfate (mg/L)	73	10.9	<10.0	<10.0/49.0	<10.0/<10.0	
Nutrients	Total Phosphorus (mg/L)	103	0.010	0.010	<0.005/0.149	0.007/0.015	See Notes
	Total Nitrogen (mg/L)	109	0.310	0.220	<0.050/2.240	0.150/0.350	
	Nitrate/Nitrite (mg/L)	106	0.140	<0.050	<0.050/1.620	<0.050/0.180	
	Chlorophyll A (mg/m^3)	60	3.3	0.9	<0.1/92.0	0.4/1.6	TSI=41.5
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	43	471.9	<10.0	<10.0/7100	<10.0/62	
	E. Coli (cfu/100ml)(*-Geo. Mn.)	43	125.3	<10.0	<10.0/2359	<10.0/52	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment	Total Phosphorus
Fish & Wildlife Propagation	S	S	S	NS						S	S	S	
Aesthetics												S	S
Agriculture					S		S	S					
Primary Body Contact Recreation									S				
Public & Private Water Supply				S									
Fish Consumption				S									

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

0.0%(0 of 52) of 3-month rolling Geo. Mean exceed OWQS of 0.037 ppm
Fish & Wildlife Propagation not supporting for Lead

Little Lee Creek at Nicut

Sample Record	Times Visited	Station ID
February 2008 - Current	93	220200050040-001AT

Stream Data

County	Sequoyah	View Site Data
Location	West of the town of Short on State Highway 101	
Latitude/Longitude	35.58, -94.56	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110104)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	59	16.3	15.8	0.3/31.4	9.1/23.1	
	Turbidity (NTU)	59	11	4	1/168	2/5	
	pH (units)	59	7.51	7.53	6.3/8.35	7.33/7.80	
	Dissolved Oxygen (mg/L)	59	9.66	9.59	5.01/13.8	8.17/11.60	
Minerals	Hardness (mg/L)	59	64.6	63.0	36.0/140.0	53.0/72.0	
	Total Dissolved Solids (mg/L)	58	88.6	82.0	50.0/204.0	72.8/98.3	
	Specific Conductivity (uS/cm)	59	139.2	129.0	81.0/314.0	113.0/154.0	
	Chloride (mg/L)	28	<10.0	<10.0	<10.0/<10.0	<10.0/<10.0	
	Sulfate (mg/L)	28	10.3	<10.0	<10.0/15.4	<10.0/<10.0	
Nutrients	Total Phosphorus (mg/L)	57	0.020	0.006	<0.005/0.259	<0.005/0.010	
	Total Nitrogen (mg/L)	63	0.314	0.190	<0.050/1.490	0.150/0.370	
	Nitrate/Nitrite (mg/L)	56	0.174	0.055	<0.050/1.490	<0.050/0.160	
	Chlorophyll A (mg/m^3)	23	9.1	0.6	0.1/4.4	0.3/1.1	TSI=26.0
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	5	113.8	<10.0	<10.0/529	<10.0/269.5	
	E. Coli (cfu/100ml)(*-Geo. Mn.)	5	1324.2	40.0	<10.0/6488	<10.0/3280.5	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment	Total Phosphorus
Fish & Wildlife Propagation	S	S	S	NEI						S	S	S	
Aesthetics												S	NEI
Agriculture					S		S	S					
Primary Body Contact Recreation									NEI				
Public & Private Water Supply				NEI					NEI				
Fish Consumption				NEI									

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

Poteau River at Heavener

Sample Record	Times Visited	Station ID
November 1998 - Current	158	220100020010-001AT

Stream Data

County	LeFlore	View Site Data
Location	South of the Town of Heavener on State Highway 59	
Latitude/Longitude	34.85833476, -94.62923436	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110105)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	118	19.0	19.2	1.8/34.9	12.1/25.8	
In-Situ	Turbidity (NTU)	117	23	16	3/152	10/24	
In-Situ	pH (units)	118	7.27	7.25	5.96/8.97	6.92/7.63	
In-Situ	Dissolved Oxygen (mg/L)	118	8.19	7.80	3.77/16.00	6.58/9.79	
Minerals	Hardness (mg/L)	118	48.0	35.0	10.0/188.0	21.4/62.3	
Minerals	Total Dissolved Solids (mg/L)	119	88.3	67.0	0.1/311.0	41.0/117.0	
Minerals	Specific Conductivity (uS/cm)	118	135.7	102.2	0.1/486.0	56.8/180.0	
Minerals	Chloride (mg/L)	77	11.8	<10.0	<10.0/105.0	<10.0/<10.0	
Minerals	Sulfate (mg/L)	78	35.5	21.4	10.2/146.0	15.8/40.7	
Nutrients	Total Phosphorus (mg/L)	114	0.075	0.054	0.008/0.430	0.038/0.087	
Nutrients	Total Nitrogen (mg/L)	115	0.764	0.605	<0.050/5.870	0.450/0.780	
Nutrients	Nitrate/Nitrite (mg/L)	116	0.255	0.163	<0.050/4.230	<0.050/0.285	
Nutrients	Chlorophyll A (mg/m^3)	16	12.1	3.2	0.1/29.7	0.9/11.8	TSI=48.9
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	28	64.5	20.0	<10.0/400	<10.0/80	
Bacteria	E. Coli (cfu/100ml)(*-Geo. Mn.)	28	58.4	31.0	<10.0/393	12.5/51.8	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment
Fish & Wildlife Propagation	S	S	S	NS						S	S	S
Aesthetics												NEI
Agriculture					S		S	S				
Primary Body Contact Recreation									S			
Public & Private Water Supply				S		S			S			
Fish Consumption				NS								

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

Fish Consumption not supporting for Lead
Fish and Wildlife Propagation not supporting for Lead

Poteau River at Pocola

Sample Record	Times Visited	Station ID
November 1998 - Current	200	220100010010-001AT

Stream Data

County	LeFlore	View Site Data
Location	West of the Town of Pocola on County Road E 1220	
Latitude/Longitude	35.23864842, -94.52021262	
Planning Watershed	Lower Arkansas (8-digit HUC -11110105)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
	Water Temperature (°C)	131	18.0	18.0	1.5/34.6	10.8/25.9	
In-Situ	Turbidity (NTU)	132	80	61	12/476	35/92	42.9% of values >OWQS of 50
In-Situ	pH (units)	130	7.19	7.20	4.86/8.99	6.86/7.60	
	Dissolved Oxygen (mg/L)	131	7.76	7.37	3.31/15.94	5.76/9.59	
Minerals	Hardness (mg/L)	133	50.8	43.0	7.5/414.0	30.3/58.8	
Minerals	Total Dissolved Solids (mg/L)	132	85.8	71.0	0.1/345.0	42.8/121.5	
Minerals	Specific Conductivity (uS/cm)	129	129.4	103.0	0.1/530.0	63.0/176.9	
Minerals	Chloride (mg/L)	81	11.2	<10.0	<10.0/33.2	<10.0/<10.0	
Minerals	Sulfate (mg/L)	81	36.8	34.1	<10.0/87.7	24.4/45.9	
Nutrients	Total Phosphorus (mg/L)	136	0.155	0.122	0.017/1.01	0.091/0.181	
Nutrients	Total Nitrogen (mg/L)	136	1.022	0.880	<0.050/6.450	0.670/1.151	
Nutrients	Nitrate/Nitrite (mg/L)	138	0.396	0.210	<0.050/4.960	0.084/0.419	
	Chlorophyll A (mg/m^3)	23	10.8	10.3	4.2/77.3	6.2/25.8	TSI=59.6
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	45	1194.7	31.0	<10.0/46000	<10.0/90	Mean> OWQS of 33
Bacteria	E. Coli (cfu/100ml)(*-Geo. Mn.)	45	185.4	31.0	<10.0/3873	<10.0/79	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment
Fish & Wildlife Propagation	NS	S	S	NS						S	S	S
Aesthetics												NEI
Agriculture					S		S	S				
Primary Body Contact Recreation									NS			
Public & Private Water Supply				S		S			S			
Fish Consumption				NS								

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

Fish Consumption not supporting for Lead
Fish and Wildlife Propagation not supporting for Lead

Sager Creek at West Siloam Springs

Sample Record	Times Visited	Station ID
November 1998 - Current	218	121700060080-001AT

Stream Data

County	Delaware	View Site Data
Location	West of the town of West Siloam Springs off US Highway 412	
Latitude/Longitude	36.20164298, -94.60538182	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110103)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	107	17.4	17.2	5.9/29.2	12.0/22.1	
	Turbidity (NTU)	106	3	1	1/55	1/2	
	pH (units)	106	7.70	7.71	6.59/8.65	7.45/7.95	
	Dissolved Oxygen (mg/L)	107	9.07	8.72	4.66/15.35	8.04/10.19	
Minerals	Hardness (mg/L)	107	131.8	134.0	10.0/198.0	120.0/146.0	
	Total Dissolved Solids (mg/L)	110	272.8	271.0	118.0/657.0	222.0/317.3	
	Specific Conductivity (uS/cm)	107	425.1	427.0	164.0/713.0	355.0/496.0	
	Chloride (mg/L)	100	36.4	34.0	<10.0/95.1	23.0/47.2	
	Sulfate (mg/L)	100	24.7	21.3	<10.0/63.7	15.6/29.5	
Nutrients	Total Phosphorus (mg/L)	114	1.117	1.040	0.012/3.965	0.644/1.501	
	Total Nitrogen (mg/L)	116	7.066	7.163	<0.050/17.550	4.599/8.961	
	Nitrate/Nitrite (mg/L)	117	6.634	6.300	<0.050/17.500	4.113/8.585	100% of values > OWQS of 2.4
	Chlorophyll A (mg/m^3)	47	12.0	0.9	0.1/8.3	0.4/2.4	TSI=35.2
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	56	512.3	109.0	<10.0/9700	33.5/475	Mean> OWQS of 33
	E. Coli (cfu/100ml)(*-Geo. Mn.)	56	217.9	31.0	<10.0/4360	<10.0/98	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment
Fish & Wildlife Propagation	S	S	S	S						S	S	S
Aesthetics												NEI
Agriculture					S		S	S				
Primary Body Contact Recreation									NS			
Public & Private Water Supply				S		NS			S			
Fish Consumption				NS								

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes *Fish Consumption not supporting for Thallium*

Brushy Creek

Sample Period	Times Visited	Sampling Sites
October 2007 - July 2008	4	5

General

Location	Sequoyah County	Click map for site data
Impoundment	1964	
Area	358 acres	
Capacity	3,258 acre-feet	
Purposes	Flood Control and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	10 nephelometric turbidity units (NTU)	25% of values > 25 NTU
	Average True Color	41 units	25% of values > OWQS of 70
	Average Secchi Disk Depth	103 cm	
	Water Clarity Rating	good	
	Trophic State Index	53	Previous value = 51
	Trophic Class	eutrophic	
Profile	Salinity	0.00 - 0.10 ppt	
Profile	Specific Conductivity	36.3 - 605 µS/cm	
Profile	pH	6.02 - 8.12 pH units	Only 7 values < 6.5 units
Profile	Oxidation-Reduction Potential	33 to 606 mV	
Profile	Dissolved Oxygen	Up to 69% of water column < 2 mg/L in July	Occurred at site 1, the dam
Nutrients	Surface Total Nitrogen	0.38 mg/L to 0.72 mg/L	
Nutrients	Surface Total Phosphorus	0.016 mg/L to 0.050 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	20:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	S	S	NS	S							
Aesthetics					S	S					
Agriculture							S	S	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

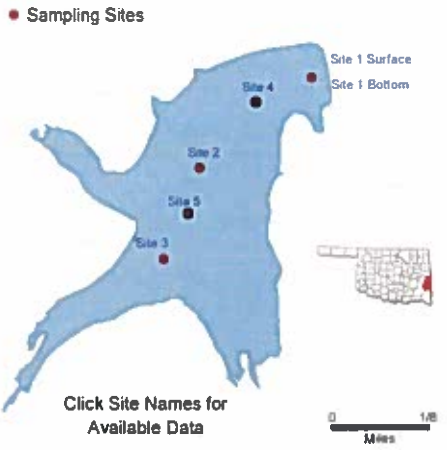
Notes *Precipitation data suggests the peak in color & turbidity are likely due to runoff, therefore the uses are considered supporting.*

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Sampling and Assessment by the **Oklahoma Water Resources Board** – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

Cedar

Sample Period	Times Visited	Sampling Sites
February 2011 - July 2011	4	5



General

Location	Le Flore County	Click map for site data
Impoundment	1937	
Area	78 acres	
Capacity	1,000 acre-feet	
Purposes	Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	6 NTU	100% of values < OWQS of 25 NTU
	Average Secchi Disk Depth	99 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	13 mg/m3	
	Trophic State Index	56	Previous Value=53
	Trophic Class	Eutrophic	
Profile	Salinity	0.0– 0.04 ppt	
	Specific Conductivity	32.8 – 106.4 µS/cm	
	pH	5.6 - 8.94 pH units	51.56% < 6.5
	Oxidation-Reduction Potential	-12 - 509 mV	
	Dissolved Oxygen	Up to 70% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.18 mg/L to 0.97 mg/L	
	Surface Total Phosphorus	0.016 mg/L to 0.057 mg/L	
	Nitrogen to Phosphorus Ratio	18:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	NEI	NS	S	S							
Aesthetics					S	•					
Agriculture							•	•	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

*Did not collect for these parameters. Although all turbidity values are <25 NTU, The FWP beneficial use cannot be assessed for this sample year as minimum data requirements were not met.

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

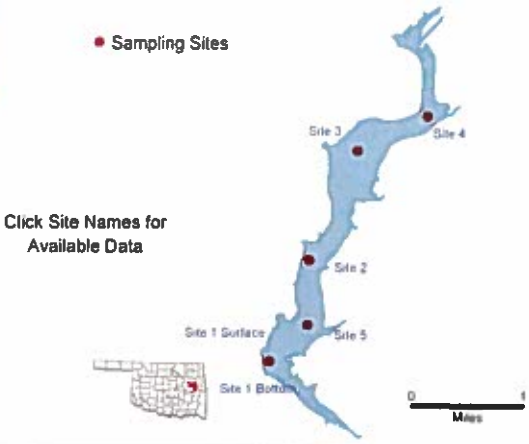
Sampling and Assessment by the **Oklahoma Water Resources Board** – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405 530 8800 – http://www.owrb.ok.gov

Greenleaf

Sample Period	Times Visited	Sampling Sites
November 2011 – August. 2012	4	5

General

Location	Muskogee County	Click map for site data
Impoundment	1939	
Area	920 acres	
Capacity	14,720 acre-feet	
Purposes	Recreation	



Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	12 NTU	8% of values > OWQS of 25 NTU (n=12)
	Average Secchi Disk Depth	67 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	11 mg/m3	
	Trophic State Index	54	Previous value = 52
	Trophic Class	Eutrophic	
Profile	Salinity	0.06– 0.12 ppt	
	Specific Conductivity	146 – 243 µS/cm	
	pH	6.89 – 8.65 pH units	
	Oxidation-Reduction Potential	22 – 427 mV	
	Dissolved Oxygen	Up to 57% of water column < 2 mg/L in May	
Nutrients	Surface Total Nitrogen	0.45 mg/L to 1.28 mg/L	
	Surface Total Phosphorus	0.006 mg/L to 0.030 mg/L	
	Nitrogen to Phosphorus Ratio	42:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	S	S	•	S							
Aesthetics					S	N/A					
Agriculture							N/A	N/A	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											NS

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

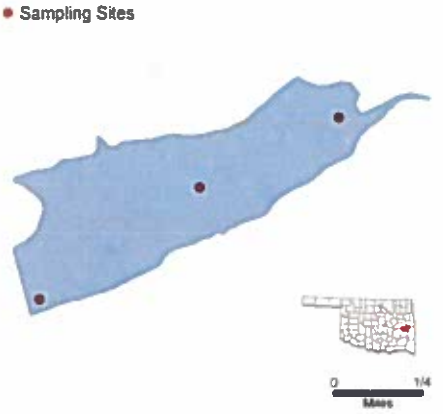
**N/A – parameters not collected in current sample year.*
* 50-70% range is undetermined for DO.

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Sampling and Assessment by the **Oklahoma Water Resources Board** – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

John Wells

Sample Period	Times Visited	Sampling Sites
October 2008 – July 2009	4	3



General

Location	Haskell County	Click map for site data
Impoundment	1936	
Area	194 acres	
Capacity	1,352 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	3 NTU	100% of values < OWQS of 25 NTU (n=12)
	Average True Color		Did not collect for true color
	Average Secchi Disk Depth	180 cm	
	Water Clarity Rating	Excellent	
	Trophic State Index	45	Previous value = 46
	Trophic Class	Mesotrophic	
Profile	Salinity	0.02 – 0.10 ppt	
Profile	Specific Conductivity	73 – 207.5 µS/cm	
Profile	pH	6.3 – 9.13 pH units	1% of values < 6.50 and 2.38% > 9.00 pH units
Profile	Oxidation-Reduction Potential	-35 – 503 mV	
Profile	Dissolved Oxygen	Up to 50% of water column < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.30 mg/L to 0.54 mg/L	
Nutrients	Surface Total Phosphorus	0.005 mg/L to 0.014 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	43:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a
Fish & Wildlife Propagation	S	S	S	*							
Aesthetics					S	*					
Agriculture							*	*	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

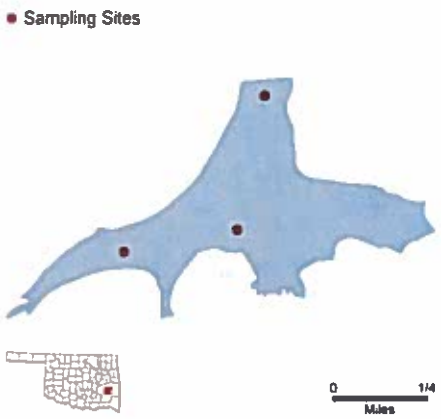
Notes *Did not collect for these parameters

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Sampling and Assessment by the **Oklahoma Water Resources Board** – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

Lloyd Church (Wilburton)

Sample Period	Times Visited	Sampling Sites
November 2005 – August 2006	4	3



General

Location	Latimer County	Click map for site data
Impoundment	1964	
Area	160 acres	
Capacity	3,060 acre-feet	
Purposes	Water Supply, Recreation, Flood Control	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	14 NTU	25% of values > OWQS of 25 NTU
	Average True Color	79 units	75% of values > OWQS of 70
	Average Secchi Disk Depth	64 cm	
	Water Clarity Rating	good	
	Trophic State Index	45	
	Trophic Class	mesotrophic	
Profile	Salinity	0.0 – 0.01 ppt	
Profile	Specific Conductivity	25.4 – 71.9 µS/cm	
Profile	pH	5.9 – 7.51 pH units	26% of values <6.5 pH units
Profile	Oxidation-Reduction Potential	79 -503 mV	
Profile	Dissolved Oxygen	Up to 62% of water column < 2 mg/L in August	
Nutrients	Surface Total Nitrogen	0.15 mg/L to 0.57 mg/L	
Nutrients	Surface Total Phosphorus	0.020 mg/L to 0.043 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	12:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	S	NS	NS	S							
Aesthetics					S	NS					
Agriculture							S	S	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

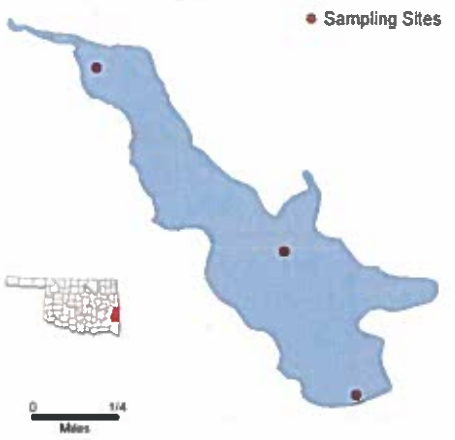
Notes Available flow and rainfall data suggest that the peak in turbidity, which occurred in March is likely due to seasonal storm events, therefore Lloyd Church Lake will be listed as supporting its Fish & Wildlife Propagation (FWP) beneficial use

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Sampling and Assessment by the **Oklahoma Water Resources Board** – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

New Spiro

Sample Period	Times Visited	Sampling Sites
October 2005 – July 2006	4	3



General

Location	Le Flore County	Click map for site data
Impoundment	1960	
Area	254 acres	
Capacity	2,160 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	18 NTU	8% of values >OWQS of 25 NTU
	Average True Color	26 units	100% of values < OWQS of 70
	Average Secchi Disk Depth	47 cm	
	Water Clarity Rating	good	
	Trophic State Index	68	
	Trophic Class	hypereutrophic	
Profile	Salinity	0.04 – 0.09 ppt	
Profile	Specific Conductivity	106.8 – 155.4 µS/cm	
Profile	pH	7.09 – 9.24 pH units	10% of values > 9.0 pH units
Profile	Oxidation-Reduction Potential	121 - 483 mV	
Profile	Dissolved Oxygen	Up to 33% of water column < 2 mg/L in August	Occurred at site 2
Nutrients	Surface Total Nitrogen	0.98 mg/L to 1.68 mg/L	
Nutrients	Surface Total Phosphorus	0.076 mg/L to 0.170 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	11:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	S	NS	S	S							
Aesthetics					NS*	S					
Agriculture							S	S	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

*The lake is listed in the WQS as a NLW indicating that the Aesthetics beneficial use is considered threatened by nutrients until studies can be conducted to confirm non-support status

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

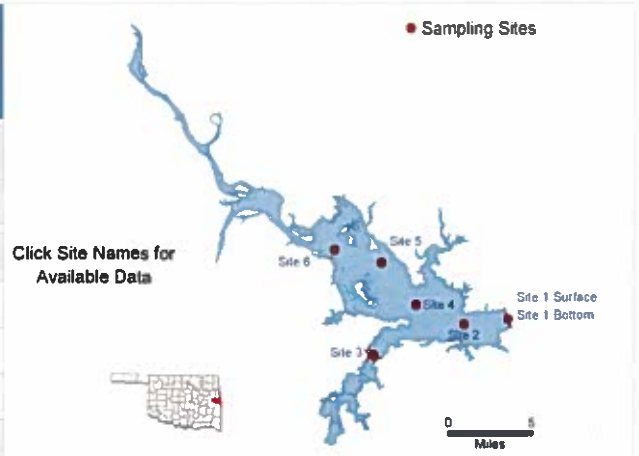
Sampling and Assessment by the **Oklahoma Water Resources Board** – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

Robert S. Kerr

Sample Period	Times Visited	Sampling Sites
November 2010 – June 2011	4	6

General

Location	Sequoyah County	Click map for site data
Impoundment	1970	
Area	43,800 acres	
Capacity	525,700 acre feet	
Purposes	Navigation, Hydropower, and Recreation	



Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	30 NTU	63% of values > 25 NTU (n=24)
	Average Secchi Depth	57 cm	All values > OWQS of 70
	Water Clarity Rating	Fair	
	Chlorophyll-a	11 mg/m3	
	Trophic State Index	54	Previous value = 50
	Trophic Class	Eutrophic	
Profile	Salinity	0.09– 0.93 ppt	
	Specific Conductivity	190.2 – 1754 µS/cm	
	pH	7.25 – 8.52 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	301 to 448 mV	
	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	0.26 mg/L to 1.12 mg/L	
	Surface Total Phosphorus	0.048 mg/L to 0.124mg/L	
	Nitrogen to Phosphorus Ratio	9:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	NS	S	S	S							
Aesthetics					S	*					
Agriculture							S	S	S		
Primary Body Contact Recreation										NEI	
Public & Private Water Supply											

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

**Did not collect for this parameter. The PBCR cannot be assessed as minimum data requirements were not met due to QA/QC issues for E. coli and fecal coliform.*

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Sampling and Assessment by the **Oklahoma Water Resources Board** – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

Stilwell City

Sample Period	Times Visited	Sampling Sites
October 2005 – August 2006	3	3

General

Location	Adair County	Click map for site data
Impoundment	1965	
Area	188 acres	
Capacity	3,110 acre-feet	
Purposes	Water Supply, Recreation, Flood Control	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	6 NTU	100% of values < OWQS of 25 NTU
	Average True Color	14 units	100% of values < OWQS of 70
	Average Secchi Disk Depth	161 cm	
	Water Clarity Rating	excellent	
	Trophic State Index	54	
	Trophic Class	eutrophic	
Profile	Salinity	0.07 – 0.14 ppt	
Profile	Specific Conductivity	159.1 – 297.2 µS/cm	
Profile	pH	6.87 – 8.53 pH units	
Profile	Oxidation-Reduction Potential	88 – 452 mV	
Profile	Dissolved Oxygen	Up to 64% of water column < 2 mg/L in August	Occurred at site 1, the dam
Nutrients	Surface Total Nitrogen	0.32 mg/L to 0.88 mg/L	
Nutrients	Surface Total Phosphorus	0.019 mg/L to 0.044 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	20:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	S	S	NS	S							
Aesthetics					S	S					
Agriculture							S	S	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

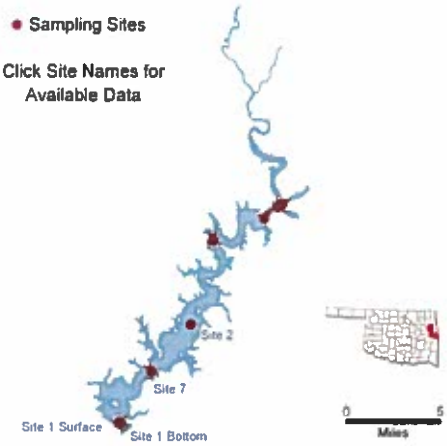
Sampling and Assessment by the **Oklahoma Water Resources Board** – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

Tenkiller (1,2,7)

Sample Period	Times Visited	Sampling Sites
November 2011 – August 2012	4	7

General

Location	Sequoyah County	Click map for site data
Impoundment	1953	
Area	12,900 acres	
Capacity	654,100 acre-feet	
Purposes	Flood Control, Hydropower	



Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	5 NTU	100% of values < OWQS of 25 NTU (n=11)
	Average Secchi Disk Depth	138 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	8 mg/m3	
	Trophic State Index	51	Previous value = 53
	Trophic Class	Eutrophic	
Profile	Salinity	0.08 – 0.13 ppt	
	Specific Conductivity	177 – 278 µS/cm	
	pH	6.56 – 9.02 pH units	Only 0.54% of recorded values > 9 pH units
	Oxidation-Reduction Potential	124-574mV	
	Dissolved Oxygen	Up to 73% of water column < 2 mg/L in August	
Nutrients	Surface Total Nitrogen	0.40 mg/L to 1.46 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.016 mg/L	
	Nitrogen to Phosphorus Ratio	124:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	S	S	NS	S							
Aesthetics					NS	N/A					
Agriculture							N/A	N/A	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											S

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

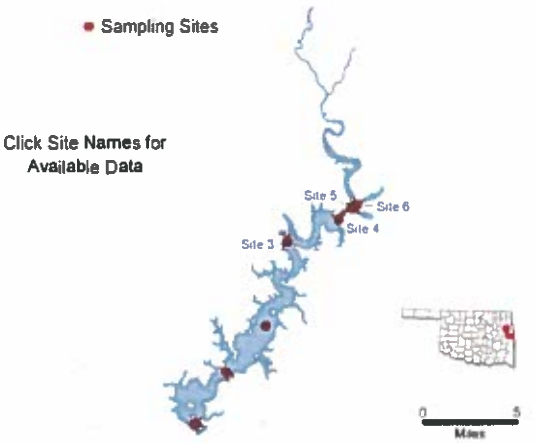
*The lake is listed in the WQS as a NLW indicating that the Aesthetics beneficial use is considered threatened by nutrients until studies can be conducted to confirm non-support status.
N/A – parameters not collected in current sample year.

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Sampling and Assessment by the **Oklahoma Water Resources Board** – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

Tenkiller, Illinois River Arm (3-6)

Sample Period	Times Visited	Sampling Sites
November 2011 – August 2012	4	7



General

Location	Sequoyah County	Click map for site data
Impoundment	1953	
Area	12,900 acres	
Capacity	654,100 acre-feet	
Purposes	Flood Control, Hydropower	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	14 NTU	14% of values < OWQS of 25 NTU (n=16)
	Average Secchi Disk Depth	56 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	16 mg/m3	
	Trophic State Index	58	Previous value = 59
	Trophic Class	Eutrophic	
Profile	Salinity	0.09 – 0.13 ppt	
Profile	Specific Conductivity	197 – 275 µS/cm	
Profile	pH	7.47 – 9.01 pH units	Only 0.66% of recorded values are > 9 pH units
Profile	Oxidation-Reduction Potential	86-567mV	
Profile	Dissolved Oxygen	Up to 50% of water column < 2 mg/L in August	
Nutrients	Surface Total Nitrogen	0.50 mg/L to 3.43 mg/L	
Nutrients	Surface Total Phosphorus	0.005 mg/L to 0.097 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	51:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	NS	S	S	S							
Aesthetics					NS	N/A					
Agriculture							N/A	N/A	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											NS

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

*The lake is listed in the WQS as a NLW indicating that the Aesthetics beneficial use is considered threatened by nutrients until studies can be conducted to confirm non-support status.

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

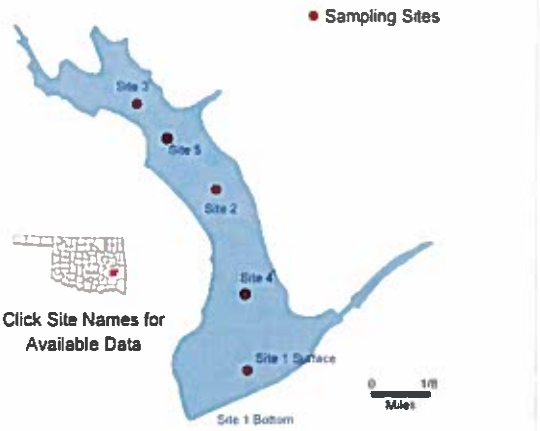
Sampling and Assessment by the **Oklahoma Water Resources Board** – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

Wayne Wallace

Sample Period	Times Visited	Sampling Sites
February 2012 – August 2012	4	5

General

Location	Latimer County	Click map for site data
Impoundment	1969	
Area	94 acres	
Capacity	1,746 acre feet	
Purposes	Flood Control and Recreation	



Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	6 NTU	100% of values < OWQS of 25 NTU (n=6)
	Average Secchi Disk Depth	115 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	27 mg/m3	
	Trophic State Index	63	Previous value = 48
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.02 – 0.07 ppt	
Profile	Specific Conductivity	56 – 153.5 µS/cm	
Profile	pH	6.11 – 9.4 pH units	14.5% of recorded values are < 6.5 pH units
Profile	Oxidation-Reduction Potential	51 to 484 mV	
Profile	Dissolved Oxygen	Up to 60% of water column < 2 mg/L in August	
Nutrients	Surface Total Nitrogen	0.48 mg/L to 0.59 mg/L	
Nutrients	Surface Total Phosphorus	0.005 mg/L to 0.014 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	74:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	S	NS	*	S							
Aesthetics					NS	N/A					
Agriculture							N/A	N/A	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

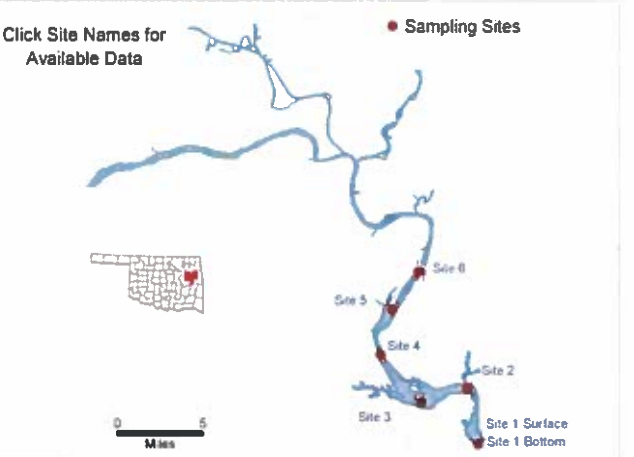
Slightly acidic conditions are common in this part of the state, due to relatively low soil pH and lack of soluble bedrock. Due to these conditions it is likely that the low pH values may be due to natural causes; therefore the Water Board is looking at the applicability of developing site-specific criteria for waters in the southeastern portion of the state. * 50-70% range is undetermined for DO.

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Sampling and Assessment by the **Oklahoma Water Resources Board** – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

Webbers Falls

Sample Period	Times Visited	Sampling Sites
November 2010 – August 2011	4	6



General

Location	Muskogee County
Impoundment	170
Area	11,600 acres
Capacity	170,100 acre-feet
Purposes	Navigation, Hydropower

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	13 NTU	100% of values < OWQS of 25 NTU (n=17)
	Average Secchi Disk Depth	63 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	27 mg/m3	
	Trophic State Index	63	Previous value = 55
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.21 – 0.79 ppt	
	Specific Conductivity	422.1 - 1490 µS/cm	
	pH	7.52 – 9.07 pH units	0.45% of Values > 9 pH units
	Oxidation-Reduction Potential	276 - 458 mV	
	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	0.38 mg/L to 1.3 mg/L	
	Surface Total Phosphorus	0.101 mg/L to 0.166 mg/L	
	Nitrogen to Phosphorus Ratio	7:1	Phosphorus limited, possibly co-limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a
Fish & Wildlife Propagation	NEI	S	S	S							
Aesthetics					S	*					
Agriculture							S	S	S		
Primary Body Contact Recreation										NEI	
Public & Private Water Supply											

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: Although 100% of the turbidity values are < 25 NTU, an assessment of the FWP beneficial use cannot be made for this sample year as minimum data requirements were not met.

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

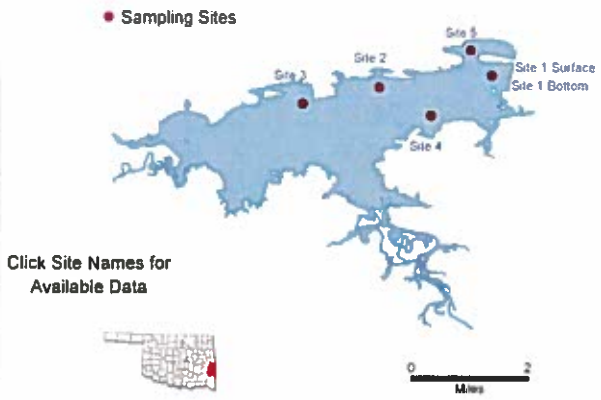
Sampling and Assessment by the **Oklahoma Water Resources Board** – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

Wister

Sample Period	Times Visited	Sampling Sites
November 2010 – July 2011	4	5

General

Location	LeFlore County	Click map for site data
Impoundment	1949	
Area	7,333 acres	
Capacity	62,360 acre feet	
Purposes	Flood Control, Water Supply, Low flow Regulation, and Conservation	



Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	17 NTU	100% of values < OWQS 25 NTU
	Average Secchi Disk Depth	54 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	14 mg/m3	
	Trophic State Index	57	Previous value = 62
	Trophic Class	Eutrophic	
Profile	Salinity	0.01 – 0.04 ppt	
	Specific Conductivity	53.9 – 112.8 µS/cm	
	pH	6.04 – 8.64 pH units	24.1 % of Values < 6.5 pH units
	Oxidation-Reduction Potential	32 to 493 mV	
	Dissolved Oxygen	Up to 30% of water column < 2.0 mg/L in spring	
Nutrients	Surface Total Nitrogen	0.29 mg/L to 0.67 mg/L	
	Surface Total Phosphorus	0.036 mg/L to 0.063 mg/L	
	Nitrogen to Phosphorus Ratio	9:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a
Fish & Wildlife Propagation	S	NS	S	S							
Aesthetics					NS*	*					
Agriculture							*	*	S		
Primary Body Contact Recreation										NEI	
Public & Private Water Supply											NS

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes *Did not collect for these parameters. *Currently, the lake is listed as a Nutrient Limited Watershed (NLW) in the Oklahoma Water Quality Standards (WQS). This listing means that the lake is considered threatened from nutrients until a more intensive study can confirm the Aesthetics beneficial use non-support status.

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Sampling and Assessment by the **Oklahoma Water Resources Board** – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

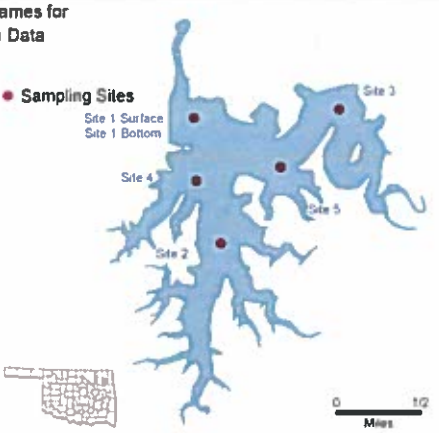
W.R. Holway

Sample Period	Times Visited	Sampling Sites
March 2011 – September 2011	4	5

General

Location	Mayes County	Click map for site data
Impoundment	1968	
Area	712 acres	
Capacity	48,000 acre-feet	
Purposes	Water Supply, Hydropower, Recreation	

Click Site Names for Available Data



Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	4 NTU	100% of Values < OWQS of 25
	Average Secchi Disk Depth	198 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	13 mg/m3	
	Trophic State Index	56	Previous Value= 58
	Trophic Class	Eutrophic	
Profile	Salinity	0.10 – 0.14 ppt	
	Specific Conductivity	215.4 - 283 µS/cm	
	pH	7.10 – 9.01 pH units	0.30% of Values > 9 pH units
	Oxidation-Reduction Potential	308 to 600 mV	
	Dissolved Oxygen	Up to 45% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.45 mg/L to 1.18 mg/L	
	Surface Total Phosphorus	0.051 mg/L to 0.066 mg/L	
	Nitrogen to Phosphorus Ratio	14:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	S	S	S	S							
Aesthetics					S	*					
Agriculture							*	*	S		
Primary Body Contact Recreation										NEI	
Public & Private Water Supply											

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

*Did not collect for these parameters

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Sampling and Assessment by the **Oklahoma Water Resources Board** – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

Oklahoma 2010 Integrated Report
Appendix B

Legend

Legend for Attainment	
Code	**Description**
F	Fully Supporting
N	Not Supporting
I	Insufficient Information
X	Not Assessed

USE ID	Description
124	Aesthetic
125	Agriculture
129	Emergency Water Supply
130	Cool Water Aquatic Community
131	Habitat Limited Aquatic Community
132	Trout Fishery
133	Warm Water Aquatic Community
134	Hydropower
135	Indus. & Muni. Process/Cooling Water
136	Navigation
137	Primary Body Contact Recreation
138	Public and Private Water Supply
139	Secondary Body Contact Recreation
1003	Fish Consumption
1004	Outstanding Resource
1005	Sensitive Water Supply
1006	High Quality Water

Category	Description
1	Attaining the Water Quality Standard and no use is threatened
2	Attaining some of the designated uses; no use is threatened; and insufficient or no data or information is available to determine if the remaining uses are attained or threatened
3	Insufficient or no data and information to determine if any designated use is attained
4 4a 4b 4c	Impaired or threatened for one or more designated uses but does not require the development of a TMDL • TMDL has been completed • Other pollution control requirements are reasonable expected to result in the attainment of the water quality standard in the near future • Impairment is not caused by a pollutant
5	The water quality standard is not attained. The waterbody is impaired or threatened for one or more designated uses by a pollutant(s), and requires a TMDL

ID	Description
91	Ammonia (Unionized) -Toxin
96	Arsenic
104	Barium
127	Cadmium
138	Chloride
153	Chlorpyrifos
154	Chromium (total)
163	Copper
187	Diazinon
198	Dieldrin
215	Enterococcus
217	Escherichia coli
230	Fishes Bioassessments
267	Lead
302	Nitrates
317	Oil and Grease
322	Oxygen, Dissolved
372	Selenium
375	Silver
385	Sulfates
398	Total Coliform
399	Total Dissolved Solids
400	Total Fecal Coliform
413	Turbidity
423	Zinc
441	pH
462	Total Phosphorus

ID	Description
2	Acid Mine Drainage
33	Discharges from Biosolids (SLUDGE) Storage, Application or Disposal
62	Industrial Point Source Discharge
68	Land Application of Wastewater Biosolids (Non-agricultural)
70	Leaking Underground Storage Tanks
82	Mine Tailings
84	Municipal (Urbanized High Density Area)
85	Municipal Point Source Discharges
92	On-site Treatment Systems (Septic Systems and Similar Decencentralized Systems)
100	Runoff from Permitted Confined Animal Feeding Operations (CAFOs)
102	Petroleum/natural Gas Activities (Legacy)
119	Silviculture Harvesting
124	Spills from Trucks or Trains
127	Surface Mining
140	Source Unknown
155	Natural Sources
156	Agriculture
157	Habitat Modification - other than Hydromodification

Oklahoma Compact Waters in the 2008 Integrated Report

2010 Category 5 Waters for the Oklahoma/Arkansas Compact Area

WBID	Name	Size	Unit	Causes	Potential Sources	TMDL Date
OK120400010070_00	Webbers Falls Lake	11600.0	ACRES	215, 413	140	2016
OK120400010130_00	Greenleaf Lake	920.0	ACRES	150, 322,413	140	2013
OK120400010260_00	Arkansas River	14.7	MILES	138, 215, 393, 399	34, 49, 62, 85,102, 133, 136, 140	2013
OK120400010400_00	Coody Creek	16.2	MILES	215, 217, 322	46, 59, 87 , 92, 108,111, 133, 136, 140	2013
OK120400020010_00	Dirty Creek	44.2	MILES	215	21, 46,49,87, 108, 92, 136, 140	2016
OK120400020030_00	Dirty Creek, South Fork	15.5	MILES	215, 322, 385	84, 140, 46, 85, 87, 92, 108, 111, 133, 136,59 ,	2019
OK120400020110_00	Dirty Creek, Georges Fork	10.0	MILES	215, 322	46, 87, 92, 108, 111, 133, 136, 140	2016
OK120400020160_00	Butler Creek	10.3	MILES	215, 217, 322	46, 59, 92, 87, 108, 111, 133, 136, 140	2019
OK120400020190_00	Elk Creek	13.9	MILES	215, 385, 322	46, 49,62, 85, 87, 92, 108, 136, 111, 133, 140 ,97	2019
OK120400020240_00	Shady Grove Creek	10.8	MILES	215, 441, 385, 399	49, 140	2019
OK121700020020_00	Tenkiller Ferry Lake	8440.0	ACRES	322	4, 59, 108, 136, 146, 140	2010
OK121700020110_00	Chicken Creek	4.9	MILES	230	140	2010
OK121700020220_00	Tenkiller Ferry Lake, Illinois River Arm	5030.0	ACRES	462, 322, 150	4, 46, 59, 92, 108, 136, 146, 140	2010
OK121700030010_00	Illinois River	7.7	MILES	462	4,46,59,85,92,100,108,136,146,140	2010
OK121700030040_00	Tahlequah Creek (Town Branch)	6.2	MILES	217	46, 92, 108, 133, 136, 140	2010
OK121700030080_00	Illinois River	32.0	MILES	462, 217, 400, 267	4,46,59,92,108,133,136,140	2010
OK121700030280_00	Illinois River	15.2	MILES	462,217, 413	4,46,59,92,108,133,136,146,140	2010
OK121700030290_00	Flint Creek	1.6	MILES	322, 462	4,46,59,92,108,133,136,146,140	2010
OK121700030350_00	Illinois River	5.2	MILES	462, 413, 215, 217	4,34,46,59,92,100,108,133,136,146,140	2013
OK121700030370_00	Ballard Creek	12.6	MILES	215	4,46,59,92,108,111,133,136,140	2013
OK121700040010_00	Caney Creek	20.9	MILES	215	4,46,59,62,92,108,111,133,136,140	2016
OK121700050010_00	Illinois River, Baron Fork	23.3	MILES	462, 371	4,34,46,59,92,100,108,133,136,146,140	2013
OK121700050090_00	Tyner Creek	14.8	MILES	215	4,46,59,92,108,136,140	2013
OK121700050120_00	Peacheater Creek	10.3	MILES	215	4,46,59,92,100,108,128,136,140	2013
OK121700060010_00	Flint Creek	7.8	MILES	462, 215	4,46,59,92,100,108,111,133,136,146,140	2010
OK121700060040_00	Battle Creek (Battle Branch)	5.4	MILES	215	4,46,59,92,108,111,133,136,140	2010
OK121700060080_00	Sager Creek	4.2	MILES	215, 302, 393	4,46,59,85,92,108,133,136,146,140	2010
OK220100010010_00	Poteau River	23.9	MILES	267, 413, 215	46,49,59,62,85,108,133,136,140	2013
OK220100010010_30	Poteau River	1.6	MILES	127, 163, 267, 372, 375	140	2019
OK220100010010_40	Poteau River	21.4	MILES	163, 267, 413	140	2016
OK220100010050_00	New Spiro Lake	254.0	ACRES	150, 322, 413	46,92,108,133,136,140	2013
OK220100020020_00	Wister Lake	7333.0	ACRES	160, 150, 462, 322, 413, 441	46,92,108,133,136,140	2013

OK220100020040_00	Poteau River, Black Fork	30.2	MILES	441	140	2013
OK220100020060_00	Cedar Lake	78.0	ACRES	322, 441	46,92,108,133,136,140	2013
OK220100030010_00	Brazil Creek	17.8	MILES	215	4, 46, 59, 92, 108, 133, 136, 140	2016
OK220100040020_00	Fourche Maline Creek	36.9	MILES	267, 322	140, 46, 62, 69, 85, 87, 92, 108, 111, 133, 136	2013
OK220100040050_00	Red Oak Creek	11.0	MILES	267, 322	46,,85, 92, 108, 133, 136, 140	2013
OK220100040080_00	Bandy Creek	12.5	MILES	413	140	2013
OK220100040100_00	Lloyd Church Lake (Wilburton City)	160.0	ACRES	322, 413, 441	46,92,108,133,136,140	2013
OK220100040150_00	Wayne Wallace Lake	94.0	ACRES	160, 322, 441	46,92,108,133,136,140	2013
OK220200010010_00	Arkansas River	20.7	MILES	215, 393, 399	49, 102, 140	2016
OK220200020020_00	Robert S. Kerr Lake	43380.0	ACRES	160, 413	140	2013
OK220200030010_10	Sallisaw Creek	9.0	MILES	385	49, 140	2013
OK220200030010_20	Sallisaw Creek	13.3	MILES	215	4,46,59,92,10,111,128,133,136,140	2013
OK220200030040_00	Brushy Creek Lake	358.0	ACRES	215, 322, 441	46,92,108,133,136,140	2013
OK220200030120_00	Stilwell City Lake	188.0	ACRES	322	46,108,133,136,140	2013
OK220200040010_00	Sans Bois Creek	9.2	MILES	322, 441, 215, 217	85, 92, 140, 156	2015
OK220200040010_10	Sans Bois Creek	10.8	MILES	385, 399, 322, 215	49, 103, 140, 46, 85, 87, 92, 108, 111, 133, 136	2015
OK220200040010_40	Sans Bois Creek	27.8	MILES	322, 413	4,46,59,85,92,108,133,136,140	2019
OK220200040030_00	John Wells Lake (Stigler)	194.0	ACRES	322,215	46,92,108,133,136,140	2019
OK220200040050_00	Sans Bois Creek, Mountain Fork	18.8	MILES	441	46,92,108,133,136,156,140	2019
OK220200050010_00	Lee Creek	1.9	MILES	215,267	46,92,108,133,136,146,140	2013
OK220200050040_10	Lee Creek	15.7	MILES	462, 322	46,92,108,133,136,146,140	2013

Water Quality Standards Update:

On April 8th, Governor Fallin approved the recent revisions of Oklahoma's Water Quality Standards. The State legislative review period concluded on April 30th. The revised standards and associated implementation rules were published in the June 3rd Oklahoma Register and become effective under state law on July 1st. EPA regulations require that the revised standards must be certified by the Oklahoma Attorney General and then be submitted to EPA Region 6 for final review and approval under the Clean Water Act, which is expected by November 2013.

Revision topics included: modification to regulatory default flows for implementing the Agricultural Beneficial Use; removal of the numeric criteria for color; clarification of the applicability of Seasonal Temperatures for calculating BOD load; restoring language determining the applicability of the Fish Consumption Beneficial Use; updates to WBID numbers and editorial changes in Appendices A.1 through A.7; changes to the Beneficial Uses of certain segments of Canadian River, Rush Creek and Wewoka Creek in Appendix A; updates to Numerical Human Health Criteria in Appendix G; and additions to Appendix H regarding Beneficial Use Designations for Certain Limited Areas of Groundwater.

OKLAHOMA'S 20010-2011 WATER QUALITY STANDARDS REVISIONS RELEVANT TO THE ARK/OK COMPACT

STATEMENT OF JOINT PRINCIPLES AND ACTIONS

WHEREAS the States of Arkansas and Oklahoma share a number of streams and rivers that flow from Arkansas into Oklahoma, six (6) of which are designated as Scenic Rivers in the State of Oklahoma;

WHEREAS the States of Arkansas and Oklahoma share a common goal of improving water quality within the States' shared watersheds;

WHEREAS the States of Arkansas and Oklahoma agree that excess nutrients from point and non-point sources can result in nutrient surplus for phosphorus and nitrogen;

WHEREAS excess phosphorus in watersheds is known to degrade water quality and threaten aquatic life;

WHEREAS Arkansas and Oklahoma agree that reducing the amount of phosphorus present in the States' shared watersheds will further the States' shared goal of improving water quality;

WHEREAS, in an effort to reduce the amount of phosphorus present in its Scenic Rivers, the State of Oklahoma has passed, and submitted to the United States Environmental Protection Agency for approval under Section 303(c) of the Clean Water Act, a total phosphorus criterion of .037 mg/l for its six (6) Scenic Rivers, modified by an implementation schedule that allows dischargers to undertake interim actions designed to improve water quality in the Scenic Rivers consistent with achieving compliance with the State of Oklahoma's .037 mg/l criterion for phosphorus, by 2012;

WHEREAS, Arkansas has steadfastly insisted and maintains that the .037 mg/l criterion for total phosphorus is neither attainable nor appropriate;

WHEREAS, Arkansas and Oklahoma agree that individual but coordinated strategies to meet water quality goals is in the best interest of both States;

The States of Arkansas and Oklahoma, acting through their environmental agencies, including, but not limited to, the Arkansas Department of Environmental Quality, the Arkansas Soil and Water Conservation Commission, the Oklahoma Secretary of Environment, the Oklahoma Water Resources Board, the Oklahoma Department of Environmental Quality and the Oklahoma Scenic Rivers Commission, are working together to reduce phosphorus in the shared Scenic Rivers Watersheds. In furtherance of that goal, the States of Arkansas and Oklahoma, acting through their environmental agencies, enter into this Statement of Joint Principles and Actions.

ARKANSAS LEGISLATION

In furtherance of the States' shared phosphorus reduction goals, the Arkansas General Assembly enacted significant legislation to improve the States' shared watersheds. Consequently, the Arkansas Soil and Water Conservation Commission is committed to developing regulations to implement the following recently passed Arkansas legislation:

- Act 1059 of 2003, requiring the Arkansas Soil and Water Conservation Commission to develop and implement programs to certify the minimal competence and knowledge of persons preparing nutrient management plans and of persons making nutrient application, including the proper utilization of litter,

- Act 1060 of 2003, requiring the Arkansas Soil and Water Conservation Commission to operate an annual registration program to assemble and maintain information on the number, composition, and practices of poultry feeding operations in the state, including the land application practices used by each individual poultry feeding operation, as well as the amount of litter stored, applied and transferred by each operation, and

- Act 1061 of 2003, declaring certain areas, including the Illinois River Watershed, to be nutrient surplus areas for phosphorus and nitrogen, and making it a violation of State law to apply designated nutrients within a nutrient surplus area except in compliance with a nutrient management plan approved by the Arkansas Soil and Water Conservation Commission or at a protective rate established by Arkansas Soil and Water Conservation Commission.

LITTER REMOVAL/REUSE TECHNIQUES

The States of Arkansas and Oklahoma, acting through their environmental agencies, will jointly pursue funding, including federal grants or other federal funding, for various litter removal and reuse techniques, such as:

- the development of a litter bank;

- burning litter for energy;

- the use of biological treatment (e.g. the Stamper Project);

- pelletization to produce a marketable fertilizer product: and

transportation of excess litter from the affected watersheds.

JOINT PHOSPHORUS INDEX

The States of Arkansas and Oklahoma, acting through their environmental agencies, are working together toward development of a Joint Phosphorus Index by August 2004. The States will consider utilization of the Joint Phosphorus Index for the development of Nutrient Management Plans.

DATA COLLECTION

Although information collected pursuant to Act 1060 of the 2003 Arkansas General Assembly, quantifying the amount of litter stored, applied and transferred by individual poultry feeding operations is made confidential under the statute, the Arkansas Soil and Water Conservation Commission will prepare detailed compilations and summaries of this information and make these compilations and summaries available upon request to the public, the Oklahoma Environmental Agencies and EPA .

The Arkansas Soil and Water Conservation Commission will work with Oklahoma in determining the format for these compilations and summaries (e.g., information by county, geographic area or watershed), as well as the amount of detail necessary to address Oklahoma's reasonable concerns. Similarly, Oklahoma will work with Arkansas to provide comparable information for poultry operations in Oklahoma.

WATERSHED MONITORING

The States of Arkansas and Oklahoma, acting through their environmental agencies, will coordinate monitoring in partnership with the Arkansas/Oklahoma Arkansas River Compact Commission throughout the shared Oklahoma Scenic Rivers Watersheds based on a common protocol and will share all information/data resulting from such monitoring. The States will hold discussions aimed at arriving at the agreed upon monitoring protocol by August 2004.

The States will submit the agreed upon design to EPA for review and endorsement.

EPA has committed to seek to obtain federal funding for the agreed upon monitoring.

REOPENER PROVISION

Oklahoma periodically reevaluates all of its water quality standards. In particular,

Oklahoma will reevaluate Oklahoma's .037 mg/l criterion for total phosphorus in Oklahoma's Scenic Rivers by 2012, based on the best scientific information available at that time, and with the full, timely inclusion of officials from the State of Arkansas representing both point and non point source dischargers.

CONTROLS ON LARGER ENTITIES

The States of Arkansas and Oklahoma, acting through their environmental agencies, understand that point source dischargers will need time to achieve water quality improvements in the affected watersheds consistent with Oklahoma's criterion for total phosphorus. Therefore, the States, acting through their environmental agencies, will issue to the point source dischargers to the shared Oklahoma Scenic Rivers Watersheds with a design capacity of greater than 1 MGD, specifically the Cities of Fayetteville, Rogers, Springdale, Siloam Springs and Bentonville, Arkansas, National Pollutant Discharge Elimination System ("NPDES") permits reflecting an effluent limit for total phosphorus of 1 mg/l (30 day average) pursuant to the implementation schedule set out below. The City of Tahlequah, Oklahoma received an NPDES permit issued in 1992 requiring it to meet a total phosphorus effluent limit of 1 mg/l.

The States of Arkansas and Oklahoma, acting through their environmental agencies, will reissue the above-specified cities' NPDES permits on a normal five (5) year reissuance cycle, with the understanding that NPDES permits for these point source dischargers to the shared Oklahoma Scenic Rivers Watersheds issued in the year 2012 or beyond must include phosphorus limits stringent enough to meet applicable water quality standards.

Schedule for Large Cities

Rogers – to meet 1 mg/l limit starting in 2004
Springdale – expansion to meet 1 mg/l limit starting in 2007
Siloam Springs – expansion to meet 1 mg/l limit starting in 2009
Fayetteville – existing facility already complies; new facility to meet 1 mg/l limit once operational (circa 2005)
Bentonville – new facility to meet 1 mg/l imit once operational (date unknown).

CONTROLS ON SMALLER ENTITIES

The State of Arkansas, acting through its environmental agencies, will work aggressively throughout the implementation period with those existing Arkansas entities with design capacities of less than 1 MGD but greater than or equal to .5 MGD to reduce the level of phosphorus in their discharges to the maximum extent possible through voluntary controls aimed at reaching either 1 mg/l total phosphorus or a phosphorus loading limit based on 1 MGD x 1 mg/l by the year 2012. The City of

Westville, Oklahoma is currently under a compliance order to meet a 1 mg/l limit within two (2) years.

NOTE: The States of Arkansas and Oklahoma, acting through their environmental agencies, understand that the above described controls do not apply to facilities, such as cooling water intake facilities, whose discharges do not contribute phosphorus to the receiving stream, so long as those facilities discharges do not contain increased concentrations of phosphorus.

WATERSHED PLAN

The States of Arkansas and Oklahoma, acting through their environmental agencies, will work together in partnership with the Arkansas-Oklahoma Arkansas River Compact Commission toward the goal of producing a Watershed Plan.

NOTE: EPA's Clean Water Act Section 319 guidance sets out nine (9) elements for a Watershed Plan.

GENERAL PROVISIONS

The parties understand that this document is not intended to create, diminish or waive any legal rights or obligations among the parties or any other person or entity not a party to this document, including individual farmers. Nothing in this document creates any rights or causes of action for any person, whether party to this document or not.

The parties recognize that a request by Oklahoma for more stringent NPDES permit concentration limits than those set out in this document, or a challenge by Arkansas to Oklahoma's phosphorus standard, would terminate this document. If a third party brings a lawsuit inconsistent with the terms of this document, both parties will indicate to the Court their support for the terms of this document.

EPA has told the parties this document represents a very positive step by the States, acting through their environmental agencies, toward improving water quality in the shared Oklahoma Scenic Rivers Watersheds, which is consistent with achieving compliance with the State of Oklahoma's .037 mg/l criterion for total phosphorus in the State's Scenic Rivers.

The States of Arkansas and Oklahoma, acting through their environmental agencies, understand that as parties to this document, they intend to respect and follow the commitments made herein, and that so long as all commitments made herein are

met, the parties will continue to seek progress under this document toward achieving improvements in water quality.

_____ _____

Marcus C. Devine
Executive Director
Arkansas Department of Environmental Quality

Date

J. Randy Young, P.E.
Executive Director
Arkansas Soil & Water Conservation Commission

Date

Miles Tolbert
Oklahoma Secretary of Environment

Date

_____ _____

Duane A. Smith Date
Executive Director
Oklahoma Water Resources Board

_____ _____

Edward H. Fite, III Date
Executive Director
Oklahoma Scenic Rivers Commission

Steven A. Thompson
Executive Director
Oklahoma Department of Environmental Quality

Date

SECOND STATEMENT OF JOINT PRINCIPLES AND ACTIONS

WHEREAS, this Second Statement of Joint Principles and Actions (Second Statement), dated this 20th day of February, 2013, is intended to extend and augment the Statement of Joint Principles and Action (First Statement) entered in 2003 among named Arkansas and Oklahoma Environmental Agencies, which with the addition of the Oklahoma Conservation Commission and Oklahoma Department of Agriculture, Food and Forestry, are herein after referred to as the "Parties"; and

WHEREAS, the States of Arkansas and Oklahoma share a common goal of improving water quality in the designated Scenic Rivers;

WHEREAS, in an effort to avoid costly and protracted litigation and administrative proceedings which would further strain relationships between the two States and distract from cooperative efforts needed to protect and improve water quality in the designated Scenic Rivers, the two States entered into a Statement of Joint Principles and Actions in 2003 (the "First Statement");

WHEREAS, under the First Statement, both states agreed to undertake interim actions designed to improve river clarity and substrate quality in the designated Scenic Rivers and their Watersheds including substantial upgrades to wastewater treatment plants and the development and implementation of regulations restricting the use of nutrients to fertilize lands within the Scenic River Watersheds lands;

WHEREAS, Oklahoma agreed in the First Agreement to re-evaluate, by 2012, the 0.037 mg/L Numeric Phosphorus Criterion based on the best scientific information available.

WHEREAS, the two States believe it is in their best interests to continue to work cooperatively to protect and improve water quality in the designated Scenic Rivers and to avoid costly and protracted litigation and administrative proceedings which would further strain relationships between the two States and distract from those cooperative efforts.

NOW THEREFORE, the Parties enter into this Second Statement of Joint Principles and Actions.

THREE YEAR EXTENSION OF COMMITMENTS

For a period of three years commencing February 20, 2013 and ending February 20, 2016 (the "Term"), the Parties make the following commitments:

The States, through the appropriate Parties, will continue to require existing point source dischargers to the Illinois River Watershed with a design capacity of greater than 1 MGD to operate under existing National Pollutant Discharge Elimination System ("NPDES") permits reflecting an effluent limit for total phosphorus of not more than 1mg/L based upon a 30 day average, assuming the U.S. Environmental Protection Agency does not object. Oklahoma's law prohibits increased loading from existing dischargers and the permitting of new dischargers in Oklahoma into its Scenic River watersheds; existing dischargers may expand and new dischargers may be permitted in Arkansas provided that the cumulative permitted loading of phosphorus (in pounds per day) in the watersheds of any of the six Scenic Rivers will not be increased during the Term of this Second Statement.

The States, through the appropriate Parties, will continue implementation and enforcement of regulations governing the use of nutrients to fertilize lands within the designated Scenic River Watersheds. Subject to the limitations of the Parties to bind their respective legislatures, the Parties shall not seek to modify current law or regulations governing the use of nutrients to fertilize lands unless the

requested modification is at least as restrictive as current law applicable to that State's respective portion of the designated Scenic River Watersheds. To the extent funding is available, the Parties agree to maintain inspectors and nutrient management plan writers for their respective nutrient management regulatory programs for the designated Scenic River Watersheds equal to, if not greater than, current agency staffing levels.

Although information collected pursuant to Act 1060 of the 2003 Arkansas General Assembly, quantifying the amount of poultry litter stored, applied and transferred by individual poultry feeding operations is made confidential under the statute, the Arkansas Natural Resources Commission will prepare detailed compilations and summaries of this information and make these compilations and summaries available on at least an annual basis to Oklahoma environmental agencies and EPA. The Arkansas Natural Resources Commission will work with appropriate Oklahoma Parties in determining the format for these compilations and summaries (e.g., information by county, geographic area or watershed), as well as the amount of detail necessary to address reasonable concerns by Oklahoma Parties. Similarly, Oklahoma Parties will work with Arkansas Parties to provide comparable information for poultry operations in Oklahoma.

JOINT PHOSPHORUS CRITERIA STUDY

COST OF JOINT STUDY -- The Arkansas Parties agree to use best efforts to secure appropriate funding in the amount of Six Hundred Thousand dollars ($600,000) to complete a three-year water quality study of the designated Scenic Rivers and their watersheds.(the "Joint Study"). Although the Arkansas Parties agree to use best efforts to secure the funding for the Joint Study, the willingness of the State of Arkansas to fund the Joint Study is not, and shall not be, construed by any signatory to this document as a legal obligation of the State of Arkansas. Although the Arkansas Parties have explored some options and believe currently that a sufficient source of funds is available to undertake the Joint Study, the Arkansas Parties may also pursue state, federal and private grants which may be available to fully or partially satisfy the willingness of the Arkansas Parties to undertake the task of finding the funding for the Joint Study under this Second Statement. Failure to secure the funding necessary to complete the Joint Study within the Term of this Second Statement shall provide just cause for termination of the Second Statement.

The funds collected to pay for the Joint Study will be placed in the Arkansas-Oklahoma Arkansas River Compact Commission ("CC"). The CC will act solely as a repository for the funds and will disperse the funds at the direction of the Joint Study Committee.

MANDATORY STUDY COMPONENTS -- The primary purpose of the Joint Study is to determine the Total Phosphorous threshold response level, in milligrams per liter (mg/L), at which any statistically significant shift occurs in algal species composition or algal biomass production resulting in undesirable aesthetic or water quality conditions in the Designated Scenic Rivers. The Joint Study shall be completed in accordance with U.S. EPA Rapid Bio-assessment Protocols, incorporate quality assurance and control provisions consistent with EPA Guidance on Quality Assurance and Quality Control, and follow EPA's most recent guidance "Using Stressor-response Relationships to Derive Numeric Nutrient Criteria" (EPA 820-S-10-001, November 2010). The Joint Study shall include a sampling population that is adequate to determine the frequency and duration component of the numeric criterion. To the extent data from reference streams or sites is incorporated into the Joint Study, reference streams or sites shall, to the fullest extent possible, be limited to streams or rivers within the same EPA eco-region and comparable to the streams in the designated Scenic River watersheds in terms of stream order and watershed land uses.

JOINT STUDY COMMITTEE -- The Joint Study will be funded by Arkansas and managed by a committee of six (6) individuals - 3 appointed by the Governor of the State of Oklahoma, 3 appointed by the Governor of the State of Arkansas (the "Joint Study Committee"). Each representative shall be qualified to design and conduct water quality studies. This committee will be authorized to select qualified scientific professionals to conduct the Joint Study and to formulate the specific scope of work for the Joint Study. The qualified scientific professionals selected or any professionals hired by the Joint Study Committee shall not reside in, nor have their principal place of business in, the States of Arkansas or Oklahoma. The Joint Study Committee members will be entitled to solicit input from stakeholders on aspects of the Joint Study such as proposed scopes of work, study protocols, sampling plans, candidate reference streams or sites and the selection of water quality indicators for the purpose of minimizing or avoiding future disputes about the methods and findings of the Joint Study. The Joint Study Committee will establish a reasonable schedule of project deliverables including at least two (2) interim written reports and at least one public meeting each year with stakeholders to provide a measure of transparency and public comment opportunities during the completion of the Joint Study. The final report and all data collected or reviewed during the Joint Study shall be made publicly available.

Failure of the Joint Study Committee to reach agreement on the procurement, execution or conduct of the Joint Study within the Term of this Second Statement shall provide just cause for termination of the Second Statement.

USE OF STUDY FINDINGS AND RESULTS -- The final report will provide an objective analysis of the water quality data and identify relationships, if any, between various concentrations of phosphorus in the designated Scenic Rivers and multiple ecological response levels commonly used in the scientific community to describe undesirable aesthetic and water quality conditions. The committee and the scientific professionals employed to complete the Joint Study will be asked to make specific recommendations as to what phosphorus levels, and what frequency and duration components of measure, are necessary to protect the aesthetics beneficial use and scenic river (Outstanding Resource Water) designations assigned to the designated Scenic Rivers, and based on overall stream health which shall include evaluating the relationship, if any, between phosphorous concentrations in the designated Scenic Rivers and biotic indicators of water quality, including primarily algal taxonomic composition and periphyton biomass. The purpose of the Joint Study is to provide reliable and objective data and analysis that will then form the basis for the Parties and EPA to make informed decisions about the scientific merit of any proposed revisions to the phosphorus criterion for the designated Scenic Rivers.

The Parties recognize that Oklahoma's total phosphorus criterion of 0.037 mg/L was adopted by Oklahoma to protect its designated Scenic Rivers' "aesthetic beneficial uses." Oklahoma's Water Quality Standards state the phosphorus criterion applies to protect the aesthetic use of the Scenic Rivers. OAC 785:45-5-19(c). Under the federal Clean Water Act, Arkansas has no aesthetic designated use for any waters of the state. Therefore, this Joint Study designed to help identify the phosphorus levels necessary to protect the aesthetic beneficial use of Oklahoma's designated Scenic Rivers shall not be binding upon or applicable to any study to develop nutrient criteria necessary to protect aquatic life or fish communities within any waters of the State of Arkansas.

The States of Arkansas and Oklahoma, acting through their respective Parties, agree to be bound by the findings of the Joint Study. Oklahoma, through the Oklahoma Water Resources Board, agrees to promulgate any new Numeric Phosphorus Criterion, subject to applicable Oklahoma statutes, rules and regulations if significantly different than the current 0.037 mg/L standard. "Significantly different" means the new Numeric Phosphorous Criterion exceeds -.010 or +.010 than the current .037 criterion. If the new Numeric Phosphorous Criterion is at or between .027 and .047, then the State of Oklahoma is not required to promulgate the new criterion in its water quality standards. Arkansas agrees to be bound by and to fully comply with the Numeric Phosphorous Criterion at the Arkansas-Oklahoma State line,

whether the existing 0.037 mg/L standard is confirmed or a new Numeric Phosphorus Criterion is promulgated. Parties for the States of Arkansas and Oklahoma shall forego any legal or administrative challenges to the Joint Study.

SUSPENSION OF ADMINISTRATIVE PROCESSES AND COVENANT NOT TO SUE

In consideration of the commitments by each Party to cooperate in completing the Joint Study, the Parties agree to the following terms which are intended to avoid costly and distracting legal proceedings while preserving all Parties' legal rights.

Oklahoma, through the Oklahoma Water Resources Board, will propose a rule amendment that removes the date to achieve full compliance with the Numeric Phosphorus Criterion set forth in Oklahoma Administrative Code 785:45-5-19 and 785:45-5-25(d), provided that such rule amendment will have to be promulgated pursuant to law. Parties for both States will continue cooperative efforts to improve and protect water quality in the Scenic Rivers, and Parties for both States covenant and agree during the Term of this Second Statement not to institute or maintain administrative enforcement actions, judicial proceedings or to take regulatory actions contrary to this Second Statement.

The Parties reserve any and all rights, claims or causes of action that presently exist or which may arise during the Term of this Second Statement related to the First Statement, the Numeric Phosphorus Criterion and the TMDL (the "Tolled Claims") but covenant and agree not to initiate legal or administrative proceedings against any other Party to this Agreement related to the Tolled Claims.

The Term of this Second Statement shall not be included in computing the running of any statute of limitations potentially applicable to any action brought by a Party to this Second Statement relating to the Tolled Claims. Any defense of laches, estoppel, waiver or other similar equitable defense to the Tolled Claims based on the running or expiration of any time period shall not include the Term of this Second Statement. The foregoing tolling agreement does not constitute any admission or acknowledgement of any fact, conclusion of law, or liability by any Party to this Second Statement. Nor does the foregoing tolling agreement constitute any admission or acknowledgement by any Party that any statute of limitations, or similar defense concerning the timeliness of commencing a legal or administrative action, is applicable to the Tolled Claims. The Parties reserve the right to assert that no statute of limitations applies to any of the Tolled Claims and that no other defense based upon the timeliness of commencing a legal or administrative action is applicable.

GENERAL PROVISIONS

Nothing in this Second Statement creates any rights or causes of action for any person who is not a Party to this Second Statement.

This Second Statement is not intended to affect any claims by or against a third party. However, if a third party initiates a legal or administrative proceeding related to water quality in the designated Scenic Rivers which is inconsistent with the terms of this Second Statement, the Parties shall take necessary steps to indicate to the Court their support for this document.

This Second Statement is effective upon execution by the Parties and without the requirement of filing with any Court and may be signed in counterparts.

This Second Statement, together with any provisions of the First Statement not superseded herein, contains the entire understanding between the Parties, and no statement, promise, or inducement made by

any Party that is not set forth in this Second Statement, together with any provisions of the First Statement not superseded herein, shall be valid or binding, nor shall it be used in construing the terms of this Second Statement.

Teresa Marks
Director
Arkansas Department of Environmental Quality

2/19/13
Date

J. Randy Young, P.E.
Director
Arkansas Natural Resources Commission

2/19/13
Date

Teresa Marks
Director
Arkansas Department of Environmental Quality

Date

J. Randy Young, P.E.
Director
Arkansas Natural Resources Commission

Date

Gary Sherrer
Oklahoma Secretary of the Environment

Feb 12, 2013
Date

J.D. Strong
Executive Director
Oklahoma Water Resources Board

Feb 12, 2013
Date

Steven A. Thompson
Executive Director
Oklahoma Department of Environmental Quality

Feb. 12, 2013
Date

Edward H. Fite, III
Administrator
Oklahoma Scenic Rivers Commission

February 20, 2013
Date

Jim Reese
Secretary and Commissioner of Agriculture
Oklahoma State Board of Agriculture

Feb 15, 2013
Date

Mike Thralls
Executive Director
Oklahoma Conservation Commission

Feb 15, 2013
Date

It is my opinion that approval of this Second Statement is within the authority of the Oklahoma officials and agencies executing the same.

E. Scott Pruitt, Attorney General of Oklahoma — 2/20/2013 Date

It is my opinion that approval of this Second Statement is within the authority of the Arkansas officials and agencies executing the same.

Dustin McDaniel, Attorney General of Arkansas — 2-19-13 Date

Completed TMDL's
In the Arkansas-Oklahoma Compact Area
Provided by the Oklahoma Department of Environmental Quality

COMPLETED TMDL'S PROVIDED BY THE OKLAHOMA DEPT. OF ENVIRONMENTAL QUALITY

11070209 - Lower Neosho			
Waterbody ID	**Station Name**	**Parameter**	**Cause Code(s)**
OK121600050020_00	Spavinaw Lake	Phosphorus	462
OK121600050070_00	Lake Eucha	Phosphorus	462
OK121600010430_00	Chouteau Creek	Enterococcus, E. coli	215,217
OK121600010440_00	Crutchfield Branch	Enterococcus, E. coli	215,217
OK121600010060_00	Ranger Creek	Enterococcus	215
OK121600010100_00	Fourteenmile Creek	Enterococcus	215
OK121600010010_00	Neosho River	Enterococcus	215
11110102 - Dirty-Greenleaf			
Waterbody ID	**Station Name**	**Parameter**	**Cause Code(s)**
OK120400010260_00	Arkansas River	Enterococcus	215
OK120400020160_00	Butler Creek	Enterococcus, E. coli, Turbidity	215,217,413
OK120400010400_00	Coody Creek	Enterococcus, E. coli	215,217
OK120400020010_00	Dirty Creek	Enterococcus, Turbidity	215,413
OK120400020110_00	Dirty Creek, Georges Fork	Enterococcus	215
OK120400020030_00	Dirty Creek, South Fork	Enterococcus	215
OK120400020190_00	Elk Creek	Enterococcus	215
OK120400020240_00	Shady Grove Creek	Enterococcus	215
11110103 - Illinois			
None			
11110104 - Robert S Kerr			
Waterbody ID	**Station Name**	**Parameter**	**Cause Code(s)**
OK220200040010_40	Sans Bois Creek	Enterococcus, E. coli	215,217
OK220200040050_00	Sans Bois Creek, Mountain Fork	E. coli	217
11110105 - Poteau			
Waterbody ID	**Station Name**	**Parameter**	**Cause Code(s)**
OK220100040020_00	Fourche Maline Creek	Enterococcus	215

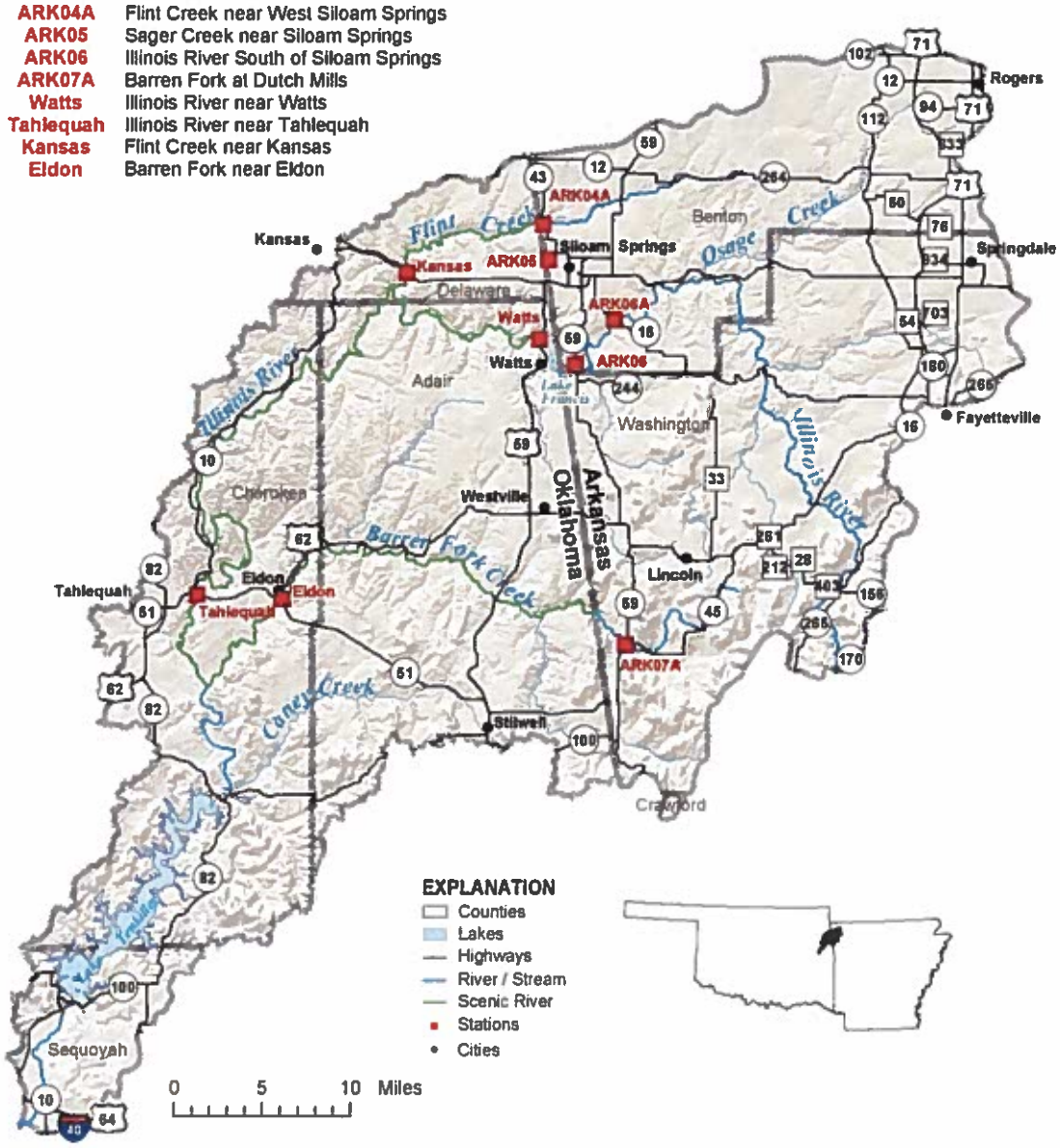
DRAFT

OKLAHOMA

Oklahoma's 5-year Rolling Average Phosphorus Report for the Illinois River Basin

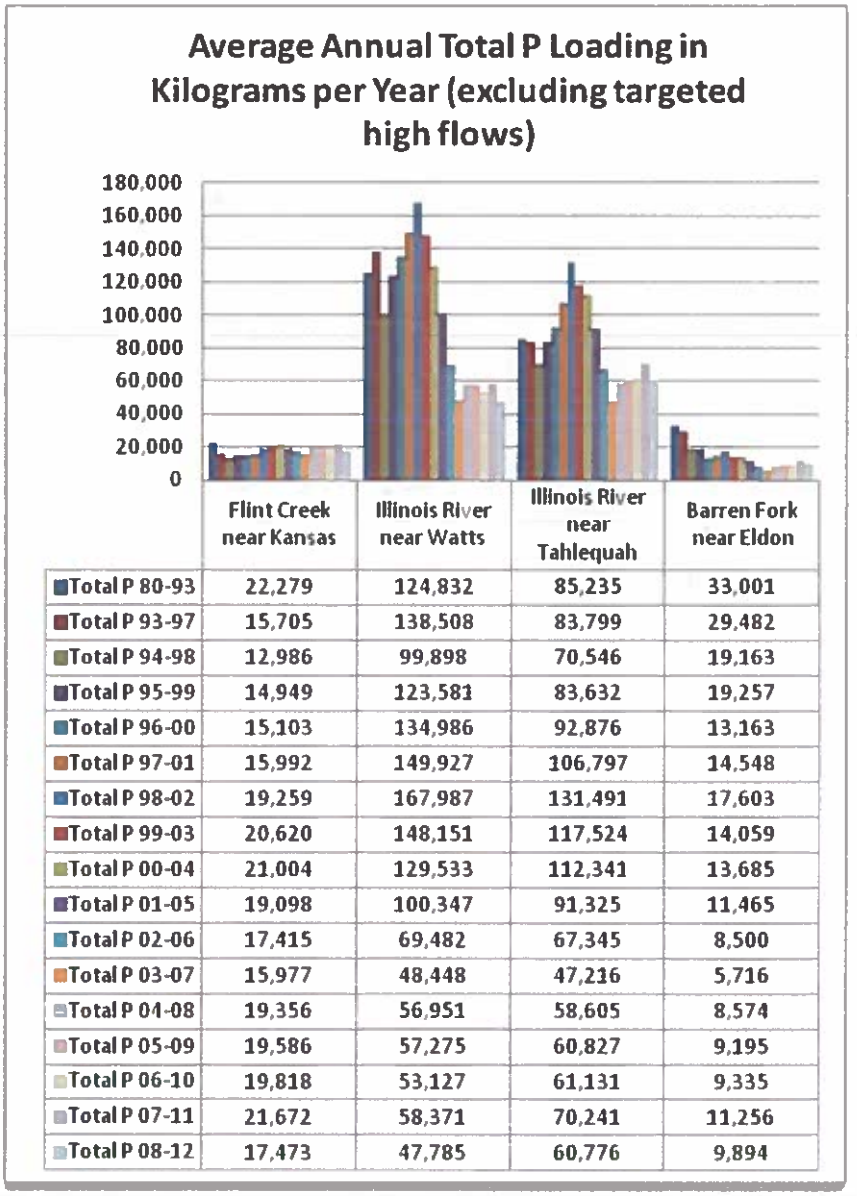
Illinois River Basin

Arkansas – Oklahoma Compact



CY 2012

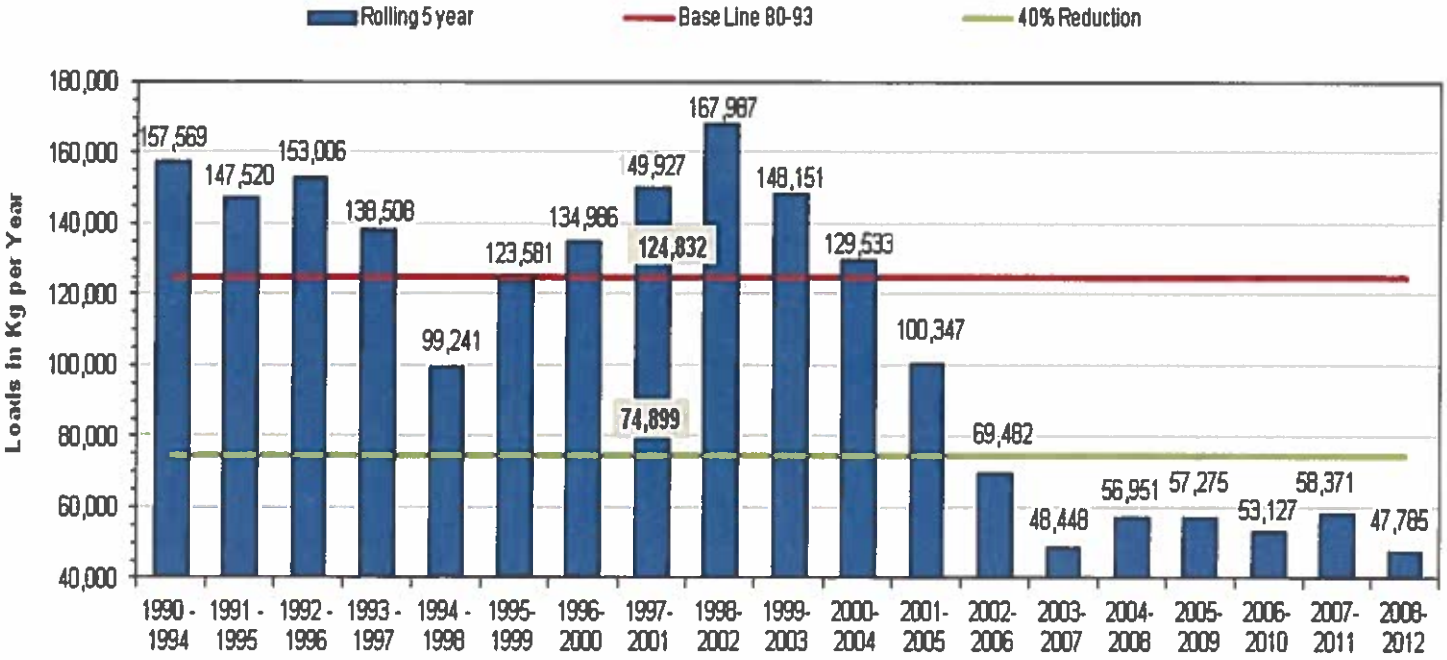
OKLAHOMA



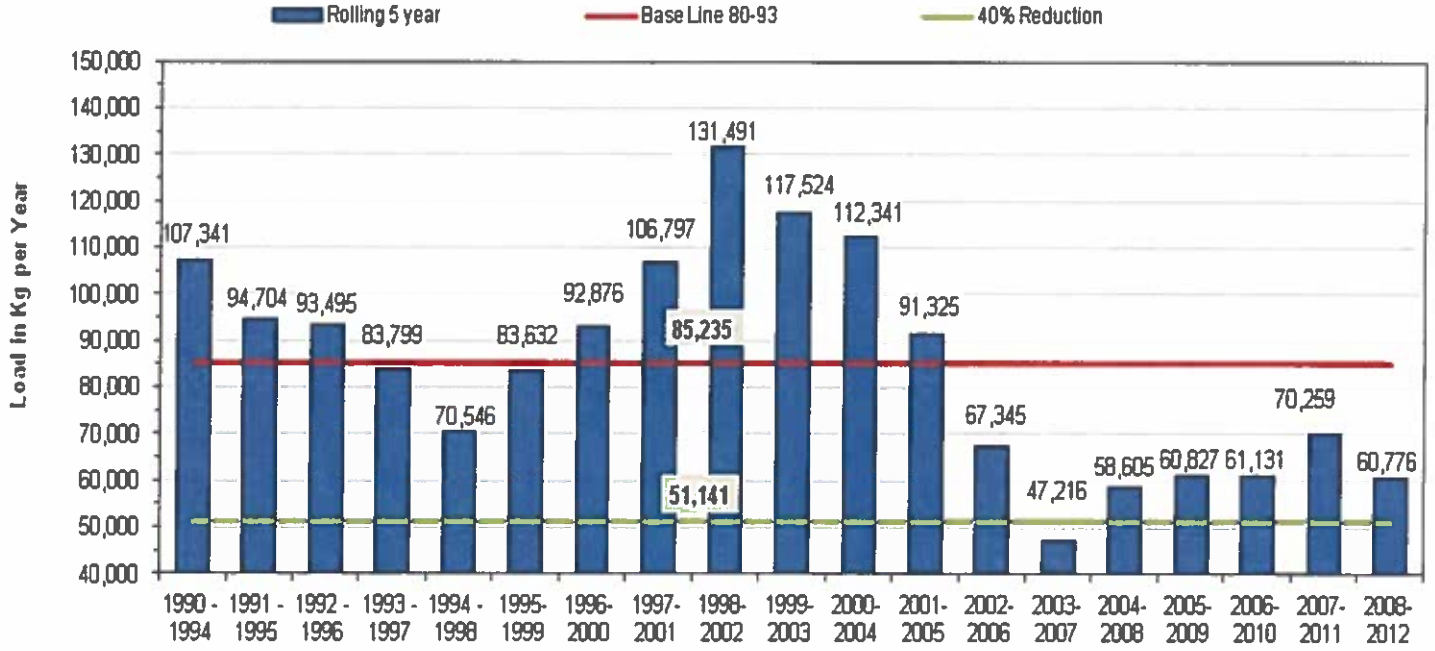
	Flint Creek near Kansas	Illinois River near Watts	Illinois River near Tahlequah	Barren Fork near Eldon
Total P 80-93	22,279	124,832	85,235	33,001
Total P 93-97	15,705	138,508	83,799	29,482
Total P 94-98	12,986	99,898	70,546	19,163
Total P 95-99	14,949	123,581	83,632	19,257
Total P 96-00	15,103	134,986	92,876	13,163
Total P 97-01	15,992	149,927	106,797	14,548
Total P 98-02	19,259	167,987	131,491	17,603
Total P 99-03	20,620	148,151	117,524	14,059
Total P 00-04	21,004	129,533	112,341	13,685
Total P 01-05	19,098	100,347	91,325	11,465
Total P 02-06	17,415	69,482	67,345	8,500
Total P 03-07	15,977	48,448	47,216	5,716
Total P 04-08	19,356	56,951	58,605	8,574
Total P 05-09	19,586	57,275	60,827	9,195
Total P 06-10	19,818	53,127	61,131	9,335
Total P 07-11	21,672	58,371	70,241	11,256
Total P 08-12	17,473	47,785	60,776	9,894

Values represent all available data, which is routinely collected and excludes targeted high flow events.

Illinois River near Watts (excluding targeted high flows)

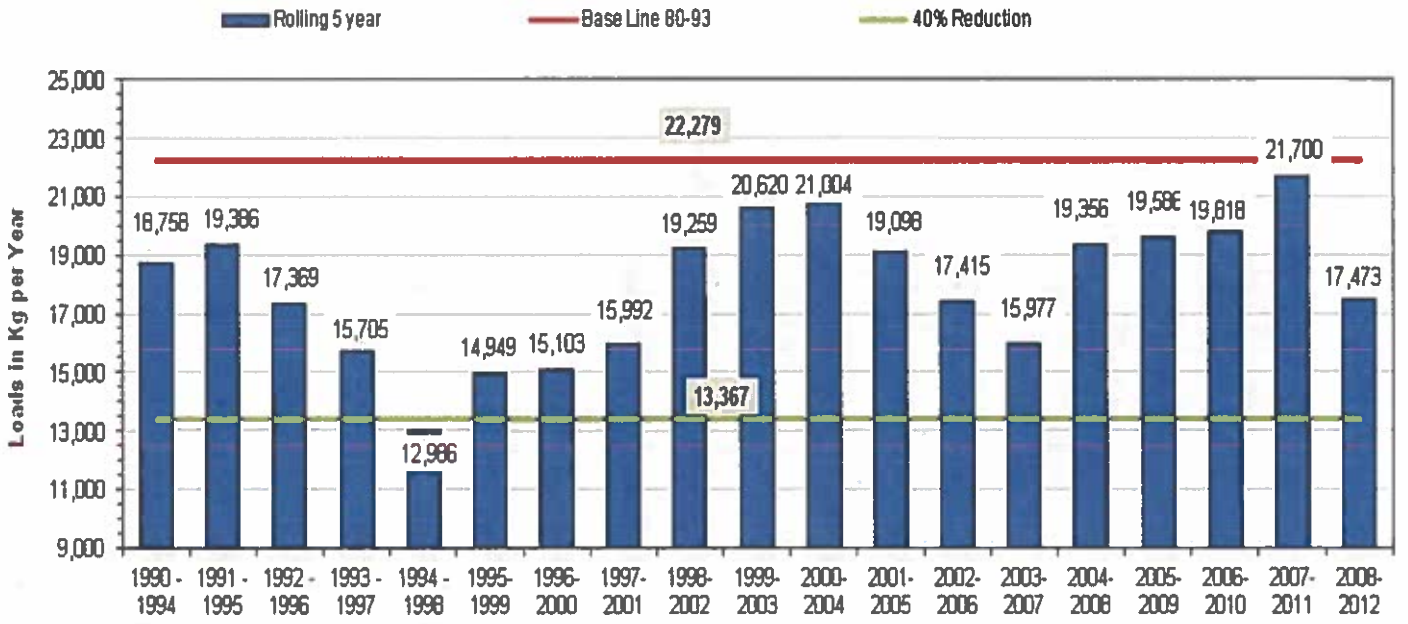


Illinois River near Tahlequah (excluding targeted high flows)

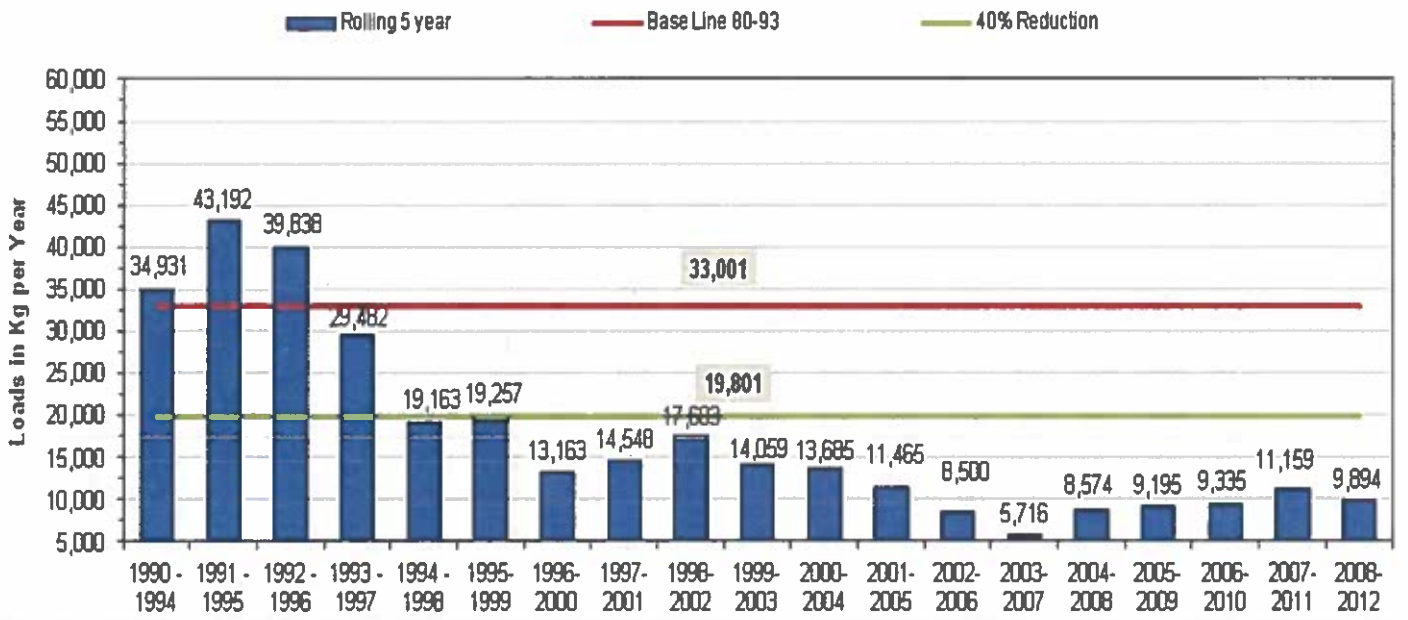


OKLAHOMA

Flint Creek near Kansas (excluding targeted high flows)



Barren Fork at Eldon (excluding targeted high flows)



Illinois River near Watts			Loadings
Year	Flow (cfs)	Total P (mg/L)	Total P kg/year
1980	173	0.423	65,279
1981	260	0.190	44,119
1982	591		
1983	352		
1984	706		
1985	947		
1986	879		
1987	815		
1988	531		
1989	558	0.210	104,653
1990	1,127	0.181	182,432
1991	724	0.162	104,534
1992	760	0.161	109,571
1993	1,163	0.277	287,317
1994	674	0.168	101,127
1995	783	0.143	100,233
1996	693	0.188	116,542
1997	573	0.163	83,415
1998	713	0.138	87,876
1999	793	0.250	177,057
2000	648	0.309	178,827
2001	649	0.346	200,549
2002	619	0.316	174,694
2003	347	0.155	48,035
2004	688	0.104	63,903
2005	459	0.106	43,453
2006	349	0.116	36,156
2007	464	0.106	43,926
2008	1177	0.068	71,480
2009	915	0.069	56,386
2010	587	0.057	29,882
2011	1101	0.081	79,648
2012	336	0.052	15,594
Average	671	0.175	104,672

Illinois River Near Tahlequah			Loadings
Year	Flow (cfs)	Total P (mg/L)	Total P kg/year
1980	249		
1981	384		
1982	812		
1983	537		
1984	1,157		
1985	1,651		
1986	1,452		
1987	1,218		
1988	820		
1989	808		
1990	1,695	0.098	147,579
1991	1,094	0.079	76,796
1992	1,207	0.080	86,205
1993	1,751	0.099	154,647
1994	1,071	0.084	80,223
1995	1,123	0.080	80,229
1996	938	0.085	71,207
1997	812	0.069	49,797
1998	1,044	0.081	75,524
1999	1,143	0.121	123,518
2000	1,083	0.136	131,543
2001	1,033	0.158	145,766
2002	851	0.211	160,366
2003	478	0.100	42,690
2004	1,157	0.075	77,499
2005	712	0.060	38,148
2006	426	0.074	28,154
2007	736	0.066	43,383
2008	1,839	0.062	101,829
2009	1,407	0.072	90,475
2010	820	0.050	36,617
2011	1,541	0.058	79,813
2012	492	0.038	16,689
Average	1,016	0.088	80,295

NOTES : Flow & Water quality data provided by USGS Oklahoma District

* WQ data from 1999 to the present also includes data routinely collected by the OWRB

' Values represent data that is routinely collected and excludes targeted high flow events.

OKLAHOMA

Flint Creek Near Kansas			Loadings
Year	Flow (cfs)	Total P (mg/L)	Total P kg/year
1980	32	0.189	5,454
1981	57	0.178	9,077
1982	69	0.186	11,537
1983	49	0.284	12,415
1984	143	0.240	30,532
1985	237	0.224	47,591
1986	183	0.223	36,430
1987	141	0.157	19,840
1988	97	0.265	22,946
1989	90	0.557	44,981
1990		0.114	
1991		0.120	
1992		0.118	
1993	182	0.156	25,359
1994	136	0.127	15,418
1995	140	0.185	23,207
1996	76	0.152	10,294
1997	94.8	0.117	9,871
1998	96.5	0.127	10,945
1999	137	0.186	22,758
2000	133	0.178	21,143
2001	101	0.164	14,793
2002	82	0.310	22,703
2003	49.8	0.316	14,055
2004	149.0	0.165	21,957
2005	91.8	0.168	13,774
2006	36.8	0.226	7,428
2007	70.3	0.240	15,068
2008	218.0	0.157	30,567
2009	141.6	0.187	23,649
2010	91.7	0.171	14,004
2011	137.8	0.152	18,707
2012	48.1	0.107	4,598
Average	110	0.195	19,265

Baron Fork at Eldon			Loadings
Year	Flow (cfs)	Total Phos. (mg/L)	Total P kg/year
1980	77		
1981	201		
1982	296		
1983	184		
1984	364		
1985	593		
1986	536		
1987	491		
1988	269		
1989	320		
1990	666		
1991	451	0.060	24,145
1992	440	0.095	37,315
1993	700	0.108	67,234
1994	328	0.037	10,878
1995	422	0.263	98,819
1996	432	0.025	9,645
1997	332	0.023	6,671
1998	409	0.033	12,054
1999	361	0.048	15,476
2000	376	0.043	14,440
2001	343	0.064	19,605
2002	262	0.088	20,591
2003	145	0.025	3,237
2004	403	0.029	10,438
2005	228	0.027	5,498
2006	169	0.027	4,075
2007	254	0.026	5,898
2008	559	0.045	22,466
2009	460	0.033	13,557
2010	225	0.027	5,426
2011	471	0.028	11,783
2012	130	0.019	2,201
Average	361	0.053	17,148

*1999 TP was modified to include less than detect values (1/2 LTD, n=5)

*2002 TP was modified to include less than detect values (1/2 LTD, n=2)

*2012 TP was modified to include less than detect values (1/2 LTD, n=4)

NOTES : Flow & Water quality data provided by USGS Oklahoma District

* WQ data from 1999 to the present also includes data routinely collected by the OWRB

* Values represent data that is routinely collected and excludes targeted high flow events.

Five-Year Average Values by Station

Illinois River at Watts				
Year	Pt (mg/l)	Flow (cfs)	Pt (kg/yr)	% Decrease
80-93	0.204	685	124,832	0.0%
90-94	0.198	890	157,569	-26.2%
91-95	0.201	821	147,520	-18.2%
92-96	0.210	815	153,006	-22.6%
93-97	0.200	777	138,508	-11.0%
94-98	0.162	687	99,241	20.5%
95-99	0.195	711	123,581	1.0%
96-00	0.221	684	134,986	-8.1%
97-01	0.249	675	149,927	-20.1%
98-02	0.275	684	167,987	-34.6%
99-03	0.271	611	148,151	-18.7%
00-04	0.246	590	129,533	-3.8%
2001-2005	0.203	552	100,347	19.6%
2002-2006	0.158	492	69,482	44.3%
2003-2007	0.118	461	48,448	61.2%
2004-2008	0.102	627	56,951	54.4%
2005-2009	0.095	673	57,272	54.1%
2006-2010	0.085	698	53,127	57.4%
2007-2011	0.077	849	58,371	53.2%
2008-2012	0.065	823	47,785	61.7%

Flint Creek near Kansas				
Year	Pt (mg/l)	Flow (cfs)	Pt (kg/yr)	% Decrease
80-93	0.214	117	22,279	0.0%
90-94	0.132	159	18,758	15.8%
91-95	0.142	153	19,386	13.0%
92-96	0.146	134	17,369	22.0%
93-97	0.140	126	15,705	29.5%
94-98	0.133	109	12,986	41.7%
95-99	0.154	109	14,949	32.9%
96-00	0.157	107	15,103	32.2%
97-01	0.159	112	15,992	28.2%
98-02	0.196	110	19,259	13.6%
99-03	0.230	101	20,620	7.4%
00-04	0.228	103	21,004	5.7%
2001-2005	0.226	95	19,098	14.3%
2002-2006	0.238	82	17,415	21.8%
2003-2007	0.225	80	15,977	28.3%
2004-2008	0.191	113	19,356	13.1%
2005-2009	0.196	112	19,586	12.1%
2006-2010	0.199	112	19,818	11.0%
2007-2011	0.184	132	21,700	2.6%
2008-2012	0.154	127	17,473	21.6%

Illinois River near Tahlequah				
Year	Pt (mg/l)	Flow (cfs)	Pt (kg/yr)	% Decrease
80-93	0.090	1060	85,235	0.0%
90-94	0.088	1364	107,341	-25.9%
91-95	0.085	1249	94,704	-11.1%
92-96	0.086	1218	93,495	-9.7%
93-97	0.082	1139	83,799	1.7%
94-98	0.079	998	70,546	17.2%
95-99	0.093	1012	83,632	1.9%
96-00	0.104	1004	92,876	-9.0%
97-01	0.117	1023	106,797	-25.3%
98-02	0.143	1031	131,491	-54.3%
99-03	0.143	918	117,524	-37.9%
00-04	0.137	920	112,341	-31.8%
2001-2005	0.121	846	91,323	-7.1%
2002-2006	0.104	725	67,345	21.0%
2003-2007	0.075	702	47,216	44.6%
2004-2008	0.067	974	58,605	31.2%
2005-2009	0.067	1024	60,827	28.6%
2006-2010	0.065	1046	61,131	28.3%
2007-2011	0.062	1269	70,259	17.6%
2008-2012	0.056	1220	60,776	28.7%

Barren Fork at Eldon				
Year	Pt (mg/l)	Flow (cfs)	Pt (kg/yr)	% Decrease
80-93	0.093	399	33,001	0.0%
90-94	0.076	517	34,931	-5.8%
91-95	0.103	468	43,192	-30.9%
92-96	0.096	464	39,838	-20.7%
93-97	0.075	443	29,482	10.7%
94-98	0.056	384	19,163	41.9%
95-99	0.055	391	19,257	41.6%
96-00	0.039	382	13,163	60.1%
97-01	0.045	364	14,548	55.9%
98-02	0.056	350	17,603	46.7%
99-03	0.053	297	14,059	57.4%
00-04	0.050	306	13,865	58.0%
2001-2005	0.046	276	11,465	65.3%
2002-2006	0.039	241	8,500	74.2%
2003-2007	0.027	24	5,716	82.7%
2004-2008	0.030	323	8,574	74.0%
2005-2009	0.031	334	9,197	72.1%
2006-2010	0.031	333	9,335	71.7%
2007-2011	0.032	394	11,159	66.2%
2008-2012	0.030	369	9,894	70.0%

Funding for Cities and Districts In the Illinois River Basin Provided by the OWRB's Financial Assistance Program

FUNDING PROVIDED BY OWRB'S FINANCIAL ASSISTANCE PROGRAM

AppID	OldSystemID	LGAName	County	ClosedAmt	ApprovedDate	AppType	ShortProjectDesc
1628	FAP-00-0058-R	Adair County Rural Water District #5	Adair	$99,500.00	7/10/2001	REAP	constructing a new 200,000-gallon water storage ta
2488	FAP-83-0033-G	Cherry Tree Rural Water District	Adair	$10,000.00	1/10/1984	Emergency	
2556	FAP-85-0129-G	Watts Public Works Authority	Adair	$10,000.00	2/12/1985	Emergency	
2565	FAP-85-0155-G	Adair County RWS & SWMD #2	Adair	$100,000.00	6/11/1985	Emergency	
2631	FAP-88-0053-G	Watts Public Works Authority	Adair	$85,000.00	7/16/1990	Emergency	WATER SYSTEM REPAIRS
2653	FAP-89-0062-G	Adair County Rural Water District #5	Adair	$50,000.00	9/10/1991	Emergency	NEW WATER SYSTEM
1268	FAP-93-0073-L	Stilwell Area Development Authority	Adair	$1,000,000.00	12/12/1995	FA Loan	WATER & SEWER SYSTEM IMPROVEMENTS
2131	FAP-97-0125-R	Watts Public Works Authority	Adair	$149,750.00	2/10/1998	REAP	WATER IMPROVEMENTS
2130	FAP-97-0124-R	Adair County Rural Water District #5	Adair	$75,000.00	6/8/1999	REAP	Water system improvements
1371	ORF-98-0010-CW	Stilwell Area Development Authority	Adair	$4,000,000.00	8/10/1999	CWSRF	WASTEWATER SYSTEM IMPROVEMENTS
2331	FAP-99-0080-R	Watts Public Works Authority	Adair	$99,800.00	11/16/1999	REAP	installing a 6" altitude valve with box and access
1460	FAP-01-0013-L	Stilwell Area Development Authority	Adair	$2,760,000.00	3/12/2002	FA Loan	WATER SYSTEM IMPROVEMENTS
1641	FAP-00-0071-R	Adair County Rural Water District #6	Adair	$146,875.00	4/9/2002	REAP	drilling a production-test well with casing, insta
3195	FAP-06-0015-R	Adair County RWS & SWMD #2	Adair	$99,999.00	3/11/2008	REAP	Line repair and water line extension
2478	FAP-83-0019-G	Burnt Cabin Rural Water District Incorporated	Cherokee	$24,000.00	11/2/1983	Emergency	
2479	FAP-83-0021-G	Cherokee County Rural Water District #8 -- Briggs	Cherokee	$53,000.00	1/10/1984	Emergency	
2686	FAP-90-0055-G	Cherokee County Rural Water District #10	Cherokee	$27,000.00	3/12/1991	Emergency	CONSTRUCTING NEW WATER SYSTEM
2739	FAP-91-0057-G	Cherokee County Rural Water District #7 -- Welling	Cherokee	$23,180.00	9/10/1991	Emergency	REPLACE TEMPORARY BRIDGE CROSSING WITH PERMANENT R
2740	FAP-91-0058-G	Cherokee County Rural Water District #8 -- Briggs	Cherokee	$23,180.00	9/10/1991	Emergency	REPLACE TEMPORARY BRIDGE CROSSINGS.
2563	FAP-85-0152-G	Cherokee County Rural Water District #9	Cherokee	$13,465.00	10/16/1991	Emergency	
2847	FAP-95-0060-G	Cherokee County Rural Water District #13	Cherokee	$100,000.00	1/9/1996	Emergency	CONSTRUCT 12' 9 X 110' STAND PIPE AND BACKWASH LAG
1278	FAP-95-0031-L	Cherokee County Rural Water District #13	Cherokee	$170,000.00	1/9/1996	FA Loan	CONSTRUCT A STANDPIPE & REPLACE WATER MAINS
2132	FAP-97-0126-R	Cherokee County Rural Water District #9	Cherokee	$99,900.00	1/13/1998	REAP	WATER TREATMENT IMPROVEMENTS
2179	FAP-98-0011-R	Burnt Cabin Rural Water District Incorporated	Cherokee	$65,427.00	6/9/1998	REAP	WATER LINE EXTENSION
2242	FAP-98-0081-R	Cherokee County Rural Water District #14	Cherokee	$54,000.00	2/10/1999	REAP	GROUND STORAGE
2897	FAP-98-0052-G	Cherokee County Rural Water District #3	Cherokee	$45,000.00	2/10/1999	Emergency	WATER DISTRIBUTION SYSTEM EXTENSION
2120	FAP-97-0110-R	Cherokee County Rural Water District #1	Cherokee	$100,000.00	12/14/1999	REAP	constructing a new treatment plant, new backwater
2109	FAP-97-0098-R	Cherokee County Rural Water District #13	Cherokee	$80,000.00	3/14/2000	REAP	constructing a new intake platform, access structu
2323	FAP-99-0072-R	Cherokee County Rural Water District #9	Cherokee	$69,900.00	11/14/2000	REAP	constructing about 7,000 feet of 2-inch PVC water
1404	FAP-98-0029-L	Cherokee County Rural Water District #1	Cherokee	$380,000.00	12/12/2000	FA Loan	CONSTRUCT NEW WATER TREATMENT PLANT
1476	FAP-02-0001-L	Cherokee County Rural Water District #8 -- Briggs	Cherokee	$285,000.00	6/11/2002	FA Loan	WATER SYSTEM IMPROVEMENTS
1477	FAP-00-0007-L	Cherokee County Rural Water District #13	Cherokee	$1,810,000.00	6/11/2002	FA Loan	INSTALL A MICROFILTRATION WATER PLANT
1493	FAP-02-0004-L	Cherokee County Rural Water District #2	Cherokee	$645,000.00	8/13/2002	FA Loan	WATER SYSTEM IMPROVEMENTS
1764	FAP-02-0026-R	Cherokee County Rural Water District #13	Cherokee	$135,000.00	6/8/2004	REAP	installing approximately 4000 L.F. of 6-inch PVC w
3191	FAP-06-0011-R	Cherokee County Rural Water District #8 -- Briggs	Cherokee	$99,999.00	6/12/2007	REAP	water line
3419	FAP-08-0033-R	Cherokee County Rural Water District #7 -- Welling	Cherokee	$39,069.00	12/9/2008	REAP	Replace river crossing
3388	FAP-08-0005-R	Cherokee County Rural Water District #12	Cherokee	$70,000.00	6/9/2009	REAP	Installing meters
3530	ORF-09-0040-DW	Tahlequah Public Works Authority	Cherokee	$16,320,000.00	12/8/2009	DWSRF	Construct new water plant & appurtenances
3568	FAP-09-0034-R	Cherokee County Rural Water District #8 -- Briggs	Cherokee	$34,914.00	4/13/2010	REAP	Tap fee for connection to Tahlequah
3703	ORF-11-0002-DW	Cherokee County Rural Water District #3	Cherokee	$3,110,000.00	7/12/2011	DWSRF	Refinance bond issue used to construct WTP
3782	ORF-11-0010-DW	Tahlequah Public Works Authority	Cherokee	$1,680,000.00	12/13/2011	DWSRF	Automated water meter reading eqpt
3801	FAP-12-0010-L	Cherokee County Rural Water District #13	Cherokee	$1,600,000.00	3/13/2012	FA Loan	Refi 2 FAP loans and one Lease Purchase Obligation
3846	FAP-12-0002-D	Cherokee County Rural Water District #3	Cherokee	$26,870.00	9/18/2012	Drought	Extend service
2472	FAP-83-0012-G	Kansas	Delaware	$92,516.00	3/13/1984	Emergency	
2517	FAP-84-0015-G	Colcord	Delaware	$95,816.00	4/10/1984	Emergency	
2582	FAP-86-0002-G	Kansas Public Works Authority	Delaware	$65,000.00	1/12/1988	Emergency	
2066	FAP-97-0040-R	Kansas Public Works Authority	Delaware	$139,270.00	3/10/1998	REAP	ADDITIONAL WELL AND WATER SYSTEM IMPROVEMENTS
2117	FAP-97-0107-R	Colcord Public Works Authority	Delaware	$94,800.00	1/12/1999	REAP	UPGRADE & ENLARGEMENT OF SEWER LAGOONS.
2108	FAP-97-0097-R	Kansas Public Works Authority	Delaware	$109,500.00	11/16/1999	REAP	rehabilitating two water storage tanks, filters an
1742	FAP-02-0003-R	Kansas Public Works Authority	Delaware	$67,000.00	11/12/2002	REAP	installing two (2) vertical in-line centrifugal pu
3385	FAP-08-0004-R	Oaks Public Works Authority	Delaware	$0.00	6/18/2013	REAP	Lagoon rehab
2493	FAP-83-0041-G	Muskogee County Rural Water District #7	Muskogee	$90,000.00	4/10/1984	Emergency	
1111	FAP-88-0040-L	Porum Public Works Authority	Muskogee	$730,000.00	1/10/1989	FA Loan	REFINANCE EXISTING DEBT
2714	FAP-90-0100-G	Braggs Public Works Authority	Muskogee	$70,000.00	2/12/1991	Emergency	Sanitary sewage collection and treatment plant imp
1242	FAP-94-0042-L	Porum Public Works Authority	Muskogee	$350,000.00	11/1/1994	FA Loan	EXTENSION OF WATER LINES
1963	FAP-96-0077-R	Braggs	Muskogee	$36,995.00	1/14/1997	REAP	WATER PLANT IMPROVEMENTS--SOURCE WATER WELL AND PU
2056	FAP-97-0021-R	East Central OK Water	Muskogee	$59,700.00	3/11/1997	REAP	SEWER LINE EXTENSION
2864	FAP-96-0045-G	East Central OK Water	Muskogee	$97,750.00	4/14/1998	Emergency	WATER LINE EXTENSION
1523	FAP-02-0011-L	Muskogee County Rural Water District #5	Muskogee	$1,390,000.00	5/13/2003	FA Loan	WATER SYSTEM IMPROVEMENTS
2416	FAP-02-0011-G	Muskogee County Rural Water District #5	Muskogee	$100,000.00	6/8/2004	Emergency	Installing approximately 42,000 L.F. of 4-inch PVC
2471	FAP-83-0008-G	Marble City	Sequoyah	$100,000.00	2/14/1984	Emergency	
2594	FAP-86-0050-G	Sequoyah County Rural Water District #5	Sequoyah	$75,000.00	5/8/1990	Emergency	WATER TREATMENT PLANT, RAW WATER INTAKE, RAW WATER
2181	FAP-98-0013-R	Sequoyah County Rural Water District #5	Sequoyah	$99,883.00	1/12/1999	REAP	constructing approximately 2 miles of 6-inch water
2332	FAP-99-0081-R	Vian	Sequoyah	$59,500.00	11/16/1999	REAP	SEWER SYSTEM INFLOW/INFILTRATION EVALUATION SURVEY
1391	ORF-98-0017-CW	Vian Public Works Authority	Sequoyah	$1,100,000.00	2/8/2000	CWSRF	WASTEWATER TREATMENT PLANT RENOVATIONS
1653	FAP-01-0005-R	Gore Public Works Authority	Sequoyah	$60,000.00	11/13/2001	REAP	conducting a public information notification progr
2429	FAP-02-0025-G	Sequoyah County Rural Water District #5	Sequoyah	$49,384.91	11/12/2002	Emergency	installing approximately 5,860 L.F. of 4-inch and
2102	FAP-97-0089-R	Vian Public Works Authority	Sequoyah	$150,000.00	6/10/2003	REAP	replacing approximately 1,150 LF of 12-inch line,
3281	FAP-07-0006-G	Vian Public Works Authority	Sequoyah	$75,000.00	1/8/2008	Emergency	Water main repair
3664	FAP-10-0004-R	Vian Public Works Authority	Sequoyah	$99,999.00	2/8/2011	REAP	Rehab lift station
1713	FAP-01-0067-R	Sequoyah County Rural Water District #5	Sequoyah	$80,000.00	7/12/2011	REAP	New water line
3716	ORF-11-0006-CW	Vian Public Works Authority	Sequoyah	$1,655,000.00	2/13/2012	CWSRF	Construct flow equalization basin at wwtp

FUNDING PROVIDED BY OWRB'S FINANCIAL ASSISTANCE PROGRAM

Permits for Water Rights in the Illinois River Watershed Issued by the OWRB's Planning and Management Division in CY 2012

PERMITS FOR WATER RIGHTS ISSUED BY OWRB'S PLANNING & MANAGEMENT DIVISION

Permits Issued within the Illinois River Basin for Calendar Year 2012

Permit #	LASTNAME	FIRSTNAME	Diversion Point Legal 1/4	1/4	1/4	SECT	TWP	RNG	COUNTY	RATE	STREAM SYSTEM	DATE FILED	DATE ISSUED	PURPOSE	AMT (af/yr)
20120053	Fain	Tommy	SE	SW	NE	16	19N	25EI	Adair	130GPM	2-17	2012-08-06	2012-12-18	Irrigation	40.0

Only 1new permit has been issued for either surface water use or groundwater use since 2007.

PERMITS FOR WATER RIGHTS ISSUED BY OWRB'S PLANNING & MANAGEMENT DIVISION

OKLAHOMA CONSERVATION COMMISSION

OKLAHOMA CONSERVATION COMMISSION
Program Activities in the Illinois River Watershed
for the period of October 2012 through September 2013

1.) **Illinois River Implementation** - The OCC began an Illinois River implementation project, the *Illinois River Watershed Riparian Protection Program,* in July of 2007 on the heels of many years of similar work in the watershed. In March, 2011 OCC obtained an additional $2,500,000 in federal money via §319(h) of the Clean Water Act matched by $1,666,667 to continue implementation in northeast Oklahoma watersheds which includes the Illinois River through 2014. In 2012 OCC was awarded an additional $431,855 federal §319(h) monies, matched by $287,903 for implementation work in these watersheds. The intent of these projects extends and complements ongoing programs in the Illinois River watershed to reduce nonpoint source pollution and restore beneficial use support to waterbodies in the watershed. Objectives of these projects are to:

- Implement practices in the Illinois River watershed that will reduce nutrient loading to help meet load reduction goals set out in OCC's Watershed Based Plan. The Watershed Based Plan was officially accepted by EPA in January, 2011. The Plan sets an interim goal of 40% phosphorus load reduction (132,000 kg), followed by a long-term load reduction goal of 70 – 80%;
- Support the Oklahoma Conservation Reserve Enhancement Program (CREP) to protect riparian areas with the greatest potential to reduce nutrient loading;
- Provide technical assistance to producers in the development of total resource conservation plans; and
- Determine the effectiveness of the projects through water quality monitoring and computer modeling to document current changes and predict the long-term effects of best management practice implementation.

Project Coordinator, Tashina Kirk, is a long time resident of the watershed and very familiar with its challenges. She conducts producer meetings promoting the project and signing up cooperators for priority cost-share of best management practice (BMP) implementation.

As of August 2013, a total of $1,727,980 has been spent on installation of conservation practices, with $1,018,645 from federal §319(h) funding. In addition, a total of $2,913,510 has been obligated for further implementation of BMPs by 258 applicants.

Major BMPs implemented include riparian area exclusion fencing, alternative watering facilities, animal feeding/waste storage facilities, heavy use areas, and septic system replacement. Practices installed as of August 2013 include:

- 1738.4 acres of riparian area exclusion including 116,796 linear feet of exclusion fencing
- 90 watering facilities, 19 water wells, 11 ponds, and 44,603 feet of pipeline

- 10 winter feeding facilities/ waste storage facilities
- 91 heavy use areas
- 87 septic system replacements
- 112,426 feet of cross fencing for pasture improvement
- 100 acres of pasture establishment
- 1 solar pump and storage tank

For more information concerning these projects, please contact Tashina Kirk at 918-696-3563.

2.) **Illinois River CREP** – In April 2007, Oklahoma and the Farm Services Agency (FSA) signed an agreement for a $20,652,500 Conservation Reserve Enhancement Program to protect 9,500 acres of riparian area in the northeastern Oklahoma watersheds of the Illinois River and Eucha-Spavinaw. The CREP program provides incentives to farmers and ranchers to remove streamside pasture or cropland from production activities for ten to fifteen years. In return, the landowners are reimbursed for the cost of installing practices such as alternative water supplies for livestock, fencing, grass planting, stream crossings, and winter feeding facilities. The landowners also receive an annual rental payment for the ten/fifteen-year period based on the average area rental rate, a signing bonus payment, and an annual practice maintenance payment.

The program employs two conservation plan writers. Monitoring and sampling is performed by an OCC Monitoring Specialist. Producer sign-ups for the Oklahoma CREP began June 1, 2007 and were facilitated by conservation district outreach meetings in the counties in which the program operates, including Adair, Cherokee, Delaware, and Sequoyah Counties. As of August 2013, CREP has a total of 65 contracts, of which 53 of these contracts are in the Illinois River Watershed. Currently, CREP has a total of 656acres contracted. A total of 548 acres are contracted in the Illinois River watershed, and 108 acres are contracted in the Eucha-Spavinaw Watershed.

CREP has installed approximately 76,733 linear feet of riparian fencing with an additional 37,075 scheduled in the Illinois River watershed. In addition, 97,573 of the 24,068 scheduled bare root seedling trees have been planted. Additional work completed in the Illinois River watershed includes two ponds, six wells and three more scheduled, ten watering tanks and seven scheduled and one heavy use area. As of August 2013, $1,337,077 is scheduled to be spent, which includes $140,972 in landowner contributions.

For more information concerning the CREP program, please contact Gina Levesque, CREP Program Coordinator, at 918-456-1919.

3.) **Streambank Stabilization** – In 2009 OCC applied for and was granted $2,000,000 through the American Recovery and Reinvestment Act (ARRA) Green Project Funding to do streambank stabilization work in this sensitive watershed. After thorough screening with extensive criteria, eleven sites were selected: two are Oklahoma Scenic Rivers Commission public access sites, five are within the City of Tahlequah sites and four are on private property. Oklahoma State University as a partner in this substantial endeavor provided on-site management along with

workshops and tours. Contracts were awarded to Jennings Environmental and North State Environmental for the design and construction. The work was mostly completed by September 30, 2012. A report on this project was submitted to OWRB which had the financial oversight responsibility. Additional work was required to complete one site and that was completed with §319(h) funds through OCC. One site within the City of Tahlequah washed out during an excessive rain event; Jennings Environmental and North State Environmental returned to re-work the site to avoid future similar incidents. This project not only did a lot to stem the flow of pollution into the river, but the in town sites in particular had the added benefit of drawing citizen notice and education, and subsequent interest in future such projects.

4.) **TMDL Development & Maintenance Support** - The recent economic downturn has challenged state budgets severely. As a consequence, available state funding to help support United States Geological Survey (USGS) monitoring stations in the watershed has disappeared. Uninterrupted continuation of this monitoring is critical for TMDL development in the watershed and for monitoring water quality improvement due to implementation measures currently ongoing. In particular, this monitoring is critical toward long-term evaluation of NPS related load reduction because it includes targeted high flow sampling to help estimate long-term trends in NPS loading. The USGS monitoring is used to help calibrate loading estimates from additional sampling efforts in the watershed that focus on measuring water quality impacts from EPA Nonpoint Source Priority Watershed Projects and from the USDA Conservation Reserve Enhancement Program.

Along with the loss of funding for monitoring, the Oklahoma Scenic Rivers Commission (OSRC) lost funding to support its maintenance of restroom facilities and cleanup of public access areas along the river corridor. Proper maintenance of these facilities is essential to ensure that the 500,000+ people who utilize the river each year for swimming, fishing, floating, hunting, hiking, and bird watching leave a minimal impact on the river corridor. OSRC maintenance of these facilities ensures that human waste is captured at these facilities and then sent to an NPDES permitted waste treatment facility for processing. This treatment reduces total phosphorus concentrations in the waste from approx. 4,500 mg/L (Portable Sanitation Association, 2003) to less than 1 mg/L, based on the City of Tahlequah NPDES permit limits.

OCC secured §319(h) funding that allowed both of these activities to continue into 2013. Oversight of these contracts is the responsibility of the Oklahoma Scenic Rivers Commission, with cooperation from the OCC as needed.

5.) **Monitoring**

CREP and Illinois River Implementation

To evaluate the effects of BMP implementation on stream water quality resulting from CREP and the Illinois River Watershed Projects, OCC initiated an automated water sampling monitoring plan in the spring of 2007 at key locations in the program area (Figure 1 and Table 1). A paired watershed monitoring design has been implemented. Use of autosamplers allows for a continuous assessment of both a true average concentration of constituents in the stream water and continuous discharge data, both crucial to accurate calculation of loading estimates

necessary to account for changes in the water quality brought about in relatively short project timeframes. Routine physico-chemical, instream habitat, and biological sampling are also conducted at monitoring sites. Data from this monitoring program will be used to evaluate changes in key parameters (particularly nutrients) over time throughout the fifteen year lifespan of the CREP program.

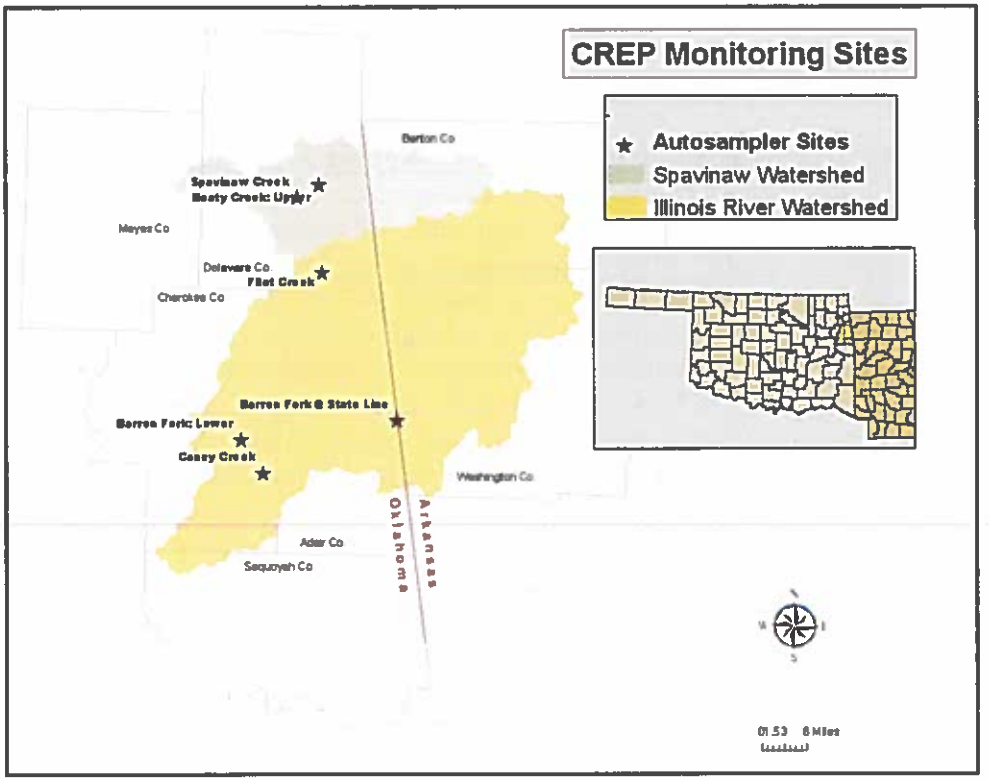


Figure 1. *Auto sampler installation sites within the Eucha/Spavinaw and Illinois River Watersheds in Oklahoma.*

Site Name	Watershed	Latitude	Longitude	County	Legal Description
Beaty Creek: Upper	Spavinaw	36.3704	-94.7191	Delaware	SW¼ NE¼ SW¼ Section 23-22N-24E
Spavinaw Creek	Spavinaw	36.3437	-94.7716	Delaware	NW¼ NW¼ SW¼ Section 32-22N-24E
Flint Creek	Illinois	36.1961	-94.7078	Delaware	NW¼ NW¼ SW¼ Section 24-20N-24E
Baron Fork: Lower	Illinois	35.86286	-94.8991	Cherokee	$SE^{1/4}$ $SE^{1/4}$ $NE^{1/4}$ 18, 16N, 23E
Baron Fork @ State line	Illinois	35.9062	-94.5191	Adair	34 7N 26E

Table 1. *Site names and locations of auto samplers used in the Eucha/Spavinaw and Illinois River §319 Program*

Rotating Basin Monitoring Program

In the late 1990s the OCC in cooperation with sister agencies and working through the Water Quality Monitoring Council agreed to coordinate efforts to ensure that all complete USGS eleven digit (i.e., HUC 11) watersheds across the state were monitored in a five year rotation. This endeavor, known as the Rotating Basin Monitoring Program (RBMP), comprises a significant component of Oklahoma's ambient monitoring effort for streams. The purpose of this program is to collect routine water samples for physical and chemical analysis, instream habitat, and biological (fish and benthic macroinvertebrates) data in support of federal mandates to assess state waters regarding their attainment/nonattainment of water quality standards. It serves a dualistic role in fulfilling requirements for an *NPS Assessment Report*, as data are analyzed and submitted biannually to the ODEQ for compilation in the state's Integrated Report. Figure 2 shows the basin schedule and statewide distribution of sites sampled for the RBMP, two of which fall in the Illinois River watershed as part of Basin Year 3 (Table 2). OCC completed the second cycle of monitoring in this basin in April 2010 and commenced the third cycle this year.

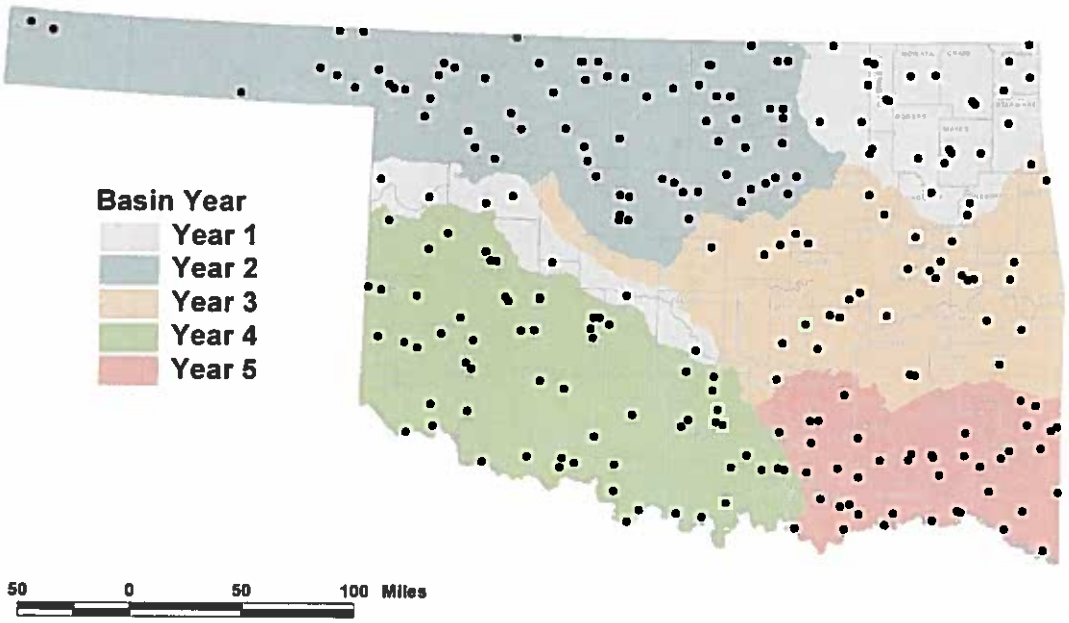


Figure 2. Basin schedule and statewide distribution of Rotating Basin Monitoring Program sites.

Table 2. RBMP monitoring sites in the Illinois River watershed.

Basin Year	Site Name	Lat	Long	Legal Description	County
RB Year 3	Ballard Creek: Lower	36.10627778	-94.56463889	NW¼ SW¼ SW¼ Section 20 19N 26E	Adair
RB Year 3	Battle Creek: Battle Branch	36.2104167	-94.68436111	SW¼ NE¼ SW¼ Section 18 20N 25E	Delaware

Report of the Annual Yield and Selected Hydrologic Data for the Arkansas River Basin Compact, Arkansas-Oklahoma, 2013 Water Year

ANNUAL YIELD AND SELECTED HYDROLOGIC DATA FOR THE ARKANSAS RIVER BASIN COMPACT, ARKANSAS-OKLAHOMA, 2012 WATER YEAR

By Terrance E. Lamb

Hydrologic Information Services

Prepared for the
ARKANSAS RIVER COMPACT COMMISSION,
ARKANSAS-OKLAHOMA

2013

CONTENTS

ILLUSTRATIONS

TABLES

CONVERSION FACTORS

Multiply	By	To obtain
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
acre	4,047	square meter (m^2)
	0.004047	square kilometer (km^2)
square mile (mi^2)	2.590	square kilometer (km^2)
cubic foot (ft^3)	0.02832	cubic meter (m^3)
acre-foot (acre-ft)	1,233	cubic meter (m^3)
	1.233x10-6	cubic kilometer (km^3)
cubic foot per second (ft^3/s)	28.32	liter per second (L/s)
	0.02832	cubic meter per second (m^3/s)
ton per day (ton/d)	0.9072	megagram per day (Mg/d)

Temperature in degrees Celsius (C) can be converted to degrees Fahrenheit (F) as follows:

$$F = 1.8 \times C + 32$$

ABBREVIATIONS

AC-FT	Acre-foot
ACID M.	Acidification method
CHLOR-A	Chlorophyll a
CHROMO FLUOROM	Chromatographic/fluorometric
COLS./100ML	Number of colonies per 100 milliliters
DEG. C	Degrees Celsius
DIS IT	Dissolved incremental titration
E.	Escherichia
FLTRD (other abbreviations sometimes used)	Filtered
Ft	Feet
FT FM L BANK	Feet from left bank
INST	Instantaneous
K	Non-ideal count
MG/L	Milligrams per liter
MM of Hg	Millimeters of mercury
m	Micron
mG/L	Micrograms per liter
ML	Milliliters
MM	Millimeters
NTU	Nephelometric turbidity units
SED.	Sediment
SUSP.	Suspended
T/DAY	Tons per day
TOT IT	Total incremental titration
UM-MF	Micron membrane filter
UNCORR.	Uncorrected
US/CM	Microsiemens per centimeter at 25 degrees
Celsius	C
WAT DIS	Water dissolved
<	Less than
>	Greater than
-- or ---	No data available
%	Percent

ANNUAL YIELD AND SELECTED HYDROLOGIC DATA FOR THE ARKANSAS RIVER BASIN COMPACT, ARKANSAS-OKLAHOMA, 2012 WATER YEAR

By Terrance E. Lamb

ABSTRACT

The computed annual yield and deficiency of the sub-basins as defined in the Arkansas River Basin Compact, Arkansas-Oklahoma, are given in tables for the 2012 water year. Actual runoff from the sub-basins, depletion caused by major reservoirs in the compact area, and depletions due to other water uses also are given in tabular form. Computed monthly mean discharges are shown for stream-flow stations in the Arkansas River Basin. Water-quality data are shown for some water-quality stations sampled in the Arkansas River Basin.

EXECUTIVE SUMMARY

Runoff from four of the five sub-basins was less than last year but well within Compact requirements. The Poteau River sub-basin runoff was 1.9 times the runoff in 2011.

INTRODUCTION

In 1955, the Congress of the United States granted consent to Arkansas and Oklahoma to enter into a compact for the apportionment of the waters of the Arkansas River and its tributaries as they affect the two States. An Arkansas-Oklahoma Arkansas River Compact committee was created with a Federal Representative acting as chairman. After research and deliberate negotiations had been completed, both States approved the Arkansas River Basin Compact, Arkansas-Oklahoma, 1972. To meet the requirements of the Compact, State-line yields of the Arkansas River Sub-Basins are determined at the end of each year.

This report was prepared for the Arkansas River Compact Commission, Arkansas-Oklahoma by Hydrologic Information Services. Stream-flow and water-quality data were collected by the U.S. Geological Survey, in cooperation with the Arkansas Natural Resources Commission and the Oklahoma Water Resources Board. The U.S. Army Corps of Engineers, Tulsa District, furnished data from the Webbers Falls, Tenkiller Ferry, Robert S. Kerr, and Wister Lakes.

PURPOSE AND SCOPE

The purpose of this report is to present the annual yields and deficiencies computed for the 2012 water year and to present some water quality data for the sub-basins in the Arkansas River Basin as defined in the Arkansas River Compact. The report includes data from stream-flow stations and some water-quality stations sampled in the Arkansas River Basin during the 2012 water year. The area included in the Compact is shown on figure 1.

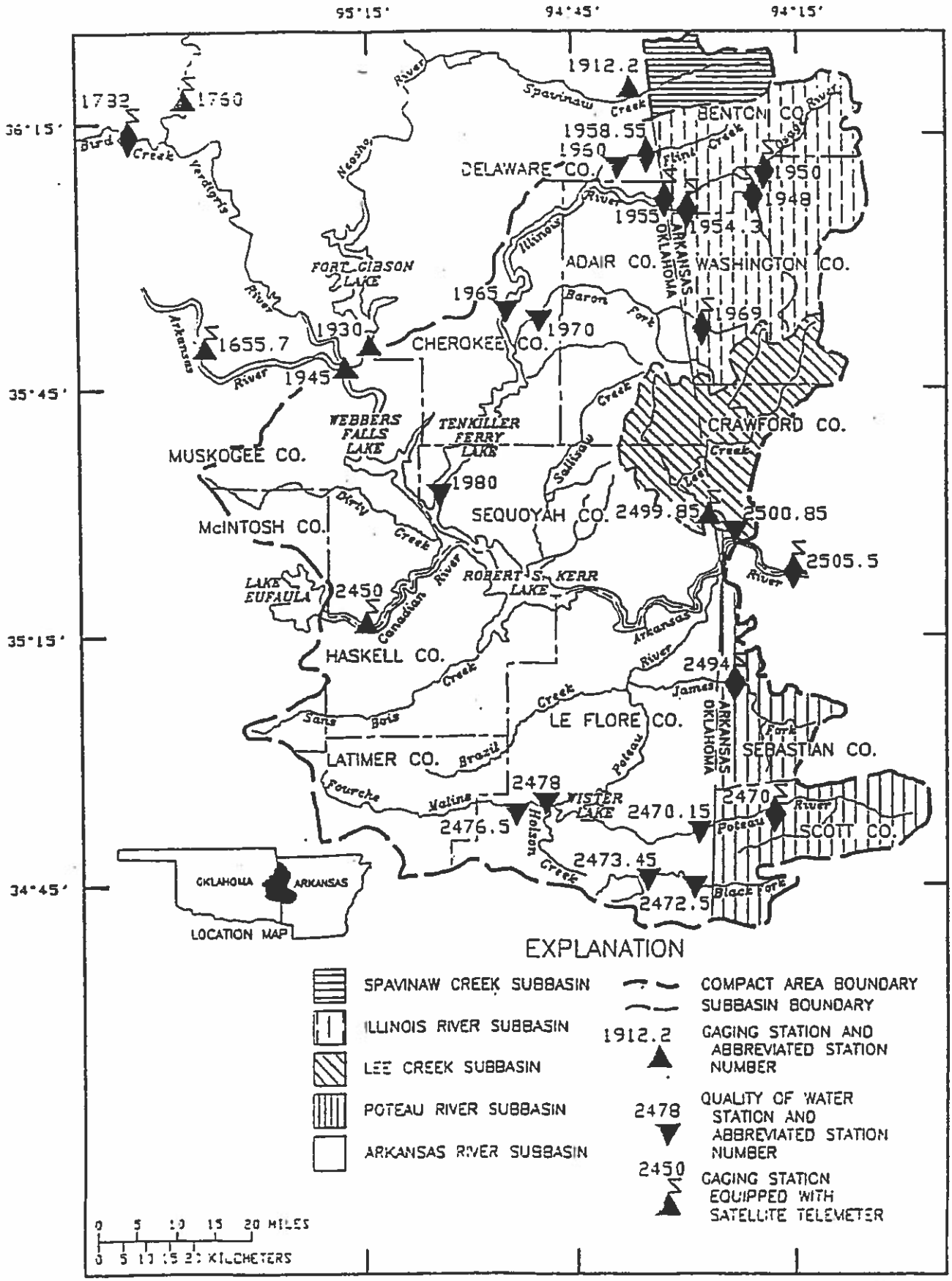


Figure 1.--Arkansas-Oklahoma Arkansas River Basin Compact area and subbasins.

DEFINITION OF TERMS

The following terms used in this report are taken from Article II of the Arkansas River Basin Compact, Arkansas-Oklahoma, 1972.

The term "Arkansas River Basin" means all of the drainage basin of the Arkansas River and its tributaries from a point immediately downstream from the confluence of the Neosho River with the Arkansas River (fig. 1) to a point immediately downstream from the confluence of Lee Creek with the Arkansas River, together with the drainage basin of Spavinaw Creek in Arkansas (fig. 1), but excludes that part of the drainage basin of the Canadian River upstream from Lake Eufaula Dam.

The term "Spavinaw Creek Sub-basin" means the drainage area of Spavinaw Creek in the State of Arkansas.

The term "Illinois River Sub-basin" means the drainage area of the Illinois River in the State of Arkansas.

The term "Lee Creek Sub-basin" means the drainage area of Lee Creek in the State of Arkansas upstream from the Oklahoma State line and in the State of Oklahoma.

The term "Poteau River Sub-basin" means the drainage area of the Poteau River in the State of Arkansas.

The term "Arkansas River Sub-basin" means all areas of the Arkansas River Basin in the Compact area except the four sub-basins described previously.

The term "water year" means a 12-month period beginning on October 1 and ending September 30.

The term "annual yield" means the computed annual gross runoff from any specified sub-basin. The runoff would have passed any certain point on a stream and would have originated within any specified area under natural conditions without any manmade depletion or accretion during the water year.

Terms related to stream-flow, water-quality, and other hydrologic data, as used in this report, are defined below.

Acre-foot is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet.

Bacteria are microscopic unicellular organisms, typically spherical, rod like, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease; others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Escherichia coli (E. coli) are present in the digestive tract of warm-blooded animals. In the laboratory, E. coli are defined as all organisms that produce orange/yellow colonies when incubated for two hours at 35 °C± 0.2 °C and transferred to 44.5 °C±0.2° for 22-24 hours on mTEC agar (nutrient medium for E. coli growth), and stained with phenol red solution. Their concentrations are expressed as number of colonies per 100 ml of sample.

Fecal coliform bacteria are present in the intestines or feces of warm-blooded animals. They are often used as indicators of the sanitary quality of the water. In the laboratory, they are defined as all the organisms that produce blue colonies within 24 hours when incubated at 44.5 °C ±0.2 °C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 ml of sample.

Fecal streptococcal bacteria also are present in intestines of warm-blooded animals. Their presence in water is considered to verify fecal pollution. They are characterized as gram-positive, cocci bacteria that are capable of growth in brain-heart infusion broth. These bacteria also are defined as all the organisms that produce red or pink colonies within 48 hours at 35 °C±0.5 °C on KF-streptococcus agar (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 ml of sample.

Code numbers have been assigned for agencies collecting and analyzing samples, and are listed in water-quality tables of this report as follows:

1028 Oklahoma District, Water Resources Division (WRD), U.S. Geological Survey
80513 Arkansas District, WRD, U.S. Geological Survey
80020 National Water Quality Laboratory, WRD, U.S. Geological Survey.

Contents are the volume of water in a reservoir or lake. Unless otherwise indicated, volume is computed based on a level pool and does not include bank storage.

Cubic foot per second is the rate of discharge representing a volume of 1 cubic foot passing a specified point during 1 second.

Deficiency is the amount the actual runoff is less than the minimum required flow.

Depletion is the difference between the inflow and outflow caused by major reservoirs.

Discharge is the volume of water that passes a given point within a given period.

- **Instantaneous discharge** is the discharge at a particular instant of time.
- **Mean discharge** is the arithmetic average of individual daily mean discharges during a specific period.

Dissolved refers to the material in a representative water sample that passes through a 0.45-micron membrane filter. This is a convenient operational definition used by Federal agencies that collect water data. Determinations of "dissolved" constituents are made on subsamples of the filtrate.

Dissolved oxygen content of water in equilibrium with air is a function of atmospheric pressure and temperature and the dissolved-solids concentration of the water. The ability of water to retain oxygen decreases with increasing temperature or dissolved solids, with small temperature changes having the more significant effect. Photosynthesis and respiration may cause diurnal variations in dissolved-oxygen concentration in water of some streams.

Drainage area of a stream at a specified location is that area, measured in a horizontal plane, enclosed by a topographic divide from which direct surface runoff from precipitation normally drains by gravity into the stream upstream from the specified point. Figures of drainage

area given herein include all closed basins, or noncontributing areas within the area, unless otherwise noted.

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of hydrologic data are obtained.

Hardness of water is a physical-chemical characteristic that is commonly recognized by the increased quantity of soap required to produce lather. It is attributable to the presence of alkaline earths (principally calcium and magnesium) and is expressed as equivalent calcium carbonate ($CaCO_3$).

Sediment is solid material that originates mostly from disintegrated rocks and is transported by, suspended in, or deposited from water; it includes chemical and biochemical precipitates and decomposed organic material, such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are degree of slope, length of slope, soil characteristics, land usage, and quantity and intensity of precipitation.

Mean concentration is the time-weighted concentration of suspended sediment passing a stream cross section during a 24-hour period.

Suspended sediment is the sediment that at any given time is maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid.

Suspended-sediment concentration is the velocity-weighted concentration of suspended sediment in the sampled zone (from the water surface to a point approximately 0.3 ft above the bed), expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L).

Suspended-sediment discharge (tons/day) is the rate at which dry weight of sediment passes a section of a stream or is the quantity of sediment, as measured by dry weight or volume that passes a section in a given time. It is computed by multiplying discharge by milligrams per liter by 0.0027.

Sodium-absorption-ratio (SAR) is the expression of relative activity of sodium ions in exchange reactions with soil and is an index of sodium or alkali hazard to the soil. Water varies, in respect to sodium hazard, from that which can be used for irrigation on almost all soils to that which generally is unsatisfactory for irrigation.

Specific conductance is a measure of the ability of water to conduct an electrical current. It is expressed in microsiemens per centimeter at 25°C. Specific conductance is related to the type and concentration of ions in solution and can be used for approximating the dissolved-solids concentration of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is about 65 percent of the specific conductance (in microsiemens). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

Stage-discharge relation is the relation between gage height (stage) and the volume of water, per unit of time, flowing past the gage in a channel.

STORET parameter codes are codes assigned to specific hydrologic measurement types and constituents for computer storage of data. These five-digit codes (shown in parentheses) are included with the water-quality information in the Hydrologic Station Records section.

Stream-flow is the discharge that occurs in a natural channel. Although the term "discharge" can be applied to the flow of a canal, the word "stream-flow" uniquely describes the discharge in a surface stream course. The term "stream-flow" is more general than "runoff", as

stream-flow may be applied to discharge whether or not it is affected by diversion or regulation.

Tons per day is the quantity of substance in solution or suspension that passes a stream section during a 24-hour period.

Total is the total amount of a given constituent in a representative water-suspended sediment sample, regardless of the constituent's physical or chemical form. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent present in both the dissolved and suspended phases of the sample. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to judge when the results should be reported as "total." (Note that the word "total" does double duty here, indicating that the sample consists of a water-suspended-sediment mixture and that the analytical method determines all of the constituent in the sample.)

COMPUTATION OF ANNUAL YIELDS

The annual yield and deficiency (table 1) for each sub-basin was computed as defined by the Arkansas River Compact (1972). Actual runoff for the sub-basins (table 2) was computed as defined by the Compact except for the station Lee Creek near Van Buren, which has been moved 3.2 miles upstream near Short, Oklahoma.

Table 1. --Annual yield and deficiency for the sub-basins for the 2012 water year, as defined in the Arkansas River Basin Compact, Arkansas-Oklahoma, 1972

[Flow in cubic feet per second]

Sub-basin	Actual runoff from the Sub-basins	Total depletions or accretions (-)	Annual yield	[a]Percent depletion allowed	Minimum required flow	[b]Deficiency
Spavinaw Creek	54.8	[c]0.001	54.8	50	27.4	0
Illinois River	522	[e]-30.0	492	60	197	0
Lee Creek	466	[c]2.48	468	100	0	0
Poteau River	709	[c]0.96	710	60	284	0
Arkansas River	2,682	[d]99.3	2,781	60	1,113	0

a Defined in the Arkansas River Basin Compact, Arkansas-Oklahoma, 1972.

b The amount of actual runoff less than the minimum required flow.

c Based on best available water-use data.

d Based on best available water-use data and 2012 direct diversions from lake storage.

e Based on best available water-use data and 34.8 cfs imported from the White River Basin in 2012.

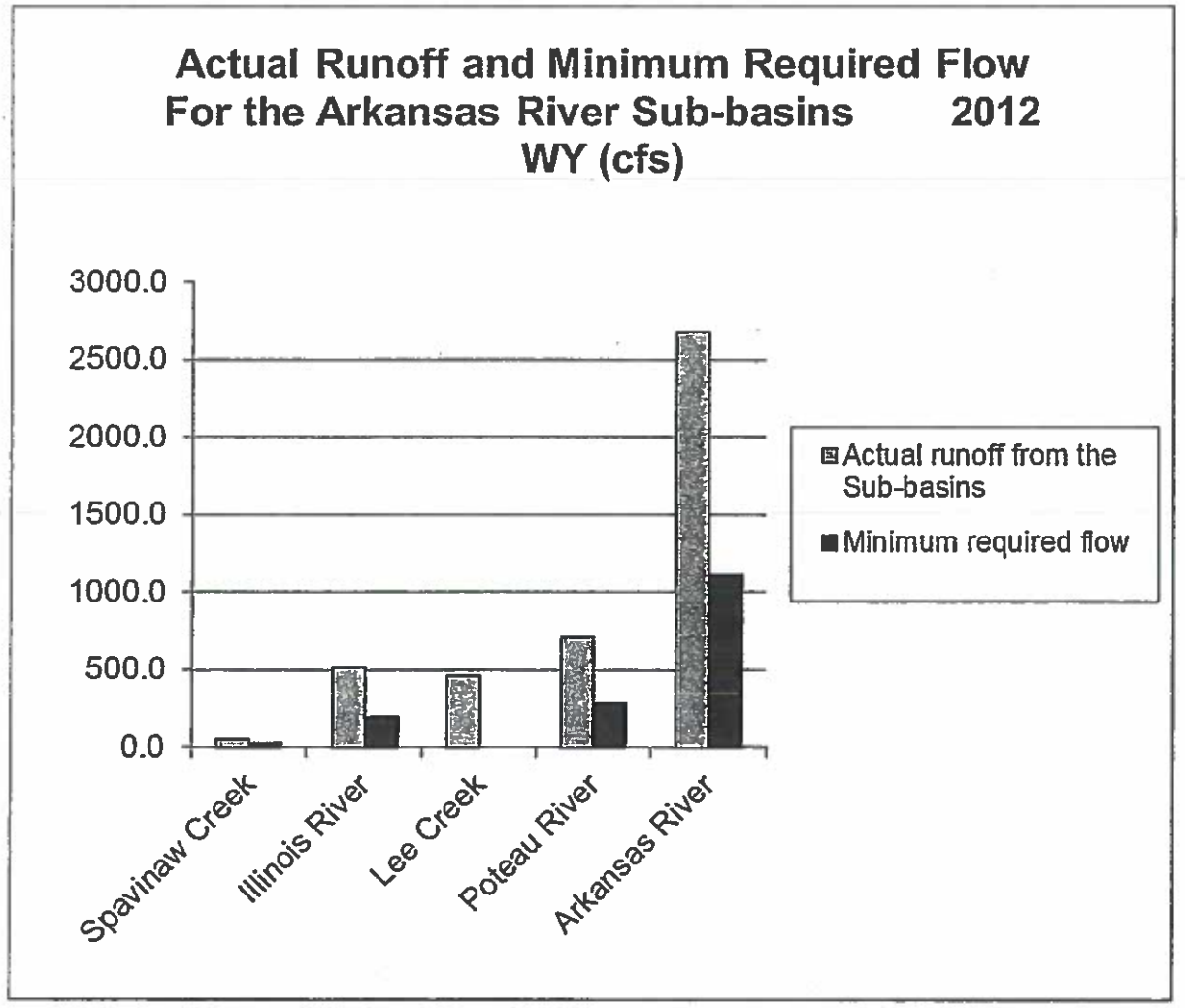

Actual Runoff and Minimum Required Flow
For the Arkansas River Sub-basins 2012
WY (cfs)
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
Spavinaw Creek
Illinois River
Lee Creek
Poteau River
Arkansas River
Actual runoff from the Sub-basins
Minimum required flow

Table 1a. --Annual yield and deficiency for the sub-basins for the 2012 water year, as defined in the Arkansas River Basin Compact, Arkansas-Oklahoma, 1972

[Quantity in acre-feet]

Sub-basin	Actual runoff from the Sub-basins	Total depletions or accretions (-)	Annual yield	[a]Percent depletion allowed	Minimum required flow	[b]Deficiency
Spavinaw Creek	39,673	[c]1	39,674	50	19,837	0
Illinois River	377,911	[e]-21,719	356,192	60	142,477	0
Lee Creek	337,369	[c]1,795	339,164	100	0	0
Poteau River	513,293	[c]695	513,988	60	205,595	0
Arkansas River	1,941,679	[d]71,890	2,013,569	60	805,427	0

a Defined in the Arkansas River Basin Compact, Arkansas-Oklahoma, 1972.

b The amount of actual runoff less than the minimum required flow.

c Based on best available water-use data.

d Based on best available water-use data and 2012 direct diversions from lake storage.

e Based on best available water-use data and 25,211 acre-ft imported from the White River Basin in 2012.

Table 2.--Actual runoff from the sub-basins for the 2012 water year

[In cubic feet per second; D.A. = drainage area; mi^2 = square mile; acre-ft = acre-feet]

Month	Spavinaw Creek D.A.=133 mi^2	[b,e] Illinois River D.A.=744 mi^2	Lee Creek D.A.=426 mi^2	[c] Poteau River D.A.=536 mi^2	[d] Arkansas River D.A.=4,062 mi^2
October	24.6	206	12.3	8.19	(130)
November	77.7	1,069	1,086	2,144	3,198
December	72.5	957	1,097	1,804	6,944
January	48.1	663	922	1,415	6,446
February	63.4	709	606	825	6,283
March	202.0	1,369	1,571	2,077	6,648
April	73.2	502	249	116	2,141
May	39.5	247	27.6	25.1	472
June	28.5	181	7.80	7.16	316
July	8.76	93	1.22	34.0	186
August	5.54	114	0.49	7.31	10.8
September	13.6	170	8.09	34.3	(146)
2012 water year	54.8	522	466	709	2,682
2012 water year (acre-ft)	39,663	378,137	337,333	513,093	1,942,034

b Includes 63 mi^2 ungaged

c Includes 125 mi^2 ungaged.

d Computed by subtracting drainage area at Arkansas River at Muskogee, Canadian River near Whitefield, Illinois River Sub-basin, Lee Creek Sub-basin, and Poteau River Sub-basin from drainage area at Arkansas River near Fort Smith, Arkansas.

e Includes 34.8 cfs discharged from Fayetteville, Rogers, and Springdale sewage treatment plants that was withdrawn from the White River Basin in Arkansas.

Annual depletion caused by major reservoirs was computed for the four major reservoirs in the basin as defined by the Arkansas River Compact (1972). These depletions are shown in tables 3 and summarized in table 1.

A compilation of withdrawals and returns of freshwater in the sub-basins was prepared using data from "Water Use In Arkansas" and "Water Use In Oklahoma", as well as return flow data for the 2012 water year in the Illinois River basin. These depletions and accretions for each sub-basin are shown in Table 4 and summarized in Table 1. Information on depletions continues to be gathered in order to re-evaluate their present impact.

Stream-flow data used in the computations are given in the Hydrologic Station Records section (p.13 to 50). The station description under "Remarks" states the degree of accuracy of the records. "Excellent" means that about 95 percent of the daily discharges are within 5 percent of the actual discharge, "good" means within 10 percent, and "fair" means within 15 percent. "Poor" means that daily discharges have less than "fair" accuracy.

Table 3.--Annual depletion caused by major reservoirs for the 2012 water year
[acre-ft = acre-feet; ft^3/s = cubic feet per second]

Reservoir	Year-end contents (acre-feet)	Change in contents in water year (acre-feet)	[a]Precipitation on reservoir surface (inches)	[b]Evaporation from reservoir (inches)	[a]Diversions (acre-feet)	Depletion (acre-feet)	Depletion (ft^3/s)
Webbers Falls	166,582	114	37.06	52.91	0	21,880	30.22
Tenkiller Ferry	552,044	-42,093	36.81	38.07	3,022	-30,591	-42.25
Robert S. Kerr	519,653	10,344	38.70	55.24	0	92,409	127.6
Wister	42,062	4,915	57.00	46.21	11,982	16,555	22.9

[a] From U.S. Army Corps of Engineers, Tulsa District.
[b] Adjusted for pan coefficient of 0.70 (from Wisler and Brater, 1949).

Table 4.--Estimates of annual depletion for the sub-basins caused by withdrawals and returns for the 2012 water year*

Sub-basin	Withdrawals ac/ft	Returns ac/ft	Total Withdrawals or Returns (-) ac/ft	Total Withdrawals or Returns (-) cfs
Spavinaw Creek	1	0[1]	1	0.001
Illinois River	3,520	25,211[2]	-21,691	-30.0
Lee Creek	1,797	0[1]	1,797	2.48
Poteau River	696	0[1]	696	0.96
Arkansas River	96,620[3]	24,700[3]	71,920	99.3

[1] No known returns for these sub-basins
[2] Based on 2012 WY returned flow transferred from the White River Basin
[3] Estimated from 2007 and 2012 WY data
* Including depletions from the 4 major reservoirs in the Arkansas River sub-basin

WATER QUALITY

Beginning in October 1984, water-quality data for the Arkansas-Oklahoma Compact have been published in this report. These data are collected to monitor the water quality in the Arkansas-Oklahoma Compact area. Over the past several years, nutrients, major ions, and sediment data have been collected. Observed concentrations of these constituents are indications of general water quality in the subject area sub-basins. In freshwater, phosphorus is often the nutrient responsible for accelerated eutrophication. To control eutrophication, the Environmental Protection Agency makes the following recommendations:

A) Total phosphates should not exceed 0.05 mg/L (as phosphorus) in a stream at a point where it enters a lake or reservoir, and
B) Total phosphorus should not exceed 0.1 mg/L in streams that do not discharge directly into lakes or reservoirs.

Water-quality data collected at some stations in the compact area in the 2012 water year are shown in tables in the Hydrologic Station Records section of this report.

SELECTED REFERENCES

Arkansas River Basin Compact Arkansas-Oklahoma, 1972, with Supplemental Interpretive Comments, Supplement No. 1: Austin, Texas, 31 p.
Arkansas Soil and Water Conservation Commission, 1981, Arkansas State Water Plan - Lakes of Arkansas, 157 p.
Wisler, C.D., and Brater, E.F., 1949, Hydrology: New York, John Wiley & Sons, Inc., 150 p.

HYDROLOGIC STATION RECORDS 2012 WY

Daily Discharge records denoted by Q and Quality of Water records by QW.

07191220 SPAVINAW CREEK NEAR SYCAMORE, OK

Neosho Basin

Lower Neosho Subbasin

LOCATION.--Lat 36°20'05", long 94°38'29" referenced to North American Datum of 1983, in NE 1/4 NW 1/4 sec.4, T.21 N., R.25 E., Delaware County, OK, Hydrologic Unit 11070209, on right bank 1.8 mi upstream from Cherokee Creek, 4.8 mi northeast of Row, 6.5 mi southeast of Sycamore, and at mile 35.0.

DRAINAGE AREA.--132 mi², revised. From automated delineation using 10-meter National Elevation Dataset digital elevation model data dated 10/01/2006 and Watershed Boundary Dataset dated 10/01/2006, using Albers Equal-Area Projection, North American Datum 1983.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--October 1961 to current year

REVISED RECORDS.--WSP 2121: 1965 (M). WDR 2012: Drainage area

GAGE.--Water-stage recorder. Datum of gage is 868.34 ft NAVD of 1988. Prior to Nov. 6, 2001, elevation published as 875 ft above NGVD of 1929, from topographic map.

REMARKS.--No estimated daily discharges. Records good. U.S. Army Corps of Engineers' satellite telemeter at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--According to local residents, a flood of approximately the same magnitude as the July 27, 1975 flood occurred in the early 1880's.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012, DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	27	24	78	62	58	42	134	48	22	14	4.8	12
2	25	23	73	60	56	42	119	62	23	13	4.6	12
3	24	23	69	57	56	41	109	75	25	13	4.6	12
4	22	25	67	54	74	41	104	69	34	12	4.6	11
5	21	26	67	52	105	40	100	62	54	11	4.5	11
6	20	27	67	51	108	39	97	57	57	11	4.3	9.4
7	20	29	68	50	103	38	94	54	53	10	4.3	8.9
8	20	38	67	49	96	37	91	51	48	9.9	4.3	8.8
9	19	131	65	48	88	37	84	48	43	10	4.3	8.6
10	19	151	63	47	83	38	76	45	38	11	4.2	8.3
11	18	124	60	46	76	39	74	44	36	11	4.8	7.7
12	19	107	58	46	71	39	71	42	34	11	5.4	7.0
13	20	91	56	45	66	42	68	41	32	11	5.3	6.6
14	22	78	56	44	63	44	66	39	29	11	4.8	8.6
15	25	72	58	44	60	45	68	38	29	9.7	4.7	13
16	29	68	62	42	58	46	70	36	27	9.3	4.6	19
17	31	67	76	41	57	46	71	35	25	9.2	4.7	22
18	31	65	81	40	55	44	68	35	25	8.7	5.3	24
19	31	61	78	39	54	46	66	34	24	8.1	5.8	25
20	30	58	81	39	52	480	65	33	22	8.1	6.1	25
21	30	57	93	38	51	1,000	63	32	22	7.8	6.2	24
22	30	90	103	38	50	1,100	61	31	21	7.4	5.8	22
23	30	165	104	38	49	735	58	29	20	6.6	5.5	19
24	30	151	99	37	49	538	55	28	20	6.2	5.2	17
25	28	128	92	39	48	413	53	27	20	5.4	4.9	15
26	27	113	85	44	48	329	52	27	19	5.0	5.2	13
27	26	104	79	56	46	268	50	26	18	5.1	6.6	12
28	26	98	74	70	44	221	49	25	17	5.1	8.7	11
29	26	89	71	70	43	187	47	24	16	5.1	9.1	11
30	25	83	68	66	---	164	46	23	15	5.0	10	11
31	25	---	65	61	---	147	---	22	---	4.8	11	---
Total	776	2,366	2,283	1,513	1,867	6,368	2,229	1,242	868	275.5	174.2	414.9
Mean	25.0	78.9	73.6	48.8	64.4	205	74.3	40.1	28.9	8.89	5.62	13.8
Max	31	165	104	70	108	1,100	134	75	57	14	11	25
Min	18	23	56	37	43	37	46	22	15	4.8	4.2	6.6
Ac-ft	1,540	4,690	4,530	3,000	3,700	12,630	4,420	2,460	1,720	546	346	823
Cfsm	0.19	0.60	0.56	0.37	0.49	1.56	0.56	0.30	0.22	0.07	0.04	0.10
In.	0.22	0.67	0.64	0.43	0.53	1.79	0.63	0.35	0.24	0.08	0.05	0.12

WATER-QUALITY RECORDS

PERIOD OF RECORD.–October 1972 to April 1988, December 2001 to current year.

REMARKS.–Samples collected periodically by the U.S. Geological Survey. All water-quality samples were analyzed at the City of Tulsa Quality Assurance Laboratory in Tulsa, Oklahoma. Suspended sediment samples were analyzed by U.S. Geological Survey. Specific conductance, pH, water temperature, air temperature, turbidity, and dissolved oxygen were determined in the field.

COOPERATION.–All analytical records were furnished by City of Tulsa Quality Assurance Laboratory, Tulsa, Oklahoma.

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 1 of 4

[%, percent; ANC, acid neutralizing capacity; $CaCO_3$, calcium carbonate; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; –, no data; <, less than]

Date	Sample start time	Barometric pressure, mm Hg (00025)	Temperature, air, °C (00020)	Discharge, instantaneous, ft^3/s (00061)	Dissolved oxygen, water, unfiltered, mg/L (00300)	Dissolved oxygen, water, unfiltered, % saturation (00301)	pH, water, unfiltered, field, standard units (00400)	Specific conductance, water, unfiltered, µS/cm at 25°C (00095)	Temperature, water, °C (00010)
03-20-2012	1230	740	—	420	9.7	95	7.7	280	13.1
03-21-2012	1330	735	12.8	940	10.2	100	7.1	252	12.9
05-15-2012	1000	749	15.4	38	9.9	94	7.5	336	12.4
06-04-2012	1300	735	31.8	32	8.9	101	7.6	336	19.6

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 2 of 4

[%, percent; ANC, acid neutralizing capacity; $CaCO_3$, calcium carbonate; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; –, no data; <, less than]

Date	Sample start time	Turbidity, water, unfiltered, monochrome near infrared LED light, 780-900 nm, detection angle 90 +/- 2.5 degrees, FNU (63680)	ANC, water, unfiltered, fixed endpoint (pH 4.5) titration, laboratory, mg/L as $CaCO_3$ (90410)	Carbon dioxide, water, unfiltered, mg/L (00405)	Ammonia plus organic nitrogen, water, unfiltered, mg/L as N (00625)	Ammonia, water, unfiltered, milligrams per liter as NH4 (71845)	Ammonia, water, unfiltered, mg/L as N (00610)	Nitrate plus nitrite, water, unfiltered, mg/L as N (00630)	Nitrate, water, unfiltered, mg/L as N (00620)
03-20-2012	1230	23	110	4.4	1.2	<.116	<.090	4.60	4.60
03-21-2012	1330	—	89	13	<.64	<.116	<.090	5.00	5.00
05-15-2012	1000	.4	140	7.9	<.64	<.116	<.090	4.20	4.10
06-04-2012	1300	.6	140	6.8	<.64	<.039	<.030	3.90	3.90

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 3 of 4

[%, percent; ANC, acid neutralizing capacity; $CaCO_3$, calcium carbonate; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data; <, less than]

Date	Sample start time	Nitrite, water, unfiltered, mg/L as N (00615)	Organic nitrogen, water, unfiltered, mg/L (00605)	Orthophosphate, water, filtered, mg/L (00660)	Orthophosphate, water, filtered, mg/L as P (00671)	Phosphorus, water, filtered, mg/L as P (00666)	Phosphorus, water, unfiltered, mg/L as P (00665)	Total nitrogen, water, unfiltered, mg/L (00600)	Total nitrogen, water, unfiltered, milligrams per liter as nitrate (71887)
03-20-2012	1230	<.060	<1.2	.267	0.087	.110	.120	5.8	26
03-21-2012	1330	<.060	<.64	.212	.069	.081	.083	<5.6	<25
05-15-2012	1000	<.060	<.64	.196	.064	.110	.130	<4.8	<21
06-04-2012	1300	<.020	<.64	.212	.069	.083	.100	<4.5	<20

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 4 of 4

[%, percent; ANC, acid neutralizing capacity; $CaCO_3$, calcium carbonate; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data; <, less than]

Date	Sample start time	Suspended sediment, sieve diameter, percent smaller than 0.0625 mm (70331)	Suspended sediment concentration, mg/L (80154)	Suspended sediment discharge, tons per day (80155)
03-20-2012	1230	87	40	45
03-21-2012	1330	99	19	48
05-15-2012	1000	56	2	.21
06-04-2012	1300	70	2	.17

07194500 ARKANSAS RIVER NEAR MUSKOGEE, OK

Robert S. Kerr Reservoir Basin
Dirty-Greenleaf Subbasin

LOCATION.--Lat 35°46'10", long 95°17'49" referenced to North American Datum of 1927, Muskogee County, OK, Hydrologic Unit 11110102, on downstream side of left pier of bridge on U.S. Highway 62, 1.7 miles downstream from Neosho River, 3.5 miles northeast of Muskogee, and at mile 457.8.

DRAINAGE AREA.--96,472 mi² of which 11,648 mi² probably is noncontributing, revised. From automated delineation using 10-meter National Elevation Dataset digital elevation model data dated 10/01/2006 and Watershed Boundary Dataset dated 10/01/2006, using Albers Equal-Area Projection, North American Datum 1983.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--October 1926 to September 1970, July 2003 to current year. Published as "at Webbers Falls" October 1933 to February 1935. Monthly discharge only for some periods, published in WSP 1311.

REVISED RECORDS.--WSP 1341: Drainage area. WDR 2012: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 471.38 ft above NGVD of 1929. See WSP 1921 for history of changes prior to Feb. 21, 1931.

REMARKS.--Records poor. Some regulation since 1940 by Grand Lake; further regulation since 1941 by Great Salt Plains Lake, and since 1951 by Hulah Lake. Flow regulated since 1953 by Fort Gibson Lake (station 07193000). Flow regulated since September 1964 by Keystone Lake (station 07164200). Flow regulated by Chouteau Lock and Dam upstream and Webbers Falls Lock and Dam downstream since 1970.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012, DAILY MEAN VALUES

REMARKS	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	1,570	878	4,110	4,390	1,400	8,120	68,900	45,100	6,600	2,520	1,130	1,310
2	1,590	787	4,520	3,350	980	7,720	56,400	78,800	6,660	2,820	834	1,340
3	1,620	1,090	1,800	4,490	2,150	6,120	48,700	92,700	7,190	2,740	922	768
4	1,160	1,350	2,690	5,020	10,800	6,960	42,900	98,300	14,900	2,770	951	1,060
5	995	854	4,620	6,150	6,100	5,710	39,500	99,500	13,700	2,730	1,660	1,680
6	686	954	2,790	5,640	6,300	4,260	41,800	77,300	6,010	2,170	1,010	1,870
7	719	1,920	3,810	2,580	7,910	3,450	42,600	65,100	1,800	2,000	1,010	1,350
8	476	19,100	3,350	2,680	17,600	6,400	42,300	60,500	3,970	1,260	479	1,580
9	674	9,860	2,120	4,150	27,900	4,840	43,200	59,400	2,420	1,740	1,300	1,250
10	2,340	2,530	1,590	4,530	28,300	4,680	42,300	54,600	2,030	1,770	1,070	896
11	1,830	2,630	1,140	3,060	24,000	5,320	36,100	46,100	3,610	1,240	925	457
12	1,290	1,350	1,990	3,170	17,000	11,700	30,800	39,700	1,150	1,270	738	889
13	1,310	3,070	3,030	5,070	19,900	12,000	30,700	35,500	2,830	989	992	1,110
14	1,600	3,700	2,630	1,060	17,500	18,400	31,100	32,800	1,480	1,110	1,090	1,330
15	1,060	4,710	2,440	2,070	15,500	19,300	48,600	23,900	3,500	1,110	892	1,030
16	1,560	5,220	4,320	4,110	10,900	23,700	48,400	21,500	2,550	1,590	1,720	981
17	1,830	4,480	3,700	2,890	12,400	21,400	44,300	22,200	2,220	1,270	1,290	4,520
18	1,040	4,090	3,280	2,850	14,500	18,100	56,600	23,900	1,850	1,650	1,330	6,170
19	1,350	3,100	4,450	5,990	9,910	21,700	53,700	26,600	1,200	1,530	1,250	5,620
20	1,930	3,390	4,890	3,720	7,350	89,400	49,100	23,900	1,330	2,040	1,490	1,130
21	1,190	5,370	4,460	1,360	9,570	95,300	46,200	17,300	2,770	1,640	1,240	774
22	1,330	7,420	16,400	1,020	11,900	77,400	41,400	16,000	2,810	1,280	997	1,380
23	2,380	5,640	25,800	2,110	12,500	93,400	38,500	16,100	2,600	2,710	860	1,150
24	1,300	5,910	34,200	1,160	10,500	85,500	37,100	13,500	2,090	1,220	1,100	721
25	1,900	4,460	26,400	6,080	11,200	91,500	27,200	14,800	2,700	2,030	1,010	839
26	2,350	6,370	25,400	4,670	11,300	91,000	20,000	10,800	1,920	913	2,950	6,240
27	2,980	13,700	25,200	5,090	7,000	88,300	19,500	8,720	2,680	e709	3,460	2,470
28	2,060	10,600	14,700	3,220	7,960	87,900	15,600	7,110	3,510	e1,270	1,760	1,280
29	2,110	5,250	9,970	1,710	12,800	89,200	14,100	7,650	4,040	e788	1,550	1,230
30	2,480	4,110	5,140	3,400	—	83,200	19,700	7,410	3,140	e868	1,700	1,020
31	2,020	—	5,320	4,230	—	73,000	—	7,170	—	e1,560	1,170	—
Total	48,730	143,893	256,260	111,020	353,130	1,254,980	1,177,300	1,153,960	115,260	51,307	39,880	53,445
Mean	1,572	4,796	8,266	3,581	12,180	40,480	39,240	37,220	3,842	1,655	1,286	1,782
Max	2,980	19,100	34,200	6,150	28,300	95,300	68,900	99,500	14,900	2,820	3,460	6,240
Min	476	787	1,140	1,020	980	3,450	14,100	7,110	1,150	709	479	457

07194800 ILLINOIS RIVER AT SAVOY, AR

Robert S. Kerr Reservoir Basin
Illinois Subbasin

LOCATION.—Lat 36 06'11", long 94 20'40" referenced to North American Datum of 1983, in SE ¼ sec.36, T. 17 N., R.32 W., Washington County, AR, Hydrologic Unit 11110103, on eastern boundary of Ozark National Forest, on left bank downstream end of State Hwy 16 bridge, 0.3 mi downstream from tributary of Lake Weddington, 0.4 mi upstream from Clear Creek, and 0.9 mi southwest of Savoy.
DRAINAGE AREA.—167 mi².

SURFACE-WATER RECORDS

PERIOD OF RECORD.—Jul 1979 to Dec 1981, Oct 1985 to Sep 1986, and Aug 1995 to current year. Occasional low-flow discharge measurments 1957 to 1963; occasional discharge measurements 1974 to 1978, 1982 to 1985, and 1990 to 1995.
REVISED RECORDS.–WDR Arkansas 2000: 1986 (M)(P), 1997-99 (M).
GAGE.—Water-stage recorder. Datum of gage is 1,017.90 ft above NGVD of 1929.
REMARKS.—Water-discharge records good. Estimated days are fair. Satellite telemeter at station. Water quality data available at the files of the USGS.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012, DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	e25	28	129	110	152	92	159	55	36	11	9.1	15
2	e24	27	120	104	140	84	145	53	35	11	9.1	14
3	e24	29	119	100	143	78	128	48	47	11	8.6	13
4	23	29	356	99	857	74	119	46	82	11	8.4	13
5	23	29	315	96	335	71	107	44	57	11	8.5	12
6	23	27	235	95	250	69	96	42	31	11	8.9	12
7	22	29	196	93	207	67	90	41	19	11	9.3	12
8	22	1,700	172	91	178	68	87	41	17	12	10	20
9	21	600	158	90	156	78	85	40	16	11	12	16
10	23	284	144	92	146	76	82	40	15	12	10	14
11	22	209	133	180	133	87	85	39	15	12	10	13
12	29	167	135	162	118	174	86	39	14	11	9.8	12
13	34	143	154	132	115	138	79	39	14	11	11	12
14	27	130	254	120	115	115	76	38	14	11	11	13
15	26	119	1,310	113	111	102	109	38	14	11	11	18
16	24	112	422	110	125	94	149	37	14	11	11	19
17	23	102	302	105	114	88	103	37	13	11	15	19
18	23	96	249	99	107	82	86	37	13	10	13	16
19	23	93	220	96	101	81	77	35	13	10	12	15
20	23	90	359	95	96	2,400	70	34	13	10	13	14
21	23	101	279	92	103	2,640	66	35	13	9.6	12	14
22	23	750	234	91	103	1,610	62	34	14	9.6	11	13
23	31	330	206	89	98	1,010	59	34	14	9.6	10	13
24	36	238	187	86	90	635	56	34	13	9.5	10	13
25	30	197	173	893	84	471	54	35	12	9.5	10	13
26	29	179	159	633	82	375	51	33	12	11	12	13
27	28	212	154	352	79	309	49	32	12	12	32	13
28	33	180	136	256	77	259	46	32	12	11	19	13
29	34	159	128	209	87	224	45	33	11	11	15	13
30	32	140	122	183	---	198	48	33	11	9.8	14	13
31	29	---	116	165	---	176	---	36	---	9.5	14	---
Total	812	6,529	7,376	5,231	4,502	12,025	2,554	1,194	616	332.1	369.7	423
Mean	26.2	218	238	169	155	388	85.1	38.5	20.5	10.7	11.9	14.1
Max	36	1,700	1,310	893	857	2,640	159	55	82	12	32	20
Min	21	27	116	86	77	67	45	32	11	9.5	8.4	12
Ac-ft	1,610	12,950	14,630	10,380	8,930	23,850	5,070	2,370	1,220	659	733	839
Cfsm	0.16	1.30	1.42	1.01	0.93	2.32	0.51	0.23	0.12	0.06	0.07	0.08
In.	0.18	1.45	1.64	1.17	1.00	2.68	0.57	0.27	0.14	0.07	0.08	0.09

07195000 OSAGE CREEK NEAR ELM SPRINGS, AR

Robert S. Kerr Reservoir Basin

Illinois Subbasin

LOCATION.--Lat 36°13'19", long 94°17'18" referenced to North American Datum of 1983, in NE 1/4 sec.21, T.18 N., R.31 W., Benton County, AR, Hydrologic Unit 11110103, on left bank 0.7 mi downstream from Little Osage Creek, and 3.2 mi northwest of Elm Springs.

DRAINAGE AREA.--130 mi².

SURFACE-WATER RECORDS

PERIOD OF RECORD.--Oct 1950 to Sep 1975 and Aug 1995 to current year. Oct 1976 to Sep 1979 a crest-stage partial-record station. Occasional discharge measurements 1977 to 1979 and 1982 to 1995. Monthly discharge only for some periods, published in WSP 1731.

REVISED RECORDS.--WDR Arkansas 1970: Drainage area. WDR Arkansas 1974: 1969.

GAGE.--Water-stage recorder. Prior to Oct 1, 1979 the water-stage recorder was located about 400 ft downstream at present datum.

REMARKS.--Water-discharge records good. Flow slightly regulated by operation of Lake Keith at Cave Springs, City of Rogers wastewater treatment plant, and City of Springdale wastewater treatment plant (located on Spring Creek, tributary to Osage Creek that discharges upstream of gage). Water quality data available at the files of the USGS. Satellite telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012, DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	88	93	122	105	119	95	158	227	91	61	61	119
2	82	96	118	102	114	94	182	156	83	62	57	91
3	85	127	118	104	114	87	179	135	116	60	61	79
4	89	111	210	102	334	81	173	123	115	59	54	80
5	83	100	152	102	164	84	164	111	103	52	59	81
6	83	94	142	107	149	87	151	100	97	57	59	78
7	84	105	134	99	142	85	126	103	88	55	60	87
8	83	2,150	128	94	137	89	122	105	87	52	72	174
9	84	555	121	95	130	88	126	98	84	55	72	95
10	93	291	114	98	129	83	135	94	74	58	60	87
11	99	228	106	105	118	103	146	93	78	58	51	84
12	218	195	107	96	110	130	140	86	81	56	42	80
13	153	172	130	93	113	107	137	80	76	58	64	76
14	127	159	154	89	116	100	136	84	91	53	65	93
15	111	166	296	85	124	95	206	86	105	48	62	162
16	102	158	183	89	126	91	178	85	99	52	61	144
17	106	137	159	93	116	86	142	83	90	57	87	114
18	145	126	144	89	111	80	134	80	99	55	66	102
19	128	115	143	88	106	85	128	82	112	53	56	94
20	118	107	311	86	107	707	129	84	108	67	56	89
21	111	120	196	81	111	853	120	85	116	69	55	85
22	104	595	175	79	111	621	113	76	117	41	53	79
23	101	229	160	83	109	414	113	75	113	48	50	73
24	101	181	146	85	104	303	115	75	100	52	51	74
25	101	159	134	343	98	250	115	76	95	53	50	77
26	104	155	129	209	93	224	110	69	91	58	97	78
27	112	153	130	164	95	207	107	60	77	82	361	80
28	108	141	127	143	95	192	101	63	55	59	134	70
29	96	135	123	127	101	179	96	181	56	46	111	65
30	87	128	120	124	---	167	164	108	56	47	95	59
31	90	---	113	123	---	155	---	97	---	57	117	---
Total	3,276	7,281	4,645	3,482	3,596	6,022	4,146	3,060	2,753	1,740	2,399	2,749
Mean	106	243	150	112	124	194	138	98.7	91.8	56.1	77.4	91.6
Max	218	2,150	311	343	334	853	206	227	117	82	361	174
Min	82	93	106	79	93	80	96	60	55	41	42	59
Ac-ft	6,500	14,440	9,210	6,910	7,130	11,940	8,220	6,070	5,460	3,450	4,760	5,450
Cfsm	0.81	1.87	1.15	0.86	0.95	1.49	1.06	0.76	0.71	0.43	0.60	0.70
In.	0.94	2.08	1.33	1.00	1.03	1.72	1.19	0.88	0.79	0.50	0.69	0.79

07195430 ILLINOIS RIVER SOUTH OF SILOAM SPRINGS, AR

Robert S. Kerr Reservoir Basin

Illinois Subbasin

LOCATION.–Lat 36°06'31", long 94°32'00" referenced to North American Datum of 1983, in SE 1/4 NE 1/4 sec.31, T.17 N., R.33 W., Benton County, AR, Hydrologic Unit 11110103, at bridge on State Hwy 59, 5.0 mi south of Siloam Springs, and 0.6 mi downstream from mouth of Cincinnati Creek.

DRAINAGE AREA.–575 mi^2.

SURFACE-WATER RECORDS

PERIOD OF RECORD.–Aug 1995 to current year. Occasional low-flow measurements in 1971.

REVISED RECORDS.–WDR Arkansas 1997: 1996.

GAGE.–Water-stage recorder.

REMARKS.–Water-discharge records good except estimated daily discharges, which are poor. Water quality data available at the files of the USGS. Satellite telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012, DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	203	192	470	411	571	411	675	423	203	111	96	204
2	193	191	437	381	525	377	630	435	192	107	94	191
3	185	205	423	365	503	353	590	330	209	110	90	160
4	187	242	742	363	2,120	333	561	302	389	109	92	143
5	186	217	1,020	349	1,400	320	531	281	362	108	89	137
6	178	203	750	348	968	318	500	260	260	104	92	134
7	176	202	630	344	810	314	471	248	217	105	92	131
8	172	4,130	557	327	710	314	450	251	191	109	96	251
9	166	7,390	511	316	636	343	439	244	182	128	116	265
10	168	1,760	469	316	589	340	427	234	170	113	123	180
11	178	1,130	433	381	551	336	417	228	162	112	103	157
12	244	863	410	471	500	552	404	224	162	107	96	144
13	427	708	447	399	474	566	391	215	158	104	109	135
14	285	611	533	363	480	487	377	210	154	103	118	134
15	241	562	3,250	341	472	442	439	217	152	102	120	181
16	217	537	1,630	332	488	412	792	210	149	101	113	286
17	199	483	1,080	323	473	389	534	205	144	102	144	246
18	206	437	857	311	444	365	437	200	136	102	193	204
19	229	406	752	302	424	349	398	194	136	100	142	175
20	212	377	1,290	297	408	3,310	376	186	136	96	131	161
21	202	379	1,250	286	417	7,680	357	181	141	93	120	151
22	197	2,510	961	281	433	7,290	334	178	147	90	113	142
23	204	1,650	814	274	418	3,930	313	179	145	88	107	133
24	212	1,040	710	273	397	2,400	307	175	138	90	102	125
25	213	809	642	1,460	374	1,730	302	175	128	90	101	125
26	200	698	585	2,700	358	1,380	290	173	127	91	109	124
27	207	690	555	1,400	346	1,170	278	162	126	122	449	126
28	247	631	522	1,020	342	1,010	268	154	122	138	464	129
29	235	562	487	803	366	894	256	186	119	111	238	124
30	213	509	464	691	—	806	277	254	115	99	183	120
31	196	—	439	626	—	734	—	197	—	95	164	—
Total	6,578	30,324	24,120	16,854	16,997	39,655	12,821	7,111	5,172	3,240	4,399	4,918
Mean	212	1,011	778	544	586	1,279	427	229	172	105	142	164
Max	427	7,390	3,250	2,700	2,120	7,680	792	435	389	138	464	286
Min	166	191	410	273	342	314	256	154	115	88	89	120
Med	203	562	585	349	474	442	411	210	151	104	113	144
Ac-ft	13,050	60,150	47,840	33,430	33,710	78,660	25,430	14,100	10,260	6,430	8,730	9,750
Cfsm	0.37	1.76	1.35	0.95	1.02	2.22	0.74	0.40	0.30	0.18	0.25	0.29
In.	0.43	1.96	1.56	1.09	1.10	2.57	0.83	0.46	0.33	0.21	0.28	0.32

07195500 ILLINOIS RIVER NEAR WATTS, OK

Robert S. Kerr Reservoir Basin
Illinois Subbasin

LOCATION.--Lat 36°07'48", long 94°34'19" referenced to North American Datum of 1927, in NW 1/4 NE 1/4 sec.18, T.19 N., R.26 E., Adair County, OK,Hydrologic Unit 11110103, near the downstream side of right abutment of U.S. Highway 59 bridge, 1.5 mi north of Watts,4.5 mi downstream from Cincinnati Creek, and at mile 106.2.
DRAINAGE AREA.--630 mi², revised. From automated delineation using 10-meter National Elevation Dataset digital elevation model data dated 10/01/2006 and Watershed Boundary Dataset dated 10/01/2006, using Albers Equal-Area Projection, North American Datum 1983.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--August 1955 to current year.
REVISED RECORDS.--WDR 2012: Drainage area.
GAGE.--Water-stage recorder. Datum of gage is 893.78 ft above NGVD of 1929.
REMARKS.--Records fair except for estimated daily discharges which are poor. Since July 2, 1957, small diversion for municipal water supply for the city of Siloam Springs, Ark., upstream from station. U.S. Army Corps of Engineers' satellite telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012, DAILY MEAN VALUES, [e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	195	182	513	449	613	402	708	426	200	112	77	183
2	182	178	476	419	565	366	657	466	191	108	75	193
3	171	190	450	399	534	349	622	356	194	108	73	159
4	169	229	738	393	1,940	331	593	322	386	e108	71	140
5	170	206	1,060	380	1,480	312	567	298	362	107	72	131
6	163	192	812	373	1,030	287	530	273	274	e104	72	128
7	153	191	686	369	861	287	501	259	225	104	72	127
8	149	2,860	608	351	755	307	476	259	196	106	77	201
9	143	6,260	558	340	676	330	464	250	186	125	89	300
10	147	1,750	516	338	626	336	446	233	171	111	105	193
11	155	1,150	476	393	594	327	440	227	164	108	88	162
12	212	875	447	504	539	502	424	221	163	103	84	148
13	387	708	474	443	508	567	408	212	162	99	89	140
14	280	621	552	396	508	488	394	203	157	97	95	143
15	227	581	2,750	366	502	443	447	206	156	98	102	182
16	198	552	1,690	330	511	411	829	200	154	95	98	307
17	183	509	1,140	344	502	386	588	194	149	94	109	288
18	189	454	920	339	472	361	475	189	140	94	181	234
19	213	416	801	325	447	342	421	183	137	90	131	200
20	202	393	1,230	318	420	2,440	403	181	140	87	118	179
21	190	395	1,310	310	430	e6,470	381	175	146	81	104	167
22	183	1,980	1,010	299	450	e5,700	353	169	152	78	99	157
23	194	1,690	873	294	428	3,430	332	164	150	74	92	147
24	196	1,100	771	292	408	2,300	323	165	144	75	87	137
25	201	858	699	1,250	385	1,760	313	168	132	76	86	134
26	190	747	638	2,620	365	1,430	303	166	125	76	93	135
27	198	740	605	1,480	348	1,210	291	158	124	90	285	139
28	231	691	572	1,080	343	1,050	287	149	122	126	494	142
29	232	615	530	866	362	936	277	159	118	97	236	138
30	207	558	505	734	---	844	295	251	114	82	171	136
31	190	---	475	665	---	771	---	197	---	75	154	---
Total	6,100	27,871	24,885	17,459	17,602	35,475	13,548	7,079	5,234	2,988	3,779	5,170
Mean	197	929	803	563	607	1,144	452	228	174	96.4	122	172
Max	387	6,260	2,750	2,620	1,940	6,470	829	466	386	126	494	307
Min	143	178	447	292	343	287	277	149	114	74	71	127
Ac-ft	12,100	55,280	49,360	34,630	34,910	70,360	26,870	14,040	10,380	5,930	7,500	10,250
Cfsm	0.31	1.47	1.27	0.89	0.96	1.82	0.72	0.36	0.28	0.15	0.19	0.27
In.	0.36	1.65	1.47	1.03	1.04	2.09	0.80	0.42	0.31	0.18	0.22	0.31

WATER-QUALITY RECORDS

PERIOD OF RECORD.—October 1989 to July 1995, July 1996 to current year.

REMARKS.—Samples collected periodically. Specific conductance, pH, water temperature, dissolved oxygen, and turbidity were determined in the field.

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 1 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; MPN/100 mL, most probable number per 100 milliliters; N, nitrogen; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; <, less than; >, greater than]

Date	Sample start time	Barometric pressure, mm Hg (00025)	Temperature, air, °C (00020)	Discharge, instantaneous, ft³/s (00061)	Dissolved oxygen, water, unfiltered, mg/L (00300)	Dissolved oxygen, water, unfiltered, % saturation (00301)	pH, water, unfiltered, field, standard units (00400)	Specific conductance, water, unfiltered, µS/cm at 25°C (00095)	Temperature, water, °C (00010)
10-04-2011	0945	761	16.3	169	9.8	104	8.2	354	18.2
11-08-2011	1300	738	17.2	1,350	9.8	101	7.8	273	15.4
11-09-2011	1415	750	9.7	4,580	10.1	99	7.9	194	14.0
12-12-2011	1300	754	7.5	447	12.6	105	8.0	319	6.9
02-02-2012	1100	750	17.1	569	11.4	102	7.9	256	10.0
03-21-2012	1215	740	11.0	5,710	9.8	98	7.4	179	14.2
03-22-2012	1145	742	11.4	5,290	10	97	7.2	177	13.0
04-17-2012	1115	742	24.5	587	9.9	101	7.7	291	14.8
05-22-2012	1045	739	25.2	171	9.6	104	8.5	351	18.1
06-25-2012	1030	746	36.3	135	8.3	110	8.1	366	28.8
08-22-2012	1300	752	30.8	97	8.7	110	8.0	374	26.3

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 2 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; MPN/100 mL, most probable number per 100 milliliters; N, nitrogen; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; <, less than; >, greater than]

Date	Sample start time	Turbidity, water, unfiltered, monochrome near infrared LED light, 780-900 nm, detection angle 90 +/- 2.5 degrees, FNU (63680)	Ammonia plus organic nitrogen, water, unfiltered, mg/L as N (00625)	Ammonia, water, filtered, mg/L as NH4 (71846)	Ammonia, water, filtered, mg/L as N (00608)	Nitrate plus nitrite, water, filtered, mg/L as N (00631)	Nitrate, water, filtered, mg/L (71851)	Nitrate, water, filtered, mg/L as N (00618)	Nitrite, water, filtered, mg/L (71856)
10-04-2011	0945	6.8	<.35	.019	.0147	2.35	10.4	2.35	.012
11-08-2011	1300	79	1.04	.023	.0182	2.16	9.51	2.15	.021
11-09-2011	1415	100	.841	.019	.0150	2.92	12.9	2.92	.028
12-12-2011	1300	4.3	.185	.016	.0122	3.51	15.5	3.51	.004
02-02-2012	1100	5.2	.210	.015	.0113	3.39	15.0	3.38	.014
03-21-2012	1215	81	.948	.047	.0368	1.48	6.53	1.48	.023
03-22-2012	1145	68	.828	.041	.0316	1.83	8.06	1.82	.018
04-17-2012	1115	12	.259	.024	.0190	2.64	11.7	2.63	.015
05-22-2012	1045	10	.213	.023	.0179	2.32	10.2	2.31	.021
06-25-2012	1030	5.6	.236	.021	.0161	1.48	6.54	1.48	.023
08-22-2012	1300	6.2	.242	<.013	<.010	1.03	4.52	1.02	.019

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 3 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; MPN/100 mL, most probable number per 100 milliliters; N, nitrogen; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; <, less than; >, greater than]

Date	Sample start time	Nitrite, water, filtered, mg/L as N (00613)	Organic nitrogen, water, unfiltered, mg/L (00605)	Orthophosphate, water, filtered, mg/L (00660)	Orthophosphate, water, filtered, mg/L as P (00671)	Phosphorus, water, filtered, mg/L as P (00666)	Phosphorus, water, unfiltered, mg/L as P (00665)	Total nitrogen, water, unfiltered, mg/L (00600)	Enterococci, Defined Substrate Technology, water, MPN/100 mL (99601)
10-04-2011	0945	.00364	<.34	.192	.0627	.0618	.0894	<2.7	10
11-08-2011	1300	.00643	1.0	.378	.123	.134	.462	3.2	>4,800
11-09-2011	1415	.00858	.83	.392	.128	.140	.333	3.8	>48,000
12-12-2011	1300	.00135	.17	.125	.0407	.0407	.0569	3.7	17
02-02-2012	1100	.00421	.20	.111	.0360	.0415	.0490	3.6	10
03-21-2012	1215	.00704	.91	.392	.128	.143	.325	2.4	>4,800
03-22-2012	1145	.00562	.80	.398	.130	.146	.273	2.7	--
04-17-2012	1115	.00467	.24	.179	.0582	.0646	.0934	2.9	82
05-22-2012	1045	.00633	.20	.167	.0545	.0598	.0770	2.5	2
06-25-2012	1030	.00709	.22	.163	.0532	.0546	.0712	1.7	14
08-22-2012	1300	.00571	<.24	.169	.0551	.0588	.0763	1.3	8

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 4 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; MPN/100 mL, most probable number per 100 milliliters; N, nitrogen; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; <, less than; >, greater than]

Date	Sample start time	Escherichia coli, Defined Substrate Technology, water, MPN/100 mL (50468)	Total coliform, Defined Substrate Technology, water, MPN/100 mL (50569)	Suspended sediment, sieve diameter, percent smaller than 0.0625 mm (70331)	Suspended sediment concentration, mg/L (80154)	Suspended sediment discharge, tons per day (80155)
10-04-2011	0945	31	8,200	93	11	5.0
11-08-2011	1300	17,000	240,000	61	487	1,780
11-09-2011	1415	7,600	>240,000	99	150	1,850
12-12-2011	1300	41	3,400	82	33	40
02-02-2012	1100	31	700	93	7	11
03-21-2012	1215	6,000	100,000	85	163	2,510
03-22-2012	1145	--	--	96	115	1,640
04-17-2012	1115	170	4,300	72	26	41
05-22-2012	1045	<10	3,800	50	14	6.5
06-25-2012	1030	<10	7,700	95	9	3.3
08-22-2012	1300	<10	3,900	79	10	2.6

07195855 FLINT CREEK NEAR WEST SILOAM SPRINGS, OK

Robert S. Kerr Reservoir Basin

Illinois Subbasin

LOCATION.–Lat 36°12'58", long 94°36'19" referenced to North American Datum of 1983, in NE 1/4 NE 1/4 sec.14, T.20 N., R.25 E., Delaware County, OK, Hydrologic Unit 11110103, on left bank 800 ft downstream from county bridge, 1.4 mi upstream from Sager Creek, 2.5 mi from Arkansas-Oklahoma State line, and northwest of West Siloam Springs, Oklahoma.

DRAINAGE AREA.–59.8 mi².

SURFACE-WATER RECORDS

PERIOD OF RECORD.–Jul 1979 to current year.

GAGE.–Water-stage recorder. Datum of gage is 958.00 ft above NGVD of 1929.

REMARKS.–Water-discharge records good. Flow is regulated by Lake Siloam Springs, 4.5 mi upstream, and sewage discharge into Flint Creek from city of Gentry. Water quality data available at the files of the USGS. Satellite telemeter at station.

Water-Data Report 2012

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012, DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	7.6	6.8	35	22	22	17	61	57	16	5.0	3.4	6.7
2	7.9	7.5	32	21	20	18	56	33	15	5.1	2.9	5.1
3	8.5	9.6	32	20	20	16	53	30	17	5.1	2.7	4.5
4	14	8.1	40	19	28	16	47	27	22	4.9	2.5	4.1
5	7.2	7.5	38	19	29	13	42	27	18	5.4	3.6	3.9
6	6.1	6.9	35	18	28	16	40	36	18	4.5	3.6	4.5
7	5.8	13	33	18	26	16	38	26	14	4.8	2.4	6.0
8	5.8	256	30	17	26	13	38	31	13	5.3	2.4	11
9	5.5	229	32	17	23	12	34	21	13	6.5	2.4	6.6
10	6.8	135	30	17	23	12	33	25	12	5.8	2.1	5.4
11	6.3	98	27	16	21	16	35	24	14	5.1	2.1	6.9
12	16	74	30	16	21	21	32	23	11	4.6	2.1	12
13	23	59	43	15	19	19	31	20	10	4.3	2.6	18
14	13	49	30	15	21	19	31	21	10	3.6	2.6	33
15	8.7	49	36	15	19	24	35	21	10	4.2	2.6	36
16	7.4	40	47	15	18	14	33	19	10	4.5	2.3	28
17	8.0	34	37	16	17	12	32	19	14	4.3	2.6	18
18	16	30	35	15	15	12	25	18	13	4.5	3.3	21
19	13	27	34	15	16	13	27	18	13	4.6	4.1	14
20	11	25	48	16	16	213	30	18	8.7	4.3	6.0	18
21	8.5	31	56	17	15	292	30	17	9.7	4.3	3.7	18
22	7.4	155	54	16	14	301	26	16	8.8	4.4	3.1	19
23	17	125	49	14	14	226	26	16	8.5	4.3	2.7	17
24	8.9	94	44	10	19	182	36	15	7.9	4.1	2.7	16
25	12	76	41	32	18	149	26	15	7.7	3.9	3.0	17
26	9.6	69	39	47	14	126	26	15	7.3	4.0	8.5	18
27	9.7	58	36	39	13	108	26	14	6.6	4.5	9.4	13
28	9.3	51	34	32	13	94	24	14	6.1	4.2	7.0	12
29	8.0	44	27	29	13	82	24	15	5.4	3.9	4.5	12
30	7.4	39	25	25	---	74	35	13	5.2	3.0	5.2	12
31	7.1	---	24	23	---	67	---	18	---	2.8	7.5	---
Total	302.5	1,906.4	1,133	626	561	2,213	1,032	682	344.9	139.8	115.6	416.7
Mean	9.76	63.5	36.5	20.2	19.3	71.4	34.4	22.0	11.5	4.51	3.73	13.9
Max	23	256	56	47	29	301	61	57	22	6.5	9.4	36
Min	5.5	6.8	24	10	13	12	24	13	5.2	2.8	2.1	3.9
Ac-ft	600	3,780	2,250	1,240	1,110	4,390	2,050	1,350	684	277	229	827

07196900 BARON FORK AT DUTCH MILLS, AR

Robert S. Kerr Reservoir Basin
Illinois Subbasin

LOCATION.–Lat 35°52'48", long 94°29'11" referenced to North American Datum of 1983, in NE 1/4 SE 1/4 sec.21, T.14 N., R.33 W., Washington County, AR, Hydrologic Unit 11110103, near right bank on downstream side of bridge on State Hwy 59 at Dutch Mills, 2.2 mi downstream from Fly Creek, and 2.9 mi upstream from Arkansas-Oklahoma State line.

DRAINAGE AREA.–40.6 mi^2.

SURFACE-WATER RECORDS

PERIOD OF RECORD.–Apr 1958 to current year. Prior to Oct 1969, published as "Barren Fork at Dutch Mills".

REVISED RECORDS.–WDR Arkansas 1970: Drainage area. WDR Arkansas 1993: 1992 (M).

GAGE.–Water-stage recorder. Datum of gage is 986.47 ft above NGVD of 1929.

REMARKS.–Water-discharge records good. Water quality data available at the files of the USGS. Satellite telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012, DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	4.0	8.2	23	21	37	29	36	21	6.5	0.47	0.25	0.58
2	3.8	8.7	21	20	33	27	33	17	6.1	0.46	0.24	0.63
3	3.7	9.7	30	19	122	25	31	13	5.5	0.47	0.23	0.64
4	3.6	11	169	19	287	23	31	11	84	0.45	0.22	0.67
5	3.7	11	93	19	96	22	29	10	17	0.46	0.21	0.65
6	3.4	12	67	18	71	22	27	9.1	5.4	0.47	0.22	0.62
7	3.5	24	54	17	58	21	25	8.1	2.0	0.58	0.20	0.55
8	3.3	750	46	17	49	24	24	8.0	1.3	0.62	0.22	0.48
9	3.3	113	41	16	43	29	23	7.7	1.00	0.58	0.19	0.47
10	3.7	49	36	30	42	26	22	7.3	0.84	0.58	0.16	0.47
11	4.1	35	34	67	37	64	22	7.0	0.71	0.60	0.15	0.47
12	5.8	28	32	40	33	82	21	7.4	0.67	0.69	0.16	0.55
13	7.1	24	37	31	33	51	20	7.5	0.63	0.58	0.16	0.58
14	7.8	21	406	28	34	41	20	7.5	0.58	0.58	0.15	0.80
15	7.4	20	319	25	35	36	34	7.0	0.62	0.74	0.15	0.95
16	7.2	18	114	24	35	32	35	6.5	0.58	0.70	0.15	1.9
17	6.6	15	77	23	32	30	25	6.0	0.55	0.70	0.16	1.8
18	6.3	14	59	21	31	28	21	5.8	0.47	0.67	0.17	1.3
19	5.9	13	48	21	29	28	19	5.4	0.50	0.58	0.20	1.1
20	5.9	12	62	20	28	751	18	5.1	0.51	0.57	0.21	1.0
21	6.1	22	50	20	33	495	17	5.0	0.55	0.57	0.19	0.96
22	7.0	251	42	19	33	288	16	4.8	0.57	0.52	0.20	0.97
23	8.4	66	36	19	31	193	14	4.7	0.56	0.46	0.22	0.96
24	9.8	42	33	18	28	119	14	4.5	0.50	0.56	0.21	0.96
25	8.7	34	30	416	26	91	14	4.5	0.49	0.58	0.23	1.0
26	8.3	41	29	172	25	75	13	4.4	0.47	0.52	0.36	1.1
27	9.1	44	28	91	25	63	12	4.1	0.47	0.47	0.39	1.1
28	14	34	26	65	24	54	11	3.8	0.45	0.44	0.38	1.1
29	14	29	25	51	33	48	11	3.9	0.44	0.36	0.40	1.2
30	11	25	24	44	---	43	16	4.2	0.46	0.29	0.47	1.4
31	8.9	---	22	40	---	39	---	5.1	---	0.27	0.59	---
Total	205.4	1,784.6	2,113	1,451	1,423	2,899	654	226.4	140.42	16.59	7.44	26.96
Mean	6.63	59.5	68.2	46.8	49.1	93.5	21.8	7.30	4.68	0.54	0.24	0.90
Max	14	750	406	416	287	751	36	21	84	0.74	0.59	1.9
Min	3.3	8.2	21	16	24	21	11	3.8	0.44	0.27	0.15	0.47
Ac-ft	407	3,540	4,190	2,880	2,820	5,750	1,300	449	279	33	15	53
Cfsm	0.16	1.47	1.68	1.15	1.21	2.30	0.54	0.18	0.12	0.01	0.01	0.02
In.	0.19	1.64	1.94	1.33	1.30	2.66	0.60	0.21	0.13	0.02	0.01	0.02

07245000 CANADIAN RIVER NEAR WHITEFIELD, OK

Lower Canadian Basin
Lower Canadian Subbasin

LOCATION.--Lat 35°15'44", long 95°14'13" referenced to North American Datum of 1927, in SW 1/4 SW 1/4 sec.7, T.9 N., R.20 E., Haskell County, OK, Hydrologic Unit 11090204, on right downstream bank at end of bridge on State Highway 2, 0.8 mi north of Whitefield, 5.5 mi upstream from Taloka (Snake) Creek, 8.2 mi downstream from Eufaula Dam, and at mile 18.8.

DRAINAGE AREA.--47,283 mi² of which 8,134 mi² probably is noncontributing, revised. From automated delineation using 10-meter National Elevation Dataset digital elevation model data dated 10/01/2006 and Watershed Boundary Dataset dated 10/01/2006, using Albers Equal-Area Projection, North American Datum 1983.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--October 1938 to current year. Monthly discharge only for some periods, published in WSP 1311.

REVISED RECORDS.--WSP 1177: Drainage area. WDR 2012: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 473.16 ft above NGVD of 1929. Prior to Jan. 11, 1939, nonrecording gage and Jan. 11, 1939 to Dec. 10, 1941, June 12, 1947 to Sept. 30, 1948, water-stage recorder, all at site 2.1 mi downstream at datum 2.20 ft higher. Dec. 11, 1941 to June 1, 1947, and Oct. 1, 1948 to Sept. 30, 1978, water-stage recorder at site 400 ft upstream and at datum 5.00 ft higher. Oct. 1, 1978 to July 26, 1983, water-stage recorder at site 400 ft upstream at same datum.

REMARKS.--Records poor. Prior to February 1964, occasional slight regulation by Conchas Lake in New Mexico and, except for 54 mi² of intervening area, completely regulated thereafter by Eufaula Lake (station 07244800). U.S. Army Corps of Engineers' satellite telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012, DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	76	835	60	47	6,310	502	14,500	1,960	831	1,110	2,290	44
2	59	736	61	41	5,260	780	13,200	1,170	143	2,030	2,540	462
3	1,340	351	66	38	5,160	92	8,720	1,410	92	1,690	1,950	1,370
4	470	1,720	113	41	5,800	616	6,970	1,600	2,490	1,620	1,530	2,040
5	73	121	164	40	8,760	1,230	4,950	666	1,930	1,870	932	1,310
6	57	71	324	40	9,000	979	5,100	184	663	2,490	1,100	438
7	53	88	516	40	9,080	82	5,560	610	143	1,860	1,430	55
8	53	178	762	39	9,130	271	3,570	1,840	1,580	1,360	1,690	47
9	53	114	116	41	7,070	1,160	4,930	1,610	623	2,030	618	37
10	59	68	64	69	5,670	92	15,300	2,260	131	1,920	82	37
11	56	59	55	107	3,950	77	12,700	1,480	2,510	1,740	59	36
12	57	54	53	70	4,810	244	8,910	1,620	1,970	1,390	479	36
13	53	51	52	57	5,410	2,360	9,680	3,700	1,220	1,760	562	50
14	50	52	66	54	4,020	4,060	8,730	8,550	1,890	771	170	54
15	50	62	193	47	2,880	4,660	9,000	8,440	2,220	1,080	52	40
16	50	66	86	49	2,130	4,450	8,970	8,460	1,470	2,070	46	38
17	1,040	58	67	53	2,240	3,240	9,250	4,240	1,060	1,510	43	37
18	676	53	60	84	208	3,080	8,500	3,080	2,020	2,200	77	38
19	76	53	59	168	130	4,630	9,030	2,460	1,430	2,470	51	36
20	1,730	58	170	71	459	4,970	10,400	999	1,810	1,820	44	157
21	130	176	96	50	2,300	831	8,240	437	2,480	1,260	393	273
22	86	526	77	40	1,750	8,860	6,220	142	1,430	841	397	351
23	145	126	67	41	910	14,500	7,200	1,070	730	1,630	50	256
24	458	91	59	34	1,590	20,200	6,970	2,870	710	1,790	42	755
25	850	78	58	1,810	1,320	28,500	6,490	4,110	1,530	994	47	417
26	1,910	82	56	1,080	234	28,300	6,620	4,470	1,750	1,660	337	42
27	2,080	79	56	1,260	2,230	28,300	4,040	1,160	2,150	729	1,930	36
28	2,600	67	49	139	533	28,200	1,430	1,950	2,410	1,620	1,470	32
29	771	67	49	94	326	28,100	255	3,680	1,480	2,270	1,360	258
30	84	62	47	77	---	23,400	1,200	1,960	1,460	2,350	757	404
31	1,070	---	42	2,020	---	14,700	---	2,070	---	1,830	68	---
Total	16,315	6,202	3,763	7,841	108,670	261,466	226,635	80,258	42,356	51,765	22,596	9,186
Mean	526	207	121	253	3,747	8,434	7,554	2,589	1,412	1,670	729	306
Max	2,600	1,720	762	2,020	9,130	28,500	15,300	8,550	2,510	2,490	2,540	2,040
Min	50	51	42	34	130	77	255	142	92	729	42	32
Ac-ft	32,360	12,300	7,460	15,550	215,500	518,600	449,500	159,200	84,010	102,700	44,820	18,220

07247000 POTEAU RIVER AT CAUTHRON, AR

Robert S. Kerr Reservoir Basin

Poteau Subbasin

LOCATION.--Lat 34°55'08", long 94°17'58" referenced to North American Datum of 1983, in NW 1/4 SE 1/4 sec.16, T.3 N., R.31 W., Scott County, AR, Hydrologic Unit 11110105, on right bank at downstream side of Scott County Road 56 bridge at Cauthron, 200 ft south of junction with State Hwy 28, 2.9 mi downstream from Cross Creek, 7.8 mi downstream from Jones Creek, and at river mile 109.0.

DRAINAGE AREA.--203 mi².

SURFACE-WATER RECORDS

PERIOD OF RECORD.--Mar 1939 to current year.

REVISED RECORDS.--WSP 1037: 1939 (M). WDR Arkansas 1970: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 569.53 ft above NGVD of 1929. Prior to May 2, 1939, nonrecording gage at present site and datum.

REMARKS.--Water-discharge records good. As of Sep 1974, flow from 92.2 mi² upstream from this station is controlled by 16 floodwater-detention reservoirs that have a total combined capacity of 39,082 acre-ft below the flood spillway crests, of which 33,524 acre-ft is flood detention capacity, 2,100 acre-ft is water-supply storage, and 3,458 acre-ft is sediment storage capacity. Water quality data available at the files of the USGS. Satellite telemeter at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in Jun 1935 reached a stage of 27.4 ft, from information by local resident.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012, DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.33	2.0	736	128	463	48	144	6.7	1.3	0.08	4.4	4.2
2	0.19	2.1	646	110	454	45	123	6.1	1.3	0.00	3.8	4.2
3	0.22	2.9	492	97	351	44	107	5.7	1.1	0.00	3.4	4.1
4	0.33	3.1	2,630	89	2,300	40	101	5.3	1.2	0.00	3.1	4.1
5	0.34	3.5	4,090	84	1,030	38	96	4.9	1.2	0.00	2.9	4.1
6	0.37	4.3	2,070	79	713	38	84	4.7	1.2	0.01	2.5	4.1
7	0.49	4.8	1,330	75	475	38	70	4.4	1.2	0.15	2.5	4.1
8	0.49	388	1,040	71	359	462	60	5.4	1.2	0.42	2.7	4.0
9	0.50	674	858	68	286	1,140	52	5.5	1.2	0.75	3.3	3.8
10	0.63	20	637	129	255	423	46	5.1	1.2	0.89	2.9	3.9
11	0.77	6.9	466	640	226	2,390	40	4.6	1.1	0.96	2.8	3.8
12	0.96	4.8	357	267	172	2,180	36	4.9	1.5	1.0	2.8	4.1
13	1.1	3.6	280	182	168	1,090	32	4.8	1.4	0.88	2.9	4.6
14	1.3	2.9	232	151	243	691	29	4.5	1.5	0.73	2.9	6.3
15	1.4	246	947	132	186	428	29	4.0	1.6	0.69	2.8	92
16	1.5	1,230	1,930	120	177	317	44	3.6	1.4	0.57	2.8	157
17	1.5	130	1,090	111	152	243	36	3.2	1.3	0.51	2.9	71
18	2.5	42	723	97	131	189	26	3.1	1.1	0.46	4.3	81
19	2.5	23	486	88	122	234	20	2.9	0.98	0.38	4.1	33
20	2.4	16	851	84	109	3,030	18	2.8	0.94	0.30	4.0	16
21	2.4	2,890	561	78	107	4,130	16	2.5	0.90	0.20	4.2	11
22	2.6	14,700	369	74	97	2,040	15	2.1	0.87	0.11	4.5	9.0
23	4.0	2,260	280	71	86	2,240	13	1.8	0.79	0.15	4.4	7.3
24	6.2	1,840	227	66	73	1,300	12	1.8	0.72	0.23	4.4	6.2
25	5.9	1,670	195	5,770	62	993	11	1.8	0.61	0.14	4.4	5.7
26	4.9	1,470	189	3,530	57	739	9.9	1.7	0.53	0.26	4.4	5.7
27	4.8	1,430	502	1,570	53	511	8.8	1.7	0.43	123	3.9	5.9
28	4.7	1,170	264	1,220	50	370	8.2	1.6	0.32	43	3.6	7.7
29	4.1	1,030	205	996	49	273	7.5	1.4	0.25	12	3.1	7.6
30	3.7	872	175	792	---	210	6.9	1.3	0.18	7.1	3.0	7.0
31	1.1	---	148	561	---	171	---	1.4	---	5.3	3.6	---
Total	64.22	32,141.9	25,006	17,530	9,006	26,085	1,301.3	111.3	30.52	200.27	107.3	582.5
Mean	2.07	1,071	807	565	311	841	43.4	3.59	1.02	6.46	3.46	19.4
Max	6.2	14,700	4,090	5,770	2,300	4,130	144	6.7	1.6	123	4.5	157
Min	0.19	2.0	148	66	49	38	6.9	1.3	0.18	0.00	2.5	3.8
Ac-ft	127	63,750	49,600	34,770	17,860	51,740	2,580	221	61	397	213	1,160

07247015 POTEAU RIVER NEAR LOVING, OK

Robert S. Kerr Reservoir Basin
Poteau Subbasin

LOCATION.--Lat 34°52'47", long 94°29'02" referenced to North American Datum of 1927, in SW 1/4 NW 1/4 sec.29, T.5 N., R.27 E., Le Flore County, OK, Hydrologic Unit 11110105, on right downstream bank of county road bridge, 0.6 mi northwest of Loving, 1.0 mi above Loving Creek, and at mile 93.6.
DRAINAGE AREA.--268 mi², revised. From automated delineation using 10-meter National Elevation Dataset digital elevation model data dated 10/01/2006 and Watershed Boundary Dataset dated 10/01/2006, using Albers Equal-Area Projection, North American Datum 1983.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--April 1992 to current year.
REVISED RECORDS.--OK-2000-1: 1999. WDR 2012: Drainage area.
GAGE.--Water-stage recorder. Datum of gage is 507.76 ft above NGVD of 1929.
REMARKS.--Records poor. Some regulation by small flood-retarding structures. U.S. Geological Survey satellite telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012, DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	e0.87	e9.5	715	157	661	60	217	15	1.9	0.06	e18	0.90
2	e0.78	e9.6	640	132	665	57	180	13	1.8	0.04	e15	0.99
3	e0.71	e16	576	113	529	51	150	12	2.2	0.03	e11	1.1
4	e0.67	e15	2,910	100	2,750	47	138	10	3.2	0.01	e9.1	1.2
5	e0.62	e14	4,980	92	1,430	43	132	9.0	3.8	0.00	e6.4	1.2
6	e0.58	e14	3,040	84	983	40	115	8.2	4.0	0.00	e3.9	1.2
7	e0.55	e13	1,550	79	720	37	98	7.3	2.8	0.00	e2.5	1.2
8	e0.52	885	1,110	73	e565	53	82	13	1.7	0.00	1.8	1.2
9	e0.49	1,340	873	69	e464	1,520	71	25	1.7	0.02	2.6	1.0
10	e0.93	240	701	317	e437	691	63	13	1.6	0.25	2.6	0.91
11	e1.3	98	567	846	e344	1,850	61	9.3	1.1	0.21	2.2	0.80
12	e1.5	59	465	491	e270	3,820	54	8.9	1.4	0.16	1.5	0.75
13	e1.4	42	385	303	e239	1,460	49	8.9	2.1	0.10	1.4	0.71
14	e1.2	33	321	229	e321	949	45	8.7	4.5	0.07	1.2	0.63
15	e1.1	226	815	187	e292	647	46	8.6	11	0.05	1.1	0.73
16	e0.97	1,730	2,070	158	266	482	62	8.3	17	0.05	0.72	22
17	e2.7	558	1,310	139	232	367	63	7.7	8.1	0.03	0.46	122
18	e3.6	243	866	121	199	281	54	6.9	7.1	0.01	39	49
19	e3.6	162	662	104	178	282	43	6.0	7.1	0.00	8.3	48
20	e3.4	124	844	95	162	4,150	37	5.1	7.0	0.00	3.4	25
21	e4.0	2,570	733	87	147	5,990	32	5.0	6.2	0.00	2.4	14
22	e5.1	17,900	508	80	145	3,180	28	5.0	5.4	0.00	2.0	9.1
23	e8.0	7,230	395	73	125	2,610	25	4.6	4.9	0.00	1.9	6.5
24	e7.6	1,990	314	69	108	1,680	23	4.8	2.9	0.00	1.7	4.9
25	e7.2	1,750	266	5,870	92	1,240	21	4.3	1.2	0.00	1.4	4.2
26	e6.9	1,540	235	8,200	80	939	19	4.1	0.70	0.07	1.3	3.6
27	e15	1,530	487	2,160	73	739	18	3.7	0.47	0.60	1.3	3.7
28	e19	1,200	392	1,610	68	575	18	3.6	0.29	96	1.2	4.2
29	e16	999	279	1,260	64	443	15	2.6	0.17	52	1.1	3.8
30	e14	855	231	973	---	339	14	2.2	0.10	22	0.96	9.3
31	e12	---	191	780	---	269	---	2.5	---	e20	0.96	---
Total	142.29	43,395.1	29,431	25,051	12,609	34,891	1,973	246.3	113.43	191.76	148.40	343.82
Mean	4.59	1,447	949	808	435	1,126	65.8	7.95	3.78	6.19	4.79	11.5
Max	19	17,900	4,980	8,200	2,750	5,990	217	25	17	96	39	122
Min	0.49	9.5	191	69	64	37	14	2.2	0.10	0.00	0.46	0.63
Ac-ft	282	86,070	58,380	49,690	25,010	69,210	3,910	489	225	380	294	682

WATER-QUALITY RECORDS

PERIOD OF RECORD.–December 1991 to current year.

REMARKS.--Samples were collected periodically. Specific conductance, pH, water temperature, turbidity and dissolved oxygen were determined in the field. WY 2011 bacteria data, omitted in the 2011 WDR, was included in this report.

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
[MPN/100 mL, most probable number per 100 milliliters; <, less than; >, greater than]

Date	Sample start time	Entero-cocci, Defined Substrate Tech-nology, water, MPN/100 mL (99601)	Esche-richia coli, Defined Substrate Tech-nology, water, MPN/100 mL (50468)	Total coliform, Defined Substrate Tech-nology, water, MPN/100 mL (50569)
10-19-2010	1600	----	----	----
12-09-2010	1600	----	----	----
03-07-2011	1455	----	----	----
04-11-2011	1530	370	20	3300
04-15-2011	1330	>4800	14000	39000
04-20-2011	1430	460	40	4400
04-26-2011	1200	>4800	3100	110000
05-02-2011	1330	>4800	9600	200000
05-23-2011	1430	220	200	18000
06-07-2011	1200	1300	63	9200
08-16-2011	0900	1500	170	55000

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Part 1 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; MPN/100 mL, most probable number per 100 milliliters; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data; <, less than; >, greater than; E, estimated]

Date	Sample start time	Barometric pressure, mm Hg (00025)	Temperature, air, °C (00020)	Discharge, instantaneous, ft³/s (00061)	Dissolved oxygen, water, unfiltered, mg/L (00300)	Dissolved oxygen, water, unfiltered, % saturation (00301)	pH, water, unfiltered, field, standard units (00400)	Specific conductance, water, unfiltered, µS/cm at 25°C (00095)	Temperature, water, °C (00010)
10-04-2011	0930	758	13.1	E .67	6.5	67	7.0	118	17.1
11-09-2011	1330	759	10.9	1,340	7.2	71	7.2	302	14.8
11-22-2011	1430	751	10.4	17,200	8.7	83	6.6	27	13.2
12-05-2011	1345	757	3.9	5,050	10.6	93	6.9	44	9.3
12-08-2011	0915	--	3.3	1,160	11.8	--	6.9	50	6.5
02-07-2012	0930	757	5.5	745	11.0	94	6.9	51	8.1
03-12-2012	1130	755	22.2	3,500	9.9	92	6.8	43	11.6
03-21-2012	1145	755	12.3	6,490	8.9	89	6.7	44	15.0
04-10-2012	0930	756	15.9	64	7.7	85	7.4	83	19.6
06-12-2012	1530	759	--	1.5	5.4	73	7.0	152	31.5
06-13-2012	1030	755	26.1	1.9	5.6	70	7.0	152	26.4
08-16-2012	0830	755	28.3	.82	3.0	37	6.9	222	26.0

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 2 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; MPN/100 mL, most probable number per 100 milliliters; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; –, no data; <, less than; >, greater than; E, estimated]

Date	Sample start time	Turbidity, water, unfiltered, broad band light source (400-680 nm), detectors at multiple angles including 90 +/- 30 degrees, ratiometric correction, NTRU (63676)	Turbidity, water, unfiltered, mono-chrome near infra-red LED light, 780-900 nm, detection angle 90 +/- 2.5 degrees, FNU (63680)	Ammonia plus organic nitrogen, water, unfiltered, mg/L as N (00625)	Ammonia, water, filtered, mg/L as NH4 (71846)	Ammonia, water, filtered, mg/L as N (00608)	Nitrate plus nitrite, water, filtered, mg/L as N (00631)	Nitrate, water, filtered, mg/L (71851)	Nitrate, water, filtered, mg/L as N (00618)
10-04-2011	0930	E 6.49	6.9	.494	.017	.0128	.009	.040	.009
11-09-2011	1330	169	180	1.49	.042	.0323	.933	4.07	.919
11-22-2011	1430	202	170	1.30	.038	.0297	.273	1.19	.268
12-05-2011	1345	51.0	–	.718	.048	.0371	.646	2.84	.642
12-08-2011	0915	E 17.3	18	.350	.051	.0395	.663	2.91	.658
02-07-2012	0930	E 18.8	–	.341	.014	.0110	.364	1.60	.361
03-12-2012	1130	75.3	78	.795	.058	.0451	.135	.588	.133
03-21-2012	1145	60.7	65	.860	.036	.0279	.099	.426	.096
04-10-2012	0930	E 7.88	7.4	.420	.014	.0111	.086	.372	.084
06-12-2012	1530	E 7.03	5.9	.536	.099	.0772	.089	.377	.085
06-13-2012	1030	E 8.06	7.6	.520	.054	.0417	.023	.100	.023
08-16-2012	0830	E 7.49	7.7	.598	.068	.0528	.059	.250	.056

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 3 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; MPN/100 mL, most probable number per 100 milliliters; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; –, no data; <, less than; >, greater than; E, estimated]

Date	Sample start time	Nitrite, water, filtered, mg/L (71856)	Nitrite, water, filtered, mg/L as N (00613)	Organic nitrogen, water, unfiltered, mg/L (00605)	Orthophos-phate, water, filtered, mg/L (00660)	Orthophos-phate, water, filtered, mg/L as P (00671)	Phos-phorus, water, filtered, mg/L as P (00666)	Phosphorus, water, unfiltered, mg/L as P (00665)	Total nitrogen, water, unfiltered, mg/L (00600)
10-04-2011	0930	< .003	< .001	.48	< .012	< .004	.0142	.0433	.50
11-09-2011	1330	.046	.0139	1.5	.173	.0564	.0729	.401	2.4
11-22-2011	1430	.015	.00465	1.3	.190	.0620	.0831	.428	1.6
12-05-2011	1345	.012	.00351	.68	.397	.130	.146	.236	1.4
12-08-2011	0915	.016	.00475	.31	.112	.0366	.0684	.0759	1.0
02-07-2012	0930	.008	.00252	.33	.052	.0170	.0284	.0601	.70
03-12-2012	1130	.008	.00251	.75	.326	.106	.136	.317	.93
03-21-2012	1145	.010	.0029	.83	.277	.0903	.119	.258	.96
04-10-2012	0930	.008	.00237	.41	< .012	< .004	.0125	.0471	.51
06-12-2012	1530	.013	.00398	.46	.040	.0130	.0276	.0548	.63
06-13-2012	1030	< .003	< .0010	.48	.021	.0067	.0180	.0508	.54
08-16-2012	0830	.009	.00283	.55	.029	.0094	.0245	.0516	.66

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Part 4 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; MPN/100 mL, most probable number per 100 milliliters; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; –, no data; <, less than; >, greater than; E, estimated]

Date	Sample start time	Entero-cocci, Defined Substrate Tech-nology, water, MPN/100 mL (99601)	Esche-richia coli, Defined Substrate Tech-nology, water, MPN/100 mL (50468)	Total coliform, Defined Substrate Tech-nology, water, MPN/100 mL (50569)	Organic carbon, water, unfiltered, mg/L (00680)	Suspended sediment, sieve diameter, percent smaller than 0.0625 mm (70331)	Suspended sediment concen-tration, mg/L (80154)	Suspended sediment discharge, tons per day (80155)
10-04-2011	0930	96	63	8,200	5.40	90	3	E .01
11-09-2011	1330	> 4,800	6,100	170,000	14.3	95	197	713
11-22-2011	1430	> 4,800	8,400	120,000	13.2	57	554	25,700
12-05-2011	1345	> 4,800	1,800	140,000	8.41	74	74	1,010
12-08-2011	0915	120	310	26,000	4.94	85	14	44
02-07-2012	0930	40	120	1,500	4.43	–	–	–
03-12-2012	1130	4,800	5,000	160,000	11.4	78	114	1,080
03-21-2012	1145	> 4,800	3,700	24,000	10.0	75	94	1,650
04-10-2012	0930	46	63	5,000	4.86	89	11	1.9
06-12-2012	1530	> 4,800	10	19,000	4.92	83	10	.04
06-13-2012	1030	> 4,800	31	19,000	5.20	97	7	.04
08-16-2012	0830	260	52	16,000	6.06	100	5	.01

07247250 BLACK FORK BELOW BIG CREEK NEAR PAGE, OK

Robert S. Kerr Reservoir Basin

Poteau Subbasin

LOCATION.–Lat 34°46'25", long 94°30'43" referenced to North American Datum of 1927, in NE 1/4 SW 1/4 sec.31, T.4 N., R.27 E., Le Flore County, OK, Hydrologic Unit 11110105, on downstream side of bridge pier of county road bridge, 2.2 mi above Haw Creek, 5.0 mi north of Page, and at mile 24.6.

DRAINAGE AREA.–94.3 mi², revised. From automated delineation using 10-meter National Elevation Dataset digital elevation model data dated 10/01/2006 and Watershed Boundary Dataset dated 10/01/2006, using Albers Equal-area Projection, North American Datum 1983.

SURFACE-WATER RECORDS

PERIOD OF RECORD.–March 1992 to current year.

REVISED RECORDS.–WDR OK-96-1: 1993(M), 1995(M): WDR 2012: Drainage area.

GAGE.–Water-stage recorder. Datum of gage is 684.00 ft. above NGVD of 1929, from topographic map.

REMARKS.– Records poor. U.S. Army Corps of Engineers' satellite telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012, DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.04	0.10	e101	e73	e154	e40	e67	e283	e2.0	0.10	e0.00	0.00
2	0.03	0.10	e90	e65	e136	e38	e55	e123	e1.9	0.08	e0.00	0.00
3	0.02	0.14	e67	e60	e149	e37	e116	e83	e1.7	0.07	e0.00	0.00
4	0.00	0.12	e3,100	e56	e888	e34	e102	e65	e1.9	0.06	e0.00	0.00
5	0.00	0.11	e1,900	e51	e499	e32	e76	e50	e1.7	0.04	e0.00	0.00
6	0.00	0.11	e860	e47	e297	e31	e61	e39	e1.4	0.05	e0.00	0.00
7	0.00	0.10	e511	e47	e229	e29	e53	e31	e1.2	0.09	e0.00	0.00
8	0.00	196	e378	e44	e193	e769	e49	e74	e0.98	0.08	0.00	0.00
9	0.00	275	e251	e42	e158	e1,240	e47	e103	e0.88	0.08	0.00	0.00
10	0.00	57	e191	e225	e149	e500	e42	e61	e0.75	0.09	0.00	0.00
11	0.00	34	e147	e361	e129	e3,040	e100	e44	e0.64	0.08	0.00	0.00
12	0.00	23	e113	e225	e102	e1,830	e129	e40	e1.0	0.07	0.00	0.00
13	0.00	18	e95	e164	e114	e769	e90	e41	e1.4	0.06	0.00	0.00
14	0.00	15	e90	e138	e125	e437	e80	e32	1.3	0.05	0.00	0.00
15	0.00	225	e724	e112	e117	e253	e104	e26	4.3	0.05	0.00	0.00
16	0.00	1,050	e1,240	e102	e104	e183	e188	e23	4.5	0.04	0.00	0.00
17	0.00	224	e553	e91	e95	e148	e135	e21	2.5	0.03	0.00	0.00
18	0.00	120	e362	e80	e86	e122	e108	e19	1.4	0.02	0.00	0.00
19	0.00	82	e268	e72	e80	e154	e88	e16	1.0	0.01	0.00	0.00
20	0.00	66	e458	e64	e76	e4,200	e79	e14	0.89	0.00	0.00	0.00
21	0.00	e6,450	e330	e58	e81	e2,300	e72	e12	0.74	0.00	0.00	0.00
22	0.00	e3,170	e257	e52	e73	e952	e60	e11	0.61	0.00	0.00	0.00
23	0.07	e1,250	e203	e47	e63	e560	e50	e8.9	0.53	0.00	0.00	0.00
24	0.07	e944	e168	e41	e59	e457	e42	e7.0	0.43	0.00	0.00	0.00
25	0.07	e805	e146	e5,310	e55	e307	e37	e6.2	0.35	0.00	0.00	0.00
26	0.06	e724	e137	e1,700	e51	e225	e33	e5.3	0.28	0.00	0.00	0.00
27	0.09	e654	e170	e900	e48	e168	e29	e4.6	0.23	0.00	0.00	0.00
28	0.14	e608	e134	e478	e44	e139	e25	e3.9	0.18	0.00	0.00	0.00
29	0.12	e446	e120	e250	e42	e110	e23	e3.2	0.14	0.00	0.00	0.00
30	0.11	e159	e100	e191	---	e91	e105	e3.2	0.12	e0.00	0.00	0.00
31	0.10	---	e86	e172	---	e79	---	e2.6	---	e0.00	0.00	---
Total	0.92	17,595.78	13,350	11,318	4,396	19,274	2,245	1,255.9	36.95	1.15	0.00	0.00
Mean	0.03	587	431	365	152	622	74.8	40.5	1.23	0.04	0.00	0.00
Max	0.14	6,450	3,100	5,310	888	4,200	188	283	4.5	0.10	0.00	0.00
Min	0.00	0.10	67	41	42	29	23	2.6	0.12	0.00	0.00	0.00
Ac-ft	1.8	34,900	26,480	22,450	8,720	38,230	4,450	2,490	73	2.3	0.00	0.00

WATER-QUALITY RECORDS

PERIOD OF RECORD.--December 1991 to current year.

REMARKS.--Samples were collected periodically. Specific conductance, pH, water temperature, turbidity and dissolved oxygen were determined in the field.

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 1 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; <, less than; E, estimated]

Date	Sample start time	Barometric pressure, mm Hg (00025)	Temperature, air, °C (00020)	Discharge, instantaneous, ft³/s (00061)	Dissolved oxygen, water, unfiltered, mg/L (00300)	Dissolved oxygen, water, unfiltered, % saturation (00301)	pH, water, unfiltered, field, standard units (00400)	Specific conductance, water, unfiltered, µS/cm at 25°C (00095)	Temperature, water, °C (00010)
10-03-2011	1530	756	26.8	.01	8.2	94	7.2	41	21.6
12-07-2011	1430	755	3.3	E 511	11.7	99	6.8	27	7.7
02-06-2012	1700	754	11.3	E 297	12.1	105	7.1	26	8.7
04-09-2012	1400	754	19.9	E 47	8.2	89	7.0	30	18.9
06-12-2012	1630	754	33.4	E 1.0	7.7	106	6.7	39	31.3

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 2 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; <, less than; E, estimated]

Date	Sample start time	Turbidity, water, unfiltered, broad band light source (400-680 nm), detectors at multiple angles including 90 +/- 30 degrees, ratiometric correction, NTRU (63676)	Turbidity, water, unfiltered, monochrome near infrared LED light, 780-900 nm, detection angle 90 +/- 2.5 degrees, FNU (63680)	Ammonia plus organic nitrogen, water, unfiltered, mg/L as N (00625)	Ammonia, water, filtered, mg/L as NH4 (71846)	Ammonia, water, filtered, mg/L as N (00608)	Nitrate plus nitrite, water, filtered, mg/L as N (00631)	Nitrate, water, filtered, mg/L (71851)	Nitrate, water, filtered, mg/L as N (00618)
10-03-2011	1530	E 6.90	3.0	.646	.015	.0114	.066	.292	.066
12-07-2011	1430	E 4.84	5.7	.095	.013	.0100	.544	2.40	.542
02-06-2012	1700	E 4.90	—	.095	.057	.0440	.307	1.35	.305
04-09-2012	1400	E 4.12	3.5	.158	.020	.0152	.117	.511	.115
06-12-2012	1630	E 3.92	3.6	.354	< .013	< .010	< .01	< .044	< .010

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 3 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; <, less than; E, estimated]

Date	Sample start time	Nitrite, water, filtered, mg/L (71856)	Nitrite, water, filtered, mg/L as N (00613)	Organic nitrogen, water, unfiltered, mg/L (00605)	Orthophosphate, water, filtered, mg/L (00660)	Orthophosphate, water, filtered, mg/L as P (00671)	Phosphorus, water, filtered, mg/L as P (00666)	Phosphorus, water, unfiltered, mg/L as P (00665)	Total nitrogen, water, unfiltered, mg/L (00600)
10-03-2011	1530	< .003	< .001	.63	< .012	< .004	.0080	.0479	.71
12-07-2011	1430	.004	.00124	.08	< .012	< .004	.0051	.0097	.64
02-06-2012	1700	.004	.00112	.05	< .012	< .004	.0040	.0085	.40
04-09-2012	1400	.006	.00185	.14	< .012	< .004	.0035	.0109	.28
06-12-2012	1630	< .003	< .0010	< .35	< .012	< .004	.0104	.0305	< .36

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 4 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; <, less than; E, estimated]

Date	Sample start time	Suspended sediment, sieve diameter, percent smaller than 0.0625 mm (70331)	Suspended sediment concentration, mg/L (80154)	Suspended sediment discharge, tons per day (80155)
10-03-2011	1530	87	4	0.00
12-07-2011	1430	100	1	E 1.4
02-06-2012	1700	100	23	E 18
04-09-2012	1400	72	4	E .51
06-12-2012	1630	84	5	E .01

07247345 BLACK FORK AT HODGEN, OK

Robert S. Kerr Reservoir Basin

Poteau Subbasin

LOCATION.–Lat 34°50'35", long 94°37'28" referenced to North American Datum of 1927, in SE 1/4 SE 1/4 sec.1, T.4 N., R.25 E., Le Flore County, OK, Hydrologic Unit 11110105, at county road bridge 0.4 mi east of Hodgen, OK.

DRAINAGE AREA.–196 mi², revised. From automated delineation using 10-meter National Elevation Dataset digital elevation model data dated 10/01/2006 and Watershed Boundary Dataset dated 10/01/2006, using Albers Equal-Area Projection, North American Datum 1983.

SURFACE-WATER RECORDS

PERIOD OF RECORD.–Discharge measurements only: 1992 to current year.

REVISED RECORDS.–WDR 2012: Drainage area.

DISCHARGE MEASUREMENTS
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Date	Discharge, in ft³/s
Oct 3, 2011	0.016
Dec 7, 2011	1,040
Feb 6, 2012	470
Apr 9, 2012	72.9
Jun 13, 2012	1.68
Aug 15, 2012	0.034

WATER-QUALITY RECORDS

PERIOD OF RECORD.--December 1991 to current year.

REMARKS.--Samples were collected periodically. Specific conductance, pH, water temperature, turbidity and dissolved oxygen were determined in the field.

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 1 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data; <, less than; E, estimated]

Date	Sample start time	Barometric pressure, mm Hg (00025)	Temperature, air, °C (00020)	Discharge, instantaneous, ft³/s (00061)	Dissolved oxygen, water, unfiltered, mg/L (00300)	Dissolved oxygen, water, unfiltered, % saturation (00301)	pH, water, unfiltered, field, standard units (00400)	Specific conductance, water, unfiltered, µS/cm at 25°C (00095)	Temperature, water, °C (00010)
10-03-2011	1330	--	29.7	0.02	11.1	--	8.8	39	28.3
12-07-2011	1330	--	2.2	1,040	11.6	--	6.8	31	7.8
02-06-2012	1515	761	13.6	470	11.7	104	7.1	31	10.0
04-09-2012	1600	757	19.9	73	8.6	98	7.0	35	21.4
06-13-2012	0930	756	27.6	1.7	5.7	73	6.6	62	27.7
08-15-2012	1330	756	33.4	.03	8.7	124	7.5	104	34.2

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 2 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data; <, less than; E, estimated]

Date	Sample start time	Turbidity, water, unfiltered, broad band light source (400-680 nm), detectors at multiple angles including 90 +/- 30 degrees, ratiometric correction, NTRU (63676)	Turbidity, water, unfiltered, monochrome near infrared LED light, 780-900 nm, detection angle 90 +/- 2.5 degrees, FNU (63680)	Ammonia plus organic nitrogen, water, unfiltered, mg/L as N (00625)	Ammonia, water, filtered, mg/L as NH4 (71846)	Ammonia, water, filtered, mg/L as N (00608)	Nitrate plus nitrite, water, filtered, mg/L as N (00631)	Nitrate, water, filtered, mg/L (71851)	Nitrate, water, filtered, mg/L as N (00618)
10-03-2011	1330	E 3.38	3.9	.486	.017	.0129	.008	.035	.008
12-07-2011	1330	E 8.92	--	.167	.014	.0110	.545	2.40	.543
02-06-2012	1515	E 12.3	--	.181	< .013	< .010	.248	1.09	.247
04-09-2012	1600	E 3.25	2.8	.175	.018	.0140	.117	.506	.114
06-13-2012	0930	E 3.61	2.3	.318	.045	.0347	.096	.419	.095
08-15-2012	1330	E 2.53	2.8	.433	.028	.0218	.025	.109	.025

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 3 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data; <, less than; E, estimated]

Date	Sample start time	Nitrite, water, filtered, mg/L (71856)	Nitrite, water, filtered, mg/L as N (00613)	Organic nitrogen, water, unfiltered, mg/L (00605)	Orthophosphate, water, filtered, mg/L (00660)	Orthophosphate, water, filtered, mg/L as P (00671)	Phosphorus, water, filtered, mg/L as P (00666)	Phosphorus, water, unfiltered, mg/L as P (00665)	Total nitrogen, water, unfiltered, mg/L (00600)
10-03-2011	1330	<.003	<.001	.47	<.012	<.004	.0065	.0177	.49
12-07-2011	1330	.007	.00213	.16	.013	.00439	.0090	.0184	.71
02-06-2012	1515	.005	.00156	<.18	<.012	<.004	.0082	.0197	.43
04-09-2012	1600	.008	.00244	.16	<.012	<.004	.0041	.0129	.29
06-13-2012	0930	.005	.00152	.28	<.012	<.004	.0073	.0231	.41
08-15-2012	1330	<.003	<.0010	.41	<.012	<.004	.0066	.0221	.46

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 4 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data; <, less than; E, estimated]

Date	Sample start time	Suspended sediment, sieve diameter, percent smaller than 0.0625 mm (70331)	Suspended sediment concentration, mg/L (80154)	Suspended sediment discharge, tons per day (80155)
10-03-2011	1330	57	6	0.00
12-07-2011	1330	100	4	11
02-06-2012	1515	100	2	2.5
04-09-2012	1600	75	9	1.8
06-13-2012	0930	76	8	.04
08-15-2012	1330	64	3	.00

07247500 FOURCHE MALINE NEAR RED OAK, OK

Robert S. Kerr Reservoir Basin
Poteau Subbasin

LOCATION.–Lat 34°54'45", long 95°09'20" referenced to North American Datum of 1927, in NW 1/4 NW 1/4 sec.13, T.5 N., R.20 E., Latimer County, OK, Hydrologic Unit 11110105, on downstream side of left abutment of county road bridge, 0.1 mi downstream from Little Fourche Maline, 5.0 mi southwest of Red Oak, and at mile 41.2.

DRAINAGE AREA.–120 mi², revised. From automated delineation using 10-meter National Elevation Dataset digital elevation model data dated 10/01/2006 and Watershed Boundary Dataset dated 10/01/2006, using Albers Equal-Area Projection, North American Datum 1983.

SURFACE-WATER RECORDS

PERIOD OF RECORD.–October 1938 to April 1991, October 1991 to current year. Monthly discharges only October 1938 to February 1939.

REVISED RECORDS.–WSP 1117: Drainage area. WSP 1631: 1940. WDR 2012: Drainage area.

GAGE.–Water-stage recorder. Datum of gage is 540.80 ft above NGVD of 1929. Prior to April 25, 1939, nonrecording gage at same site and datum.

REMARKS.– Records poor due to occasional debris buildups on control. Some regulation by several flood-retarding structures. U.S. Army Corps of Engineers satellite telemeter at station.

EXTREMES OUTSIDE PERIOD OF RECORD.–Flood in June 1935 reached a stage of 25.4 ft, from floodmarks.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012, DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	e0.38	7.7	15	19	122	32	68	59	3.0	0.29	0.64	3.5
2	e0.37	6.7	14	16	101	29	58	56	3.2	0.24	0.57	3.2
3	e0.29	5.4	16	14	175	26	114	45	3.9	0.21	0.47	2.3
4	e0.21	4.2	230	14	763	24	1,070	33	7.0	0.18	0.34	1.4
5	e0.20	3.7	358	14	425	21	780	29	27	0.16	0.27	0.96
6	e0.19	3.6	148	13	218	20	586	23	16	0.14	0.21	0.70
7	e0.35	3.7	82	14	150	20	367	20	11	0.14	0.18	0.53
8	0.34	28	53	13	113	31	215	53	7.7	0.12	0.17	0.41
9	0.33	55	39	13	91	71	113	126	5.7	0.11	0.32	0.26
10	0.37	34	31	18	88	79	92	68	4.2	0.09	1.2	0.16
11	0.36	22	25	65	88	78	87	39	3.7	0.07	0.94	0.10
12	0.34	18	22	74	73	118	137	31	27	0.06	0.62	0.06
13	0.31	13	19	50	70	109	111	46	66	0.05	0.70	0.04
14	0.30	16	22	38	85	83	84	45	19	0.06	0.68	0.05
15	0.30	15	75	31	81	67	75	31	244	0.10	0.60	0.07
16	0.29	9.7	115	27	76	58	221	21	210	0.20	0.46	0.09
17	0.29	10	81	24	68	50	133	16	77	0.20	0.33	0.10
18	0.39	83	59	22	62	44	89	12	33	0.18	1.6	0.10
19	0.37	7.8	47	20	59	48	66	9.5	17	0.15	15	0.07
20	0.36	8.8	82	17	58	2,470	56	7.1	10	0.12	10	0.05
21	0.36	45	109	16	68	2,710	54	5.8	63	0.10	7.8	0.02
22	0.39	363	80	16	81	1,210	43	4.6	3.8	0.13	4.6	0.00
23	1.3	162	59	16	71	1,030	36	4.7	2.6	0.16	2.7	0.00
24	3.9	64	46	14	60	937	29	4.9	1.6	0.18	1.6	0.00
25	11	38	38	1,540	49	875	24	4.7	0.99	0.20	1.4	0.00
26	8.8	27	33	1,640	43	804	20	3.8	0.62	0.24	1.9	0.00
27	6.8	23	30	987	38	647	18	3.5	0.42	4.7	1.8	0.00
28	8.3	19	26	802	36	458	15	3.4	0.35	2.1	1.5	0.00
29	16	20	23	623	34	197	15	3.3	0.41	1.4	2.0	0.00
30	13	18	21	494	—	98	19	3.7	0.35	0.73	6.0	0.04
31	10	—	20	248	—	80	—	3.3	—	0.64	4.5	—
Total	86.19	1,059.6	2,018	6,912	3,446	12,524	4,795	815.3	812.84	13.45	71.10	14.21
Mean	2.78	35.3	65.1	223	119	404	160	26.3	27.1	0.43	2.29	0.47
Max	16	363	358	1,640	763	2,710	1,070	126	244	4.7	15	3.5
Min	0.19	3.6	14	13	34	20	15	3.3	0.35	0.05	0.17	0.00
Ac-ft	171	2,100	4,000	13,710	6,840	24,840	9,510	1,620	1,610	27	141	28

07247650 FOURCHE MALINE NEAR LEFLORE, OK

Robert S. Kerr Reservoir Basin

Poteau Subbasin

LOCATION.--Lat 34°55'11", long 94°56'43" referenced to North American Datum of 1927, in NE 1/4 SE 1/4 sec.11, T.5 N., R.22 E., Le Flore County, OK, Hydrologic Unit 11110105, at county road bridge 1.6 mi east of Leflore, OK.

DRAINAGE AREA.--267 mi², revised. From automated delineation using 10-meter National Elevation Dataset digital elevation model data dated 10/01/2006 and Watershed Boundary Dataset dated 10/01/2006, using Albers Equal-Area Projection, North American Datum 1983.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--Discharge measurements only: 1992 to current year.

REVISED RECORDS.--WDR 2012: Drainage area.

DISCHARGE MEASUREMENTS
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Date	Discharge, in ft³/s
Nov 9, 2011	35.1
Nov 22, 2011	2,590
Dec 5, 2011	948
Dec 8, 2011	221
Jan 25, 2012	6,540
Feb 7, 2012	541
Mar 12, 2012	8,130
Mar 21, 2012	5,480
Apr 10, 2012	147
Jun 13, 2012	14.8
Jun 27, 2012	3.67
Aug 16, 2012	0.01

WATER-QUALITY RECORDS

PERIOD OF RECORD.–December 1991 to current year.

REMARKS.—Samples were collected periodically. Specific conductance, pH, water temperature, dissolved oxygen and tubidity were determined in the field. WY 2011 bacteria data, omitted in the 2011 WDR, was included in this report.

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

[MPN/100 mL, most probable number per 100 milliliters; <, less than; >, greater than]

Date	Sample start time	Entero-cocci, Defined Substrate Tech-nology, water, MPN/100 mL (99601)	Esche-richia coli, Defined Substrate Tech-nology, water, MPN/100 mL (50468)	Total coliform, Defined Substrate Tech-nology, water, MPN/100 mL (50569)
10-27-2010	0945	180	10	6100
12-15-2010	1030	100	20	270
02-23-2011	1030	27	160	610
04-11-2011	1130	820	490	16000
04-15-2011	1030	>4800	7500	46000
04-20-2011	0930	980	110	3900
04-26-2011	1730	>4800	2100	170000
05-02-2011	1400	>4800	2400	58000
05-23-2011	1000	1800	1400	41000
06-07-2011	0830	87	41	6300
08-16-2011	1300	60	<10	4100

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Part 1 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; MPN/100 mL, most probable number per 100 milliliters; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; <, less than; >, greater than; E, estimated]

Date	Sample start time	Barometric pressure, mm Hg (00025)	Temperature, air, °C (00020)	Discharge, instantaneous, ft³/s (00061)	Dissolved oxygen, water, unfiltered, mg/L (00300)	Dissolved oxygen, water, unfiltered, % saturation (00301)	pH, water, unfiltered, field, standard units (00400)	Specific conductance, water, unfiltered, µS/cm at 25°C (00095)	Temperature, water, °C (00010)
11-09-2011	0945	759	7.2	35	5.3	52	7.3	178	13.7
11-22-2011	0800	751	7.7	2,590	9.6	89	6.9	63	11.6
12-05-2011	0930	759	.9	948	10.4	90	7.1	90	8.9
12-08-2011	1400	757	7.8	221	12.0	96	7.2	103	5.6
01-25-2012	1400	743	7.6	6,540	11.1	96	6.7	37.0	8.0
02-07-2012	1300	758	11.7	541	10.7	92	6.9	70	8.7
03-12-2012	1000	756	15.0	8,130	10.3	95	7.0	80	11.5
03-21-2012	0900	752	13.5	5,480	7.4	75	6.8	57	15.4
04-10-2012	1330	758	24.7	147	7.3	80	7.2	78	19.2
06-13-2012	1400	756	32.1	14.8	5.5	70	7.0	162	27.4
06-27-2012	1030	753	30.4	3.7	5.5	72	7.2	151	28.8
08-16-2012	1200	756	31.6	E .01	2.9	39	7.0	202	30.5

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 2 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; MPN/100 mL, most probable number per 100 milliliters; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; <, less than; >, greater than; E, estimated]

Date	Sample start time	Turbidity, water, unfiltered, broad band light source (400-680 nm), detectors at multiple angles including 90 +/- 30 degrees, ratiometric correction, NTRU (63676)	Turbidity, water, unfiltered, mono-chrome near infra-red LED light, 780-900 nm, detection angle 90 +/- 2.5 degrees, FNU (63680)	Ammonia plus organic nitrogen, water, unfiltered, mg/L as N (00625)	Ammonia, water, filtered, mg/L as NH4 (71846)	Ammonia, water, filtered, mg/L as N (00608)	Nitrate plus nitrite, water, filtered, mg/L as N (00631)	Nitrate, water, filtered, mg/L (71851)	Nitrate, water, filtered, mg/L as N (00618)
11-09-2011	0945	29.0	32	.598	<.013	<.010	--	--	--
11-22-2011	0800	211	210	1.26	.036	.0279	.997	4.39	.991
12-05-2011	0930	97.4	96	.665	.022	.0167	1.08	4.74	1.07
12-08-2011	1400	22.4	24	.380	.022	.0167	1.32	5.83	1.32
01-25-2012	1400	184	--	1.09	.042	.0324	.412	1.80	.406
02-07-2012	1300	49.2	--	.455	.030	.0234	.649	2.86	.645
03-12-2012	1000	38.7	36	.460	.022	.0168	.193	.849	.192
03-21-2012	0900	79.0	80	.902	.028	.0219	.178	.762	.172
04-10-2012	1330	34.1	33	.515	.053	.0411	.269	1.15	.260
06-13-2012	1400	E 17.4	20	.501	<.013	<.010	<.01	<.044	<.010
06-27-2012	1030	25.6	35	.662	<.013	<.010	.048	.211	.048
08-16-2012	1200	E 14.8	18	.929	.034	.0261	<.01	<.044	<.010

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 3 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; MPN/100 mL, most probable number per 100 milliliters; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; <, less than; >, greater than; E, estimated]

Date	Sample start time	Nitrite, water, filtered, mg/L (71856)	Nitrite, water, filtered, mg/L as N (00613)	Organic nitrogen, water, unfiltered, mg/L (00605)	Orthophos-phate, water, filtered, mg/L (00660)	Orthophos-phate, water, filtered, mg/L as P (00671)	Phos-phorus, water, filtered, mg/L as P (00666)	Phosphorus, water, unfiltered, mg/L as P (00665)	Total nitrogen, water, unfiltered, mg/L (00600)
11-09-2011	0945	<.003	<.0010	<.60	<.012	<.004	.0106	.0563	--
11-22-2011	0800	.022	.00658	1.2	.096	.0314	.0494	.248	2.3
12-05-2011	0930	.021	.00629	.65	.089	.0291	.0423	.137	1.7
12-08-2011	1400	.018	.00559	.36	<.012	<.004	.0150	.0403	1.7
01-25-2012	1400	.019	.00578	1.1	.089	.0291	.0598	.336	1.5
02-07-2012	1300	.013	.00388	.43	.022	.00731	.0177	.0710	1.1
03-12-2012	1000	.005	.00161	.44	.021	.00669	.0210	.0574	.65
03-21-2012	0900	.019	.0057	.88	.111	.0361	.0672	.182	1.1
04-10-2012	1330	.031	.00944	.47	.039	.0126	.0250	.0785	.78
06-13-2012	1400	<.003	<.0010	<.50	.015	.00501	.0178	.0576	<.51
06-27-2012	1030	<.003	<.0010	<.66	.026	.0085	.0285	.0956	.71
08-16-2012	1200	<.003	<.0010	.90	.016	.00508	.0215	.0752	<.94

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 4 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; MPN/100 mL, most probable number per 100 milliliters; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; <, less than; >, greater than; E, estimated]

Date	Sample start time	Entero-cocci, Defined Substrate Tech-nology, water, MPN/100 mL (99601)	Esche-richia coli, Defined Substrate Tech-nology, water, MPN/100 mL (50468)	Total coliform, Defined Substrate Tech-nology, water, MPN/100 mL (50569)	Organic carbon, water, unfiltered, mg/L (00680)	Suspended sediment, sieve diameter, percent smaller than 0.0625 mm (70331)	Suspended sediment concen-tration, mg/L (80154)	Suspended sediment discharge, tons per day (80155)
11-09-2011	0945	1,700	660	12,000	9.35	90	31	2.9
11-22-2011	0800	> 4,800	24,000	69,000	14.1	96	281	1,970
12-05-2011	0930	410	1,300	52,000	8.22	95	104	266
12-08-2011	1400	170	84	5,000	4.90	61	26	16
01-25-2012	1400	3,500	4,000	33,000	12.6	98	168	2,970
02-07-2012	1300	120	350	2,800	7.79	91	45	66
03-12-2012	1000	340	870	4,600	7.12	--	--	--
03-21-2012	0900	4,000	10,000	40,000	11.1	92	78	1,150
04-10-2012	1330	92	98	4,400	8.12	93	28	11
06-13-2012	1400	150	30	15,000	7.48	90	18	.72
06-27-2012	1030	54	< 10	10,000	8.46	73	48	.48
08-16-2012	1200	54	10	69,000	11.8	91	15	E .00

07249400 JAMES FORK NEAR HACKETT, AR

Robert S. Kerr Reservoir Basin
Poteau Subbasin

LOCATION.–Lat 35°09'45", long 94°24'25" referenced to North American Datum of 1983, in NW 1/4 NW 1/4 sec.34, T.6 N., R.32 W., Sebastian County, AR, Hydrologic Unit 11110105, near left bank on downstream side of bridge on State Hwy 45, 1.7 mi south of Hackett, 2.0 mi downstream from Elder Branch, and 3.6 mi upstream from Arkansas-Oklahoma State line.
DRAINAGE AREA.–147 mi².

SURFACE-WATER RECORDS

PERIOD OF RECORD.–Apr 1958 to current year.
REVISED RECORDS.–WDR Arkansas 1970: Drainage area.
GAGE.–Water-stage recorder. Datum of gage is 457.71 ft above NGVD of 1929. Prior to Oct 1, 1990, at datum 2.00 ft higher.
REMARKS.–Water-discharge records good except estimated daily discharges, which are poor. Water quality data available at the files of the USGS. Satellite telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012, DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2.6	9.4	119	43	194	42	68	17	e15	e0.99	e2.0	e1.0
2	2.0	8.0	106	34	200	35	57	19	e14	e0.98	e1.8	e1.0
3	1.4	7.9	97	28	219	32	63	14	e12	e0.97	e1.6	e1.0
4	1.2	6.9	2,160	26	2,130	26	131	13	e11	e0.96	e1.4	e1.0
5	1.3	6.7	2,420	25	535	22	81	13	e9.8	e0.95	e1.2	e1.0
6	1.3	6.3	1,100	22	337	20	58	13	e8.5	e0.94	1.0	e1.0
7	0.97	6.4	473	22	263	18	47	13	e7.2	e0.93	e1.0	e1.0
8	0.99	266	318	22	225	164	40	13	e6.0	e0.92	e1.0	e1.1
9	1.0	922	243	20	190	524	33	13	e4.8	e21	e1.0	e1.1
10	1.1	150	191	116	191	192	30	13	e3.5	e108	e1.0	e1.0
11	1.7	91	155	692	180	967	28	13	e2.3	e10	e1.0	e1.0
12	1.8	69	131	214	136	1,370	e27	13	e2.2	e7.4	e1.0	e1.0
13	1.5	57	111	119	143	381	22	13	e2.1	e5.0	e1.0	e1.1
14	1.7	51	109	90	233	246	19	14	e2.0	e2.2	e1.0	1.2
15	1.9	55	252	71	179	184	e23	14	e2.0	e27	e1.0	1.4
16	1.6	381	367	63	145	145	e47	14	e1.9	e41	e1.0	1.4
17	1.6	155	235	60	124	120	e30	14	e1.8	e21	e1.0	2.0
18	2.7	95	166	42	111	97	21	14	e1.8	e8.5	e1.1	2.4
19	2.4	75	138	33	106	106	16	14	e1.7	e7.2	e1.1	2.3
20	2.1	62	352	32	99	3,920	14	15	e1.7	e6.7	e1.1	1.8
21	2.3	85	231	30	139	3,540	14	15	e1.6	e5.0	e1.1	1.2
22	2.7	2,990	153	27	118	1,220	13	15	e1.5	e4.3	e1.0	0.98
23	5.3	531	118	25	98	575	13	15	e1.5	e3.6	e1.0	0.91
24	3.1	296	96	22	77	382	13	15	e1.4	e3.0	e1.0	0.85
25	3.9	217	84	3,350	58	282	12	15	e1.3	e2.4	e1.0	0.80
26	4.6	191	76	3,660	51	220	12	16	e1.3	e2.0	e1.0	0.76
27	6.9	307	110	727	48	177	12	16	e1.2	e165	e1.0	0.77
28	12	209	94	437	44	146	12	16	e1.1	e44	e1.0	0.88
29	11	164	67	315	44	121	12	16	e1.1	e28	e1.0	0.88
30	14	138	57	259	---	101	12	16	e1.0	e10	e1.0	0.94
31	12	---	48	221	---	83	---	16	---	e5.0	e1.0	---
Total	110.66	7,608.6	10,377	10,847	6,617	15,458	980	450	124.3	544.94	34.4	34.77
Mean	3.57	254	335	350	228	499	32.7	14.5	4.14	17.6	1.11	1.16
Max	14	2,990	2,420	3,660	2,130	3,920	131	19	15	165	2.0	2.4
Min	0.97	6.3	48	20	44	18	12	13	1.0	0.92	1.0	0.76
Ac-ft	219	15,090	20,580	21,520	13,120	30,660	1,940	893	247	1,080	68	69
Cfsm	0.02	1.73	2.28	2.38	1.55	3.39	0.22	0.10	0.03	0.12	0.01	0.01
In.	0.03	1.93	2.63	2.74	1.67	3.91	0.25	0.11	0.03	0.14	0.01	0.01

07249455 ARKANSAS RIVER NEAR FORT SMITH, AR

Robert S. Kerr Reservoir Basin

Robert S. Kerr Reservoir Subbasin

LOCATION.–Lat 35°23'30", long 94°25'56" referenced to North American Datum of 1927, in NW 1/4 SW 1/4 sec.8, T.8 N., R.32 E., Sebastian County, AR, Hydrologic Unit 11110104, at U.S. Highway 64 bridge at Oklahoma and Arkansas state line, .7 mi downstream from Poteau River, 6.6 mi upstream from Lee Creek, 8.0 mi upstream from Arkansas River at Van Buren, and at mile 324.5.

DRAINAGE AREA.–145,940 mi² of which 16,285 mi² probably is noncontributing, revised. From automated delineation using 10-meter National Elevation Dataset digital elevation model data dated 10/01/2006 and Watershed Boundary Dataset dated 10/01/2006, using Albers Equal-Area Projection, North American Datum 1983.

SURFACE-WATER RECORDS

PERIOD OF RECORD.–May 1997 to current year. Some data collected prior to period of record and are available in the district office.

REVISED RECORDS.–WDR 2012: Drainage area.

GAGE.–Water-stage recorder. Datum of gage is 380.24 ft above NGVD of 1929.

REMARKS.–Records fair, except for discharges less than 3,000 ft³/s which are poor. Flow regulated by W.D. Mayo Lock and Dam 14 upstream and J.W. Trimble Lock and Dam 13 downstream.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012, DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	544	1,150	11,200	14,900	9,050	6,320	97,900	42,100	8,800	4,560	3,320	1,880
2	473	2,180	15,100	1,360	14,400	7,170	95,300	67,800	3,290	6,350	4,860	454
3	4,180	3,830	10,800	9,680	14,700	7,890	76,600	93,700	8,670	1,720	2,760	640
4	359	5,810	12,600	7,140	41,200	15,300	75,600	100,000	18,200	2,650	3,320	2,930
5	854	651	21,000	10,900	25,800	4,260	63,300	103,000	21,100	4,680	1,960	3,210
6	1,460	562	16,100	6,470	31,600	5,450	57,600	92,500	13,100	4,210	1,380	2,380
7	634	3,640	14,400	2,270	22,900	3,810	68,100	73,200	657	1,980	2,100	1,030
8	626	32,300	9,400	4,540	35,600	22,700	67,800	67,200	8,180	4,640	369	1,700
9	433	31,800	14,400	8,620	41,900	9,690	57,000	62,100	1,720	2,660	6,320	940
10	385	6,930	7,950	8,130	48,200	17,600	66,800	59,900	1,390	5,050	108	127
11	702	8,860	12,600	19,200	42,000	5,340	68,800	51,000	8,750	5,680	138	1,390
12	842	4,400	15,200	12,700	35,700	22,700	44,700	49,000	1,950	2,470	1,060	2,320
13	1,140	161	15,500	13,300	31,000	23,100	50,200	40,400	3,910	4,030	1,600	893
14	1,120	8,850	12,500	2,090	30,000	20,600	40,100	36,900	4,140	2,270	95	2,370
15	285	4,310	18,100	7,130	39,700	31,800	60,900	40,500	5,920	2,610	114	1,040
16	622	10,400	22,400	6,510	17,600	30,700	71,500	32,700	4,460	4,130	1,560	826
17	3,090	8,490	10,600	10,900	24,700	31,300	63,300	28,300	463	2,110	167	5,920
18	1,190	8,580	15,900	4,910	20,600	27,000	57,400	28,300	11,000	3,880	3,180	3,240
19	2,770	849	17,100	5,470	14,500	26,200	72,600	30,000	1,390	2,190	1,870	6,900
20	4,560	9,600	23,200	12,000	14,300	127,000	61,400	37,500	5,730	8,880	1,240	4,240
21	548	16,100	24,000	3,270	17,600	175,000	60,200	12,700	4,690	785	2,730	1,770
22	859	27,400	19,900	470	18,800	133,000	53,400	15,500	5,370	6,890	1,250	1,930
23	2,640	28,400	41,200	6,090	15,400	135,000	40,500	12,600	3,030	2,780	228	963
24	7,990	17,600	36,100	6,650	14,100	120,000	43,300	16,600	5,420	3,290	31	1,520
25	8,430	15,600	37,100	60,700	16,800	125,000	46,500	14,900	1,800	3,690	3,070	1,800
26	3,820	16,300	25,800	46,400	7,140	132,000	27,200	24,900	5,500	3,770	6,210	3,410
27	8,030	31,600	32,400	37,600	14,600	127,000	28,600	11,000	2,180	291	6,870	2,530
28	3,010	16,900	24,300	23,100	10,600	135,000	18,800	13,200	6,320	2,960	3,430	1,590
29	2,870	16,800	18,700	5,550	26,800	132,000	19,800	16,200	7,860	4,040	1,330	3,010
30	2,270	13,900	11,800	8,250	---	128,000	13,800	5,810	7,110	4,360	1,010	3,020
31	3,210	---	6,840	19,100	---	112,000	---	9,140	---	3,200	5,960	---
Total	69,946	353,953	574,190	385,400	697,290	1,899,930	1,669,000	1,288,650	182,100	112,806	69,640	65,973
Mean	2,256	11,800	18,520	12,430	24,040	61,290	55,630	41,570	6,070	3,639	2,246	2,199
Max	8,430	32,300	41,200	60,700	48,200	175,000	97,900	103,000	21,100	8,880	6,870	6,900
Min	285	161	6,840	470	7,140	3,810	13,800	5,810	463	291	31	127
Ac-ft	138,700	702,100	1,139,000	764,400	1,383,000	3,769,000	3,310,000	2,556,000	361,200	223,800	138,100	130,900

WATER-QUALITY RECORDS

PERIOD OF RECORD.—July 1996 to current year.

REMARKS.—Samples collected bimonthly. Specific conductance, pH, water temperature, turbidity and dissolved oxygen were determined in the field.

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 1 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data; <, less than; E, estimated]

Date	Sample start time	Barometric pressure, mm Hg (00025)	Temperature, air, °C (00020)	Discharge, instantaneous, ft³/s (00061)	Dissolved oxygen, water, unfiltered, mg/L (00300)	Dissolved oxygen, water, unfiltered, % saturation (00301)	pH, water, unfiltered, field, standard units (00400)	Specific conductance, water, unfiltered, µS/cm at 25°C (00095)	Temperature, water, °C (00010)
10-12-2011	1100	752	19.6	324	8.2	95	8.2	720	22.0
12-28-2011	1400	760.000	13.7	20,900	12.8	107	8.2	241	7.8
02-29-2012	1230	759	--	39,100	12.4	113	7.9	902	11.1
04-25-2012	1200	--	--	46,700	10.5	--	8.1	849	19.1
06-28-2012	1230	760	39.0	857	7.7	104	8.4	554	31.1
08-28-2012	1300	757	31.7	2,710	8.7	114	8.2	641	28.8

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 2 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data; <, less than; E, estimated]

Date	Sample start time	Turbidity, water, unfiltered, broad band light source (400-680 nm), detectors at multiple angles including 90 +/- 30 degrees, ratiometric correction, NTRU (63676)	Turbidity, water, unfiltered, monochrome near infrared LED light, 780-900 nm, detection angle 90 +/- 2.5 (63680)	Chloride, water, filtered, mg/L (00940)	Sulfate, water, filtered, mg/L (00945)	Ammonia plus organic nitrogen, water, unfiltered, mg/L as N (00625)	Ammonia, water, filtered, mg/L as NH4 (71846)	Ammonia, water, filtered, mg/L as N (00608)	Nitrate plus nitrite, water, filtered, mg/L as N (00631)
10-12-2011	1100	E 7.49	5.0	121	46.3	.477	< .013	< .01	< .008
12-28-2011	1400	20.6	22	48.0	28.2	.499	.030	.0233	.661
02-29-2012	1230	24.0	23	180	59.1	.489	.023	.0178	.704
04-25-2012	1200	36.2	32	168	54.0	.657	.014	.0107	.629
06-28-2012	1230	E 8.78	20	79.3	40.2	.437	.020	.0155	.017
08-28-2012	1300	E 11.1	7.1	101	39.4	.655	< .013	< .010	< .01

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 3 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data; <, less than; E, estimated]

Date	Sample start time	Nitrate, water, filtered, mg/L (71851)	Nitrate, water, filtered, mg/L as N (00618)	Nitrite, water, filtered, mg/L (71856)	Nitrite, water, filtered, mg/L as N (00613)	Organic nitrogen, water, unfiltered, (00605)	Orthophosphate, water, filtered, (00660)	Orthophosphate, water, filtered, (00671)	Phosphorus, water, filtered, mg/L as P (00666)
10-12-2011	1100	< .035	< .008	< .003	< .001	< .48	.226	.0737	.0810
12-28-2011	1400	2.90	.655	.019	.00573	.48	.153	.0498	.0557
02-29-2012	1230	3.09	.699	.017	.00512	.47	.171	.0557	.0678
04-25-2012	1200	2.74	.618	.037	.0112	.65	.125	.0406	.0484
06-28-2012	1230	.069	.016	.006	.00177	.42	.136	.0444	.0557
08-28-2012	1300	< .044	< .010	< .003	< .0010	< .66	.285	.0928	.103

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
Part 4 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data; <, less than; E, estimated]

Date	Sample start time	Phosphorus, water, unfiltered, mg/L as P (00665)	Total nitrogen, water, unfiltered, (00600)	Suspended sediment, sieve diameter, percent smaller than 0.0625 (70331)	Suspended sediment concentration, (80154)	Suspended sediment discharge, tons per day (80155)
10-12-2011	1100	.118	< .49	88	7	6.1
12-28-2011	1400	.104	1.2	82	22	1,240
02-29-2012	1230	.119	1.2	86	27	2,850
04-25-2012	1200	.482	1.3	--	--	--
06-28-2012	1230	.086	.45	73	11	25
08-28-2012	1300	.158	< .67	65	21	154

07249985 LEE CREEK NEAR SHORT, OK

Robert S. Kerr Reservoir Basin
Robert S. Kerr Reservoir Subbasin

LOCATION.--Lat 35°31'02", long 94°27'51" referenced to North American Datum of 1983, in NW 1/4 NE 1/4 sec.17, T.12 N., R.27 E., Sequoyah County, OK, Hydrologic Unit 11110104, on left bank 0.5 mi west of Arkansas-Oklahoma State line, 500 ft downstream from Webber Creek, 4.1 mi south of Short, Oklahoma, 7.5 mi southwest of Uniontown, Arkansas, and at river mile 11.0.

DRAINAGE AREA.--420 mi².

SURFACE-WATER RECORDS

PERIOD OF RECORD.--Oct 1930 to Jun 1937 and Oct 1950 to current year. Prior to Oct 1992, published as "07250000 Lee Creek near Van Buren".

REVISED RECORDS.--WSP 1211: 1931 (M). WSP 1441: 1935 (M). WDR Arkansas 1970: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 429.44 ft above NGVD of 1929. Prior to Oct 1992 recording gage 3.2 mi downstream at datum 21.40 ft lower. Sep 1930 to Jun 1937, nonrecording gage at former site and datum.

REMARKS.--Water-discharge records good. Water quality data available at the files of the USGS. Satellite telemeter at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr 15, 1945 reached a stage of about 35.0 ft, from floodmarks at former site and datum, discharge about 112,000 ft³/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012, DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	14	53	639	246	696	260	491	76	5.7	1.1	0.79	3.2
2	12	47	562	218	618	243	432	79	5.3	0.97	0.54	3.1
3	9.9	46	565	195	563	223	536	73	4.7	0.82	0.32	2.8
4	8.7	42	4,010	179	1,410	203	831	66	16	0.69	0.16	2.8
5	7.5	38	2,960	167	1,260	185	535	59	29	0.62	0.03	2.6
6	6.6	34	1,820	158	920	170	427	52	22	0.55	0.00	2.6
7	5.7	42	1,330	149	764	160	356	45	14	0.47	0.00	3.0
8	4.9	4,780	1,060	141	663	281	305	39	18	0.41	0.00	3.7
9	4.1	4,220	884	132	588	372	268	36	15	0.40	0.00	3.8
10	4.8	1,440	754	446	552	346	237	31	12	0.49	0.00	3.5
11	6.7	894	660	2,030	508	712	227	28	10	0.54	0.00	3.3
12	13	657	598	1,230	441	1,940	215	28	9.0	0.63	0.00	3.2
13	13	518	574	840	429	1,260	187	27	7.6	0.73	0.00	3.1
14	10	423	695	667	466	922	169	24	6.8	1.6	0.00	4.3
15	8.1	408	3,910	563	581	747	186	21	6.0	3.1	0.00	7.5
16	6.7	455	2,170	491	794	642	277	18	5.5	2.0	0.00	10
17	5.7	401	1,410	438	719	566	261	17	5.3	1.7	0.00	17
18	6.9	344	1,030	377	641	495	210	15	5.1	1.3	0.00	14
19	6.0	305	804	335	583	469	170	13	4.5	1.0	0.00	12
20	5.0	278	1,080	308	528	11,600	151	12	4.1	0.84	0.00	12
21	4.7	632	1,120	281	531	8,800	135	11	3.6	0.83	0.00	11
22	5.1	6,190	869	256	533	5,260	120	9.4	3.6	0.81	0.00	10
23	11	2,360	710	234	493	3,510	108	8.7	3.4	0.71	0.00	10
24	7.7	1,450	602	213	438	2,190	97	7.8	2.9	0.57	0.00	10
25	7.4	1,070	524	6,600	380	1,560	88	7.0	2.6	0.41	0.00	10
26	7.4	1,010	464	4,630	341	1,210	79	6.6	2.3	0.32	0.00	9.9
27	18	1,310	427	2,330	315	983	73	5.8	2.0	3.3	0.00	11
28	32	1,080	381	1,510	293	824	64	5.1	1.8	4.9	3.5	15
29	32	877	338	1,120	275	704	58	8.4	1.6	2.6	3.3	17
30	38	738	305	918	---	629	62	7.1	1.3	1.6	3.0	18
31	54	---	275	787	---	559	---	7.1	---	1.1	3.2	---
Total	376.6	32,142	33,530	28,189	17,323	48,025	7,355	843.0	230.7	37.11	14.84	239.4
Mean	12.1	1,071	1,082	909	597	1,549	245	27.2	7.69	1.20	0.48	7.98
Max	54	6,190	4,010	6,600	1,410	11,600	831	79	29	4.9	3.5	18
Min	4.1	34	275	132	275	160	58	5.1	1.3	0.32	0.00	2.6
Ac-ft	747	63,750	66,510	55,910	34,360	95,260	14,590	1,670	458	74	29	475
Cfsm	0.03	2.55	2.58	2.17	1.42	3.69	0.58	0.06	0.02	0.00	0.00	0.02
In.	0.03	2.85	2.97	2.50	1.53	4.25	0.65	0.07	0.02	0.00	0.00	0.02

07250550 ARKANSAS RIVER AT JAMES W. TRIMBLE LOCK AND DAM NEAR VAN BUREN, AR

Robert S. Kerr Reservoir Basin

Robert S. Kerr Reservoir Subbasin

LOCATION.--Lat 35°20'56", long 94°17'54" referenced to North American Datum of 1983, in NE 1/4 NE 1/4 sec.28, T.8 N., R.31 W., Sebastian County, AR, Hydrologic Unit 11110104, on dam, and at river mile 308.9.

DRAINAGE AREA.--151,000 mi², of which 22,200 mi² is probably noncontributing.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--Oct 1927 to current year. Prior to Oct 1969, published as "07250500 Arkansas River at Van Buren", and Oct 1969 to Sep 1988, published as "at Dam No. 13", near Van Buren. Gage height records collected from 1879 to Dec 1955 at Fort Smith, 16.3 mi upstream, are contained in reports of National Weather Service.

REVISED RECORDS.--WSP 1211: 1934-36. WSP 1561: 1554. WDR Arkansas 1970: Drainage area.

GAGE.--Water-stage and gate position recorder. Datum of gage is at NGVD of 1929 (levels by U.S. Army Corps of Engineers). Prior to Oct 1, 1934, nonrecording gage, and Oct 1, 1934 to Dec 20, 1969, recording gage at site 7.9 mi upstream at datum 372.36 ft higher.

REMARKS.--Water-discharge records good except estimated daily discharges, which are poor. Beginning Apr 26, 1970, daily discharge computed from relation between discharge, head, and gate openings. Flow regulated upstream by many locks, dams, and reservoirs. On Oct 19, 1988, the Arkansas Electric Cooperative Corporation hydroplant began operation, and discharges at the hydroplant are added to flows from the lock and dam. Water quality data available at the files of the USGS. Satellite telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012, DAILY MEAN VALUES, [e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	e365	e365	11,200	15,700	10,400	5,410	95,600	39,900	8,140	5,020	2,960	2,380
2	e365	1,760	14,800	2,420	14,700	8,040	92,200	65,800	2,480	5,840	3,830	e852
3	3,860	3,800	11,000	9,530	16,500	8,260	73,900	93,300	9,120	2,670	3,070	e419
4	e365	5,340	16,800	5,480	42,100	15,900	73,700	102,000	16,600	1,940	2,800	2,610
5	e504	e365	23,700	11,700	24,900	4,620	60,900	104,000	20,900	5,340	2,000	3,260
6	1,670	e365	16,500	5,920	33,800	4,080	53,700	94,300	12,600	3,710	1,610	3,160
7	e365	4,300	17,000	2,710	21,600	4,800	64,600	68,500	2,320	2,000	2,260	e1,120
8	e365	33,400	9,660	4,140	37,300	24,100	65,300	64,200	7,060	4,390	e365	2,300
9	e365	34,500	14,800	6,580	39,300	9,860	52,700	60,400	1,430	2,460	5,900	e365
10	e365	9,150	9,810	9,300	47,000	18,600	61,700	58,100	e697	4,890	e365	e365
11	1,400	9,150	13,200	20,500	41,000	6,450	65,900	49,600	8,440	6,000	e365	1,080
12	e886	4,230	14,600	14,800	34,100	26,300	44,500	46,900	1,170	2,840	e365	1,990
13	e1,000	e365	15,600	14,700	31,000	25,000	47,700	40,000	2,670	3,100	e1,040	e1,030
14	e998	9,820	11,900	3,740	29,700	23,000	38,700	33,800	4,620	2,090	e365	2,500
15	e365	3,760	23,600	7,620	38,600	33,300	57,600	40,600	5,830	3,000	e365	e1,290
16	e365	11,000	23,700	6,510	19,000	29,700	68,800	29,100	3,460	4,220	1,890	e365
17	2,450	7,340	12,900	10,300	24,600	33,100	60,900	27,800	e365	2,000	e365	5,890
18	3,220	7,620	17,100	6,950	20,900	28,000	54,100	25,300	9,690	4,170	3,060	2,990
19	e1,100	2,870	16,900	5,120	15,200	27,400	71,100	28,800	2,880	2,670	1,340	7,090
20	4,990	9,820	23,500	12,800	16,800	119,000	58,900	35,700	5,450	8,830	1,190	3,540
21	e365	16,700	27,500	3,570	18,500	172,000	59,900	12,600	4,230	942	2,500	e1,360
22	e365	32,100	17,000	e365	19,400	149,000	53,700	13,900	4,940	6,250	e1,360	1,390
23	3,230	30,800	40,600	6,030	16,300	129,000	40,300	12,700	3,670	2,460	e365	e760
24	8,510	18,000	34,100	6,560	15,500	120,000	42,800	16,200	4,050	2,660	e365	1,260
25	7,900	17,000	36,800	69,100	16,100	124,000	46,800	14,200	3,230	3,110	3,170	1,740
26	3,480	17,300	25,200	49,200	7,740	126,000	26,700	24,600	5,330	3,780	5,150	3,740
27	7,070	32,700	31,300	41,500	17,000	123,000	27,100	10,200	1,670	e446	6,390	3,150
28	4,430	17,600	25,300	24,400	10,100	125,000	17,100	13,400	5,180	3,130	3,560	1,660
29	1,760	16,100	18,500	6,840	27,000	123,000	19,700	16,800	8,410	5,020	1,140	2,330
30	1,770	17,400	14,000	10,100	---	119,000	13,200	5,100	6,340	4,830	2,070	2,670
31	3,810	---	6,220	17,400	---	113,000	---	10,100	---	3,000	5,010	---
Total	68,053	375,020	594,790	411,585	706,140	1,877,920	1,609,800	1,257,900	172,972	112,808	66,585	64,656
Mean	2,195	12,500	19,190	13,280	24,350	60,580	53,660	40,580	5,766	3,639	2,148	2,155
Max	8,510	34,500	40,600	69,100	47,000	172,000	95,600	104,000	20,900	8,830	6,390	7,090
Min	365	365	6,220	365	7,740	4,080	13,200	5,100	365	446	365	365
Ac-ft	135,000	743,900	1,180,000	816,400	1,401,000	3,725,000	3,193,000	2,495,000	343,100	223,800	132,100	128,200

Compact

ARKANSAS - OKLAHOMA ARKANSAS RIVER COMPACT

1972

ARKANSAS RIVER BASIN COMPACT

ARKANSAS-OKLAHOMA, 1972

Approved

by the

ARKANSAS RIVER COMPACT COMMITTEE

FOR ARKANSAS:

S. Keith Jackson
Committee Member

John Luce
Committee Member
(alternate)

FOR OKLAHOMA:

Glade R. Kirkpatrick
Committee Member

Milton Craig
Committee Member
(alternate)

FOR UNITED STATES OF AMERICA:

Trigg Twichell
Federal Representative and Chairman of Committee

Attest:

Willard B. Mills
Secretary

March 16, 1970
Revised March 3, 1972

PREFACE

In 1955, the Congress of the United States by Public Law 97, 84th Congress, 1st Session, granted consent to the States of Arkansas and Oklahoma to negotiate and enter into a Compact for the apportionment of the waters of the Arkansas River and its tributaries between the two States. With this authorization and the appointment of a Federal Representative to act as Chairman, the States created the Arkansas-Oklahoma Arkansas River Compact Committee on March 14, 1956, for the purpose of drafting a proposed Compact for the apportionment of the waters of the Arkansas River and its tributaries as they affect those States.

From the beginning the Committee was deliberate in its operations. Two important subcommittees: engineering and legal, were appointed early for the purpose of assembling, analyzing, and interpreting essential engineering and legal data needed by the Compact Committee.

The engineering subcommittee made hydrologic studies which were utilized in determining that portion of the Arkansas River Basin that should be covered by the interstate Compact, analyzed the quantity, quality, and mode of occurrence of the water resources of the area in question and made long-range estimates of the quantities of water that would be needed by the States in future years, recognizing existing water rights and water uses.

The legal committee researched existing Interstate Water Compacts and continuously advised the Compact Committee on legal matters that related to Compact negotiations.

The work of these subcommittees and their reports were invaluable to the Compact committee in reaching its unanimous agreement of the proposed Compact.

The Federal Representative employed a consulting engineer in the field of interstate compacts, and received legal counsel from the U.S. Department of Justice on matters that were of concern to the Federal agencies.

The Arkansas River Compact Committee approved its first formal interstate Compact draft March 16, 1970.

The State of Arkansas ratified this Compact draft through its Act No. 16, 1971, as passed by the Arkansas General Assembly and signed by Governor Dale Bumpers, January 26, 1971.

The State of Oklahoma ratified the interstate Compact draft through H. B. No. 1326, as passed by the Oklahoma Legislature and signed by Governor David Hall, April 24, 1971. This ratification, however, carried the following amendment:

> "SECTION 2. This ratification is subject to the State of Oklahoma and the State of Arkansas, acting through their duly authorized compact representatives, amending said 'Arkansas River Basin Compact' in the particulars as set forth hereinafter, and further, that ratification of said amendment of said compact by the Legislature of the State of Arkansas. Said amendment being expressed as follows:
>
> "The following language shall be added to Article VI, Section A of said compact, to-wit: 'Provided however that nothing contained in this compact or its ratification by Arkansas or Oklahoma shall be interpreted as granting either State or the parties hereto the right or power of eminent domain in any manner whatsoever outside the borders of its own state.'"

The Arkansas River Compact Committee unanimously approved the Oklahoma amendment as an appropriate clarification statement in the Compact. The Federal member of the Committee was formally advised that the Federal agencies had no objections to this amendment.

The State of Arkansas adopted the State of Oklahoma's amendment to the Arkansas River Compact draft through Act No. 40, as passed by the Arkansas General Assembly and signed by Governor Dale Bumpers, February 17, 1972.

The Arkansas River Basin Compact, Arkansas-Oklahoma, 1972, as revised March 3, 1972, contains the amendment as approved by both States and corrections of typographical errors found in the March 16, 1970 draft.

ARKANSAS RIVER BASIN COMPACT
ARKANSAS-OKLAHOMA, 1972

with
SUPPLEMENTAL INTERPRETIVE COMMENTS
Prepared by the Compact Committee

Compact

The State of Arkansas and the State of Oklahoma, acting through their duly authorized Compact representatives, S. Keith Jackson of Arkansas and Glade R. Kirkpatrick of Oklahoma, after negotiations participated in by Trigg Twichell, appointed by the President as the representative of the United States of America, pursuant to and in accordance with the consent to such negotations granted by an Act of Congress of the United States of America (Public Law 97, 84th Congress, 1st session), approved June 28, 1955, have agreed as follows respecting the waters of the Arkansas River and its tributaries:

Comment

On November 25, 1969, the authorized representatives of the States of Arkansas and Oklahoma approved the language of a draft of a Compact relating to the apportionment of the waters of the Arkansas River Basin originating in the two States between Muskogee, Oklahoma, and Van Buren, Arkansas; including Spavinaw Creek, a tributary to the Grand River upstream from Muskogee; and except the Canadian River above Eufaula Dam, a tributary to the Arkansas River between Muskogee and Van Buren.

The Compact is the result of negotiations between the parties over a period of years. The Compact Committee had the cooperation and advice of all interested Federal agencies, including the counsel of representatives of the United States Department of Justice. Its activities were supported by the water resources agencies of the States. In addition, extensive studies were conducted for the benefit of the Committee by the engineering departments of the University of Arkansas and Oklahoma State University under the federal Water Resources Research program.

These interpretive comments on the approved draft of November 25, 1969, have been prepared so that members of the respective legislatures, congressional committees, Federal agencies, and subsequent Compact administrators might be fully appraised of the intent of the Compact negotiating Committee with regard to each Article of the Compact.

ARTICLE I

Compact

The major purposes of this Compact are:

A. To promote interstate comity between the States of Arkansas and Oklahoma;

B. To provide for an equitable apportionment of the waters of the Arkansas River between the States of Arkansas and Oklahoma and to promote the orderly development thereof;

C. To provide an agency for administering the water apportionment agreed to herein;

D. To encourage the maintenance of an active pollution abatement program in each of the two States and to seek the further reduction of both natural and man-made pollution in the waters of the Arkansas River Basin; and

E. To facilitate the cooperation of the water administration agencies of the States of Arkansas and Oklahoma in the total development and management of the water resources of the Arkansas River Basin.

Comment

Article I is self-explanatory.

ARTICLE II

Compact

As used in this Compact:-

A. The term "State" means either State signatory hereto and shall be construed to include any person or

persons, entity or agency of either State who, by reason of official responsibility or by designation of the Governor of that State, is acting as an official representative of that State.

B. The term "Arkansas-Oklahoma Arkansas River Compact Commission," or the term "Commission" means the agency created by this Compact for the administration thereof.

C. The term "Arkansas River Basin" means all of the drainage basin of the Arkansas River and its tributaries from a point immediately below the confluence of the Grand-Neosho River with the Arkansas River near Muskogee, Oklahoma, to a point immediately below the confluence of Lee Creek with the Arkansas River near Van Buren, Arkansas, together with the drainage basin of Spavinaw Creek in Arkansas, but excluding that portion of the drainage basin of the Canadian River above Eufaula Dam.

D. The term "Spavinaw Creek Sub-basin" means the drainage area of Spavinaw Creek in the State of Arkansas.

E. The term "Illinois River Sub-basin" means the drainage area of Illinois River in the State of Arkansas.

F. The term "Lee Creek Sub-basin" means the drainage area of Lee Creek in the State of Arkansas and the State of Oklahoma.

G. The term "Poteau River Sub-basin" means the drainage area of Poteau River in the State of Arkansas.

H. The term "Arkansas River Sub-basin" means all areas of the Arkansas River Basin except the four sub-basins described above.

I. The term "water year" means a twelve-month period beginning on October 1, and ending September 30.

J. The term "annual yield" means the computed annual gross runoff from any specified sub-basin which would have passed any certain point on a stream and would have originated within any specified area under natural conditions, without any man-made depletion or accretion during the water year.

K. The term "pollution" means contaimination or other alterations of the physical, chemical, biological or radiological properties of water or the discharge of any liquid, gaseous, or solid substances into any waters which creates, or is likely to result in a nuisance, or which renders or

is likely to render the waters into which it is discharged harmful, detrimental or injurious to public health, safety, or welfare, or which is harmful, detrimental or injurious to beneficial uses of the water.

Comment

This is the Article of specific definition of terms as they apply to this Compact.

Subsections A and B are self-explanatory.

Subsection C defines the "Arkansas River Basin" as it pertains to this Compact. (See figure 1). It isolates that portion of the overall Arkansas River drainage basin in which the States of Arkansas and Oklahoma are primarily and mutually concerned. All of the area above the gaging station on the main stem of the Arkansas River near Muskogee, Oklahoma, and the Eufaula Dam in the Canadian River except the Spavinaw Creek Basin in the State of Arkansas, has been excluded from consideration.

The intent of the Committee has been to deal with the water originating within the area delineated by this definition and no attempt has been made to define the rights, if any, of either State in waters originating outside the defined area which might flow into and through the area in the main stem of the Arkansas River or the Canadian River.

Waters of the Arkansas River Basin originating above Muskogee and Eufaula Dam have been allocated in part by Compacts between the States of Kansas and Oklahoma, and in the upper reaches of the basin between the States of Colorado and Kansas. The State of Arkansas was not a party to either of those Compacts, and the State of Oklahoma was not a party to the Colorado-Kansas Compact. Waters originating above

Eufaula Dam have been allocated in part by Compact between the States of New Mexico, Oklahoma and Texas; and the State of Arkansas was not a party to that Compact.

Both States recognize that storage has been constructed in the State of Oklahoma above Muskogee for the impounding and release of water to aid navigation in both the States of Oklahoma and Arkansas; and that such waters will in whole or in part flow through the Compact area. It is recognized also that power releases from reservoirs upstream of Muskogee will flow through the Compact area in the main stem of the Arkansas River, and may be subject to diversions and/or impoundment and use in either State. Flood control releases from upstream reservoirs will fall in the same category as power releases.

The drainage area in the State of Arkansas of Spavinaw Creek, a tributary of the Neosho River, has been included in this Compact area. The portion of Spavinaw Creek Basin lying in the State of Oklahoma was included in the physical delineation of the Grand-Neosho River Basin in the Kansas-Oklahoma Arkansas River Basin Compact. In the Kansas-Oklahoma Compact, Spavinaw Creek was excluded from the conservation storage limitation provisions which were the basis of that Compact.

The Spavinaw Creek Sub-basin has been included in this Compact, even though it is not directly tributary to the rest of the Compact area, because (1) the headwaters are in the State of Arkansas and the stream flows into the State of Oklahoma as is the case with all the other tributaries under consideration; (2) the rights of the State of Arkansas were not considered in the Kansas-Oklahoma Compact; and (3) the State of Oklahoma already has substantial development and interest in water supply of the stream.

The lower cutoff point of the Compact area has been placed immediately below the confluence of Lee Creek with the Arkansas River near Van Buren, Arkansas. Lee Creek is the farthest downstream tributary having headwaters in the State of Arkansas and flowing into the State of Oklahoma. It re-enters the State of Arkansas and flows into the Arkansas River in that State. There is interest in the Van Buren-Fort Smith area in Lee Creek as a source of municipal water supply.

Subsections D through H define the various sub-basins which, for purposes of this Compact, have been designated on Spavinaw Creek, Illinois River, Lee Creek and Poteau River, as well as for the Arkansas River main stem. These sub-basins differ from the sub-basins outlined in the Report of the Engineering Advisory Committee, dated January 1969, except for Lee Creek Sub-basin which remains consistent with the original report. It also differs from the Engineering Committee's original recommendations to the Compact Committee concerning the delineation of sub-basins. (See figure 1):

Subsection I is self-explanatory.

Subsection J defines "annual yield," which is a term basic to the allocations of this Compact. It refers to the runoff originating within any area and which would occur under unaltered natural conditions, i.e., where there would be no artificial man-made depletions of, or additions to, the original supply and no regulation of that supply.

The only time this could be measured absolutely would be before any facilities to utilize, import or impound water were constructed. After the first such facility is introduced, the measurement becomes something of an approximation relative to how accurately depletions can be computed

and their ratio to water yield. An excellent opportunity exists in this Compact area to establish relationship of "annual yield" and runoff at key points or with precipitation, or a combination of runoff and precipitation. This is true since depletions are small in relation to the average yield of this basin.

Subsection K is self-explanatory.

ARTICLE III

Compact

A. The physical and other conditions peculiar to the Arkansas River Basin constitute the basis of this Compact, and neither of the States hereby, nor the Congress of the United States by its consent hereto, concedes that this Compact establishes any general principle with respect to any other interstate stream.

B. By this Compact, neither State signatory hereto is relinquishing any interest or right it may have with respect to any waters flowing between them which do not originate in the Arkansas River Basin as defined by this Compact.

Comment

Subsection A confirms the principle that each Compact area has its own special problems and solutions thereto, and cannot provide per se the solutions for other compacting areas.

Subsection B is an affirmation of the principle of equitable apportionment between States of the water of interstate streams (Kansas v. Colorado, 206 U.S. 46; Colorado v. Kansas, 320 U.S. 383).

ARTICLE IV

Compact

The States of Arkansas and Oklahoma hereby agree upon the following apportionment of the waters of the Arkansas River Basin:

A. The State of Arkansas shall have the right to develop and use the waters of the Spavinaw Creek Sub-basin subject to the limitation that the annual yield shall not be depleted by more than fifty percent (50%).

B. The State of Arkansas shall have the right to develop and use the waters of the Illinois River Sub-basin subject to the limitation that the annual yield shall not be depleted by more than sixty percent (60%).

C. The State of Arkansas shall have the right to develop and use all waters originating within the Lee Creek Sub-basin in the State of Arkansas, or the equivalent thereof.

D. The State of Oklahoma shall have the right to develop and use all waters originating within the Lee Creek Sub-basin in the State of Oklahoma, or the equivalent thereof.

E. The State of Arkansas shall have the right to develop and use the waters of the Poteau River Sub-basin subject to the limitation that the annual yield shall not be depleted by more than sixty percent (60%).

F. The State of Oklahoma shall have the right to develop and use the waters of the Arkansas River Sub-basin subject to the limitation that the annual yield shall not be depleted by more than sixty percent (60%).

Comment

This Article apportions the available water resources of the Basin between the two States. Although large quantities of good quality water are available in the Basin, flows fluctuate widely, and provisions for storage will be essential to any substantial development of water use.

The record of Compact negotiations will show that early consideration was given to the possibility of writing a compact based on allocation of conservation storage. Near the end of negotiations and after careful deliberation and study, the consideration of conservation storage allocations was dropped and it was agreed to make allocations on the basis of percentages of annual yield.

It is realized that problems of deficient low flows presently exist and will no doubt continue in the future. Base flows of tributary streams in the Basin are generally low and most streams recede to no flow during dry periods. It is anticipated that future developments of storage facilities will provide for low flow augmentation but it is considered infeasible to specify minimum flows for any stream system. Release of flows from the system of major reservoirs presently constructed and planned for flood control, hydroelectric power and navigation should assure the maintenance of adequate flows throughout the main stem of the Arkansas River in the Compact area.

The percentages of annual flows apportioned between the States are based on the assumptions that the "upstream" State should generally have first call on available waters. Engineering studies have shown it is generally infeasible to develop over sixty percent (60%) of the long-term yield of any Basin in this area.

The division of water is on the basis that forty percent (40%) of the annual yield would be delivered from the upstream State. Exceptions to this have been made in the cases of Spavinaw and Lee Creek Basins.

The City of Tulsa has developed 96,000 acre-feet of conservation storage on lower Spavinaw Creek in the State of Oklahoma for municipal water supply. These reservoirs collect flows from 386 square miles, of which 120 square miles are in the State of Arkansas. In recognition of these existing developments, it was agreed to limit the State of Arkansas allocation to fifty percent (50%) of the annual yield from the area in that State.

The Lee Creek Basin roughly parallels the Arkansas-Oklahoma stateline. The drainage area is approximately sixty percent (60%) in the State of Arkansas and forty percent (40%) in the State of Oklahoma. The main stem rises in the State of Arkansas, but some small tributaries in the upper reaches rise in the State of Oklahoma and flow into the State of Arkansas. The main stem first crosses the Arkansas-Oklahoma stateline at mile 24.6, and then flows back into the State of Arkansas at mile 9.0, crossing and recrossing the stateline until entering the State of Arkansas for the last time at mile 7.6. This watershed is an excellent source of water for the Fort Smith metropolitan area, including nearby areas in the State of Oklahoma, and for which there is a large potential need for future water supplies. In order to permit the full development of this Basin, it was agreed that waters of this Basin be allocated on the basis of origin. This will permit either State to fully develop, use and consume a quantity of water equal to the total annual yield of the Lee Creek Basin in each State.

Each State recognizes that waters are now being transported from one basin to another and that these transbasin diversions could increase in the future. It is also recognized that such transbasin diversion of water is a charge against the apportionment to the respective States.

ARTICLE V

Compact

A. On or before December 31 of each year, following the effective date of this Compact, the Commission shall determine the stateline yields of the Arkansas River Basin for the previous water year.

B. Any depletion of annual yield in excess of that allowed by the provisions of this Compact shall, subject to the control of the Commission, be delivered to the downstream State, and said delivery shall consist of not less than sixty percent (60%) of the current runoff of the basin.

C. Methods for determining the annual yield of each of the sub-basins shall be those developed and approved by the Commission.

Comments

Subsection A provides for the computation of "annual yield" before the end of the calendar year, while the computation itself is based on data available for the water year ending September 30 of that same calendar year. This means that necessary hydrologic data (such as stream flow, water quality, precipitation, etc.) will be required in less than three months after the end of the water year.

Subsection B provides for adjustment of annual depletions so that a depletion in excess of the allocation to either State during the previous water year shall be delivered (restored to the downstream State) as soon as practicable consistent with proper water management.

It is anticipated that each State should control its water management so that consumptive-use depletions will not exceed its allocation. Excess stream-flow depletions, which would be a withholding of water by any means (consumptive uses or storage) could possibly occur in low yield years, but could be made up in subsequent periods of high runoff.

No provisions are made in this Compact for credits for over-deliveries nor for continuing debits for under-deliveries. As a practical manner the water resources of the area are of such a magnitude, and the physical conditions limiting storage facilities are such that complete utilization of the allocated quantities might never be reached.

The allocations are of such magnitude in relation to these factors that the States essentially will be unrestricted in the control and use of the water resources of the Compact area. The Compact does, however, protect against the possibility of either State encroaching upon the rights of the other at some future time when maximum utilization could be approached. (There is a distinct possibility in this area that such a condition might never occur). Or, in a period of extreme drought, it would provide an equitable distribution of a limited water supply.

Subsection C is intended as a directive for determining annual yield. Appendix I attached to these comments outlines procedures for this purpose. Present depletions are small in relation to the original yield and an opportunity exists to establish correlations of yield at agreed-to points in both States. As developments occur in the future, it may be necessary to refine procedures and make arrangements for the collection of additional basic data. It is anticipated that a technical advisory group will be available to the Commission and will develop adequate procedures and make recommendations for the collection of necessary basic data as required for the proper administration of the Compact.

ARTICLE VI

Compact

A. Each State may construct, own and operate for its needs water storage reservoirs in the other State; provided, however, that nothing contained in this Compact or its ratification by Arkansas or Oklahoma shall be interpreted as granting either State or the parties hereto the right or power of eminent domain in any manner whatsoever outside the borders of its own State.

B. Depletion in annual yield of any sub-basin of the Arkansas River Basin caused by the operation of any water storage reservoir either heretofore or hereafter constructed by the United States or any of its agencies, instrumentalities or wards, or by a State, political sub-division thereof, or any person or persons shall be charged against the State in which the yield therefrom is utilized.

C. Each State shall have the free and unrestricted right to utilize the natural channel of any stream within the Arkansas River Basin for conveyance through the other State of waters released from any water storage reservoir for an intended downstream point of diversion or use without loss of ownership of such waters; provided, however, that a reduction shall be made in the amount of water which can be withdrawn at point of removal, equal to the transmission losses.

Comment

This Article recognizes the possibilities of special problems arising and sets forth general provisions for handling some of these problems.

In Subsection A, the Committee recognizes that storage capacity may be constructed by one State in the other and that the Compact creates no bar to such construction. Each State, either individually or the two States jointly, may construct, own and operate for their needs water storage reservoirs in either State.

Subsection B makes it quite clear that depletions resulting from storage constructed at any point in the Basin by the United States, the States or individuals shall be charged against the State in which the benefits of the depletion are realized. Although the Compact is silent as to what part the Commission might take in the event that storage is constructed in one State for the benefit of the other State, it is the view of the Committee that such matters would be worked out at State level so long as the provisions of the Compact are complied with.

Subsection C allows either State to use the channel as a conveyor to transport water from a structure in one State to a point in the other State where it can be used. The only restriction is that a carriage or transmission loss will be charged against the State utilizing the natural channel in the other State. The amount of such transmission loss will be determined by the Compact Commission whenever the need arises.

ARTICLE VII

Compact

The States of Arkansas and Oklahoma mutually agree to:

A. The principle of individual State effort to abate man-made pollution within each State's respective borders, and the continuing support of both States in an active pollution abatement program;

B. The cooperation of the appropriate State agencies in the States of Arkansas and Oklahoma to investigate and abate sources of alleged interstate pollution within the Arkansas River Basin;

C. Enter into joint programs for the identification and control of sources of pollution of the waters of the Arkansas River and its tributaries which are of interstate significance;

D. The principle that neither State may require the other to provide water for the purpose of water quality control as a substitute for adequate waste treatment;

E. Utilize the provisions of all Federal and State water pollution laws and to recognize such water quality standards as may be now or hereafter established under the Federal Water Pollution Control Act in the resolution of any pollution problems affecting the waters of the Arkansas River Basin.

Comment

The States recognize that there is no serious interstate pollution problem in the Basin at present; and that the States are obligated to maintain adequate water quality in the Arkansas River Basin through

whatever means is available to them. An important provision is that neither State may require the other to provide water for the purpose of water quality control as a substitute for adequate waste treatment.

Through active pollution abatement programs the States hope to avoid the conflict over future problems, but have provided that, if necessary, they may utilize the provisions of the Federal Water Pollution Control Act in cases which cannot be resolved within the provisions of the Compact.

ARTICLE VIII

Compact

A. There is hereby created an interstate administrative agency to be known as the "Arkansas-Oklahoma Arkansas River Compact Commission." The Commission shall be composed of three Commissioners representing the State of Arkansas and three Commissioners representing the State of Oklahoma, selected as provided below; and, if designated by the President or an authorized Federal agency, one Commissioner representing the United States. The President, or the Federal agency authorized to make such appointments, is hereby requested to designate a Commissioner and an alternate representing the United States. The Federal Commissioner, if one be designated, shall be the Chairman and presiding officer of the Commission, but shall not have the right to vote in any of the deliberations of the Commission.

B. One Arkansas Commissioner shall be the Director of the Arkansas Soil and Water Conservation Commission, or such other agency as may be hereafter responsible for administering water law in the State. The other two Commissioners shall reside in the Arkansas River drainage area in the State of Arkansas and shall be appointed by the Governor, by and with the advice and consent of the Senate, to four-year staggered terms with the first two Commissioners being appointed simultaneously to terms of two (2) and four (4) years, respectively.

C. One Oklahoma Commissioner shall be the Director of the Oklahoma Water Resources Board, or such other agency as may be hereafter responsible for administering water law in the State. The other two Commissioners shall reside within the Arkansas River drainage area in the State of Oklahoma and shall be appointed by the Governor, by and with the advice and consent of the Senate, to four-year staggered terms, with the first two Commissioners being appointed simultaneously to terms of two (2) and four (4) years, respectively.

D. A majority of the Commissioners of each State and the Commissioner or his alternate representing the United States, if they are so designated, must be present to constitute a quorum. In taking any Commission action, each signatory State shall have a single vote representing the majority opinion of the Commissioners of that State.

E. In the case of a tie vote on any of the Commission's determinations, orders, or other actions, a majority of the Commissioners of either State may, upon written request to the Chairman, submit the question to arbitration. Arbitration shall not be compulsory, but on the event of arbitration, there shall be three arbitrators:

(1) One named by resolution duly adopted by the Arkansas Soil and Water Conservation Commission, or such other State agency as may be hereafter responsible for administering water law in the State of Arkansas; and

(2) One named by resolution duly adopted by the Oklahoma Water Resources Board, or such other State agency as may be hereafter responsible for administering water law in the State of Oklahoma; and

(3) The third chosen by the two arbitrators who are selected as provided above.

If the arbitrators fail to select a third within sixty (60) days following their selection, then he shall be chosen by the Chairman of the Commission.

F. The salaries and personal expenses of each Commissioner shall be paid by the Government which he represents. All other expenses which are incurred by the Commission incident to the administration of this Compact shall be borne equally by the two States and shall be paid by the

Commission out of the "Arkansas-Oklahoma Arkansas River Compact Fund," initiated and maintained as provided in Article IX(B)(5) below. The States hereby mutually agree to appropriate sums sufficient to cover its share of the expenses incurred in the administration of this Compact, to be paid into said fund. Disbursements shall be made from said fund in such manner as may be authorized by the Commission. Such funds shall not be subject to the audit and accounting procedures of the States; however, all receipts and disbursements of funds handled by the Commission shall be audited by a qualified independent public accountant at regular intervals, and the report of such audit shall be included in and become a part of the annual report of the Commission, provided by Article IX(B)(6) below. The Commission shall not pledge the credit of either State and shall not incur any obligations prior to the availability of funds adequate to meet the same.

Comment

This Article creates the administrative agency which will administer the terms of this Compact after it becomes effective through ratification by the States and approval by the Congress. The provisions are similar to those adopted in a number of other interstate stream compacts.

The Article provides for three members for each of the signatory States as Commission members and staggers the terms of those members in order to insure some degree of continuity in its membership.

Subsection D defines a quorum and provides that each State shall have only one vote which represents the majority decision of each State in conducting the business affairs of the Commission.

Subsection E sets forth arbitration procedures for the Commission in the event of a tie vote on important matters. Arbitration is not to be compulsory but is provided in the event that some matter of extreme concern to one of the States requires such action.

Subsection F sets forth the procedure for paying the salaries and expenses of the Commissioners and costs incurred by the Commission in the administration of the Compact. This subsection together with Article IX(B)(5) creates a Compact fund which is essential to flexibility of operation. It also provides for auditing procedures and the report of such audit.

ARTICLE IX

Compact

A. The Commission shall have the power to:

(1) Employ such engineering, legal, clerical and other personnel as in its judgment may be necessary for the performance of its functions under this Compact;

(2) Enter into contracts with appropriate State or Federal agencies for the collection, correlation, and presentation of factual data, for the maintenance of records and for the preparation of reports;

(3) Establish and maintain an office for the conduct of its affairs;

(4) Adopt and procure a seal for its official use;

(5) Adopt rules and regulations governing its operations. The procedures employed for the administration of this Compact shall not be subject to any Administrative Procedures Act of either State, but shall be subject to the provisions hereof and to the rules and regulations of the Commission; provided, however, all rules and regulations of the Commission shall be filed with the Secretary of State of the signatory States;

(6) Cooperate with Federal and State agencies and political subdivisions of the signatory States in developing principles, consistent with the provisions of this Compact and with Federal and State policy, for the storage and release of

water from reservoirs, both existing and future within the Arkansas River Basin, for the purpose of assuring their operation in the best interests of the States and the United States;

(7) Hold hearings and compel the attendance of witnesses for the purpose of taking testimony and receiving other appropriate and proper evidence and issuing such appropriate orders as it deems necessary for the proper administration of this Compact, which orders shall be enforceable upon the request by the Commission or any other interested party in any court of competent jurisdiction within the county wherein the subject matter to which the order relates is in existence, subject to the right of review through the appellate courts of the State of situs. Any hearing held for the promulgation and issuance of orders shall be in the county and State of the subject matter of said hearing;

(8) Make and file official certified copies of any of its findings, recommendations or reports with such officers or agencies of either State, or the United States, as may have any interest in or jurisdiction over the subject matter. Findings of fact made by the Commission shall be admissible in evidence and shall constitute prima facie evidence of such fact in any court or before any agency of competent jurisdiction. The making of findings, recommendations, or reports by the Commission shall not be a condition precedent to instituting or maintaining any action or proceeding of any kind by a signatory State in any court, or before any tribunal, agency or officer, for the protection of any right under this Compact or for the enforcement of any of its provisions;

(9) Secure from the head of any department or agency of the Federal or State government such information, suggestions, estimates and statistics as it may need or believe to be useful for carrying out its functions and as may be available to or procurable by the department or agency to which the request is addressed;

(10) Print or otherwise reproduce and distribute all of its proceedings and reports; and

(11) Accept, for the purposes of this Compact, any and all private donations and gifts and Federal grants of money.

B. The Commission shall:

(1) Cause to be established, maintained and operated such stream, reservoir or other gaging stations as may be necessary for the proper administration of this Compact;

(2) Collect, analyze and report on data as to stream flows, water quality, annual yields and such other information as is necessary for the proper administration of this Compact;

(3) Continue research for developing methods of determining total basin yields;

(4) Perform all other functions required of it by the Compact and do all things necessary, proper or convenient in the performance of its duties thereunder;

(5) Establish and maintain the "Arkansas-Oklahoma Arkansas River Compact Fund," consisting of any and all funds received by the Commission under the authority of this Compact and deposited in one or more banks qualifying for the deposit of public funds of the signatory States;

(6) Prepare and submit an annual report to the Governor of each signatory State and to the President of the United States covering the activities of the Commission for the preceding fiscal year, together with an accounting of all funds received and expended by it in the conduct of its work;

(7) Prepare and submit to the Governor of each of the States of Arkansas and Oklahoma an annual budget covering the anticipated expenses of the Commission for the following fiscal year; and

(8) Make available to the Governor or any State agency of either State or to any authorized representative of the United States, upon request, any information within its possession.

Comment

Article IX sets forth the powers and duties of the administrative Commission. It provides the Commission with the necessary latitude and flexibility for carrying out the provisions and purposes of the Compact.

Subsection A enumerates the powers of the Commission while Subsection B sets out certain specific duties of the Commission. Other duties not specifically stated in Subsection B are implied in the inherent powers granted in Subsection A.

Subsection A(2) enables the Commission to obtain data which is important to the Commission's work and findings. Most of the data useful to the Commission will be gathered by other agencies. However, there could be times when necessary engineering or other data is not gathered by any other agency, and it might be desirable for the Commission to collect the data.

Subsection A(6) gives the Commission the power to cooperate directly and closely with Federal agencies in its administrative activities as they relate to interstate phases of project operation. This subsection deals with all types of storage and release of water whether it is under Federal or State control. Essentially it gives the Commission the power to manage the water resources of the Basin in the best possible manner.

In Subsection A(9) "secure" means that the Commission may obtain information, of whatever nature, by request or purchase if necessary, and is not intended to infer that the Commission will have the power to obtain such information by adverse means from any agency or such information as any agency is prevented by law from releasing. It is not the intent of the subsection that the Commission shall compete with other data collecting agencies of either State or Federal government, but rather that the Commission will utilize these available sources to the extent possible. It is necessary this Commission be given authority to do such work when it is not able to obtain needed information from other agencies due to budget or personnel limitations.

Subsections B(6) and (7) provide for annual reports and annual budgets to be submitted to the respective Governors of the signatory States and to the President of the United States, but sets no date for the submission of these reports. Therefore, it is incumbent upon the Compact Commission to set such a date in the rules and regulations of the Commission. This provides some flexibility in the preparation of the annual report permitting the date to be changed if and when it should become necessary.

All other subsections are self-explanatory.

ARTICLE X

Compact

A. The provisions hereof shall remain in full force and effect until changed or amended by unanimous action of the States acting through their Commissioners and until such changes are ratified by the legislatures of the respective States and consented to by the Congress of the United States in the same manner as this Compact is required to be ratified to become effective.

B. This Compact may be terminated at any time by the appropriate action of the legislature of both signatory States.

C. In the event of amendment or termination of the Compact, all rights established under the Compact shall continue unimpaired.

Comment

This Article affirms the rather obvious fact that no action can be taken to modify the provisions of the Compact without unanimous action of the States and until the changes are ratified by the legislatures and the Congress. It also recognizes the right to terminate by the appropriate action of the States, and the protection of vested rights in the case of such an event.

ARTICLE XI

Compact

Nothing in this Compact shall be deemed:

A. To impair or affect the powers, rights or obligations of the United States, or those claiming under its authority in, over and to the waters of the Arkansas River Basin;

B. To interfere with or impair the right or power of either signatory State to regulate within its boundaries the appropriation, use and control of waters within that State not inconsistent with its obligations under this Compact.

Comment

This Article is a general declaration whereby the States disclaim any intention of impairing or affecting the powers, rights, or obligations of the United States, as they apply to the Arkansas River Basin.

It clearly states that the Compact is not intended to interfere with or impair the rights or powers of either signatory State to regulate the waters within its own boundaries.

ARTICLE XII

Compact

If any part or application of this Compact should be declared invalid by a court of competent jurisdiction, all other provisions and applications of this Compact shall remain in full force and effect.

Comment

This Article is self-explanatory.

ARTICLE XIII

Compact

A. This Compact shall become binding and obligatory when it shall have been ratified by the legislature of each

State and consented to by the Congress of the United States, and when the Congressional Act consenting to this Compact includes the consent of Congress to name and join the United States as a party in any litigation in the United States Supreme Court, if the United States is an indispensable party, and if the litigation arises out of this Compact or its application, and if a signatory State is a party thereto.

B. The States of Arkansas and Oklahoma mutually agree and consent to be sued in the United States District Court under the provisions of Public Law 87-830 as enacted October 15, 1962, or as may be thereafter amended.

C. Notice of ratification by the legislature of each State shall be given by the Governor of that State to the Governor of the other State, and to the President of the United States, and the President is hereby requested to give notice to the Governor of each State of consent by the Congress of the United States.

IN WITNESS WHEREOF, the authorized representatives have executed three counterparts hereof each of which shall be and constitute an original, one of which shall be deposited with the Administrator of General Services of the United States, and one of which shall be forwarded to the Governor of each State.

DONE at the City of Tulsa, State of Oklahoma, this 3rd day of March, A.D., 19 72.

Comment

The Committee wishes to stress the importance of this Article. The utilization of the water resources of this Basin is in large part dependent upon storage facilities. Regulatory works are needed to control and to put the water to use. This area is a single unit within a larger area, the Arkansas-Red-White River Basins in which the pattern of development has been well established. It is now being and must in the future be achieved largely with the assistance and cooperation of the United States government. It is the hope of this Committee that there will be no need to exercise the consent authority which is sought in this Article. As a practical matter, however, should interstate litigation arise out of

the Compact or its application in which the United States is an indispensable party, no satisfactory solution can be reached unless the United States is made a party thereto.

The members of the Arkansas-Oklahoma Arkansas River Compact Committee agree March 3, 1972, that the foregoing statement expresses the intent of the Committee with regard to the draft of the Arkansas-Oklahoma Arkansas River Basin Compact dated November 25, 1969.

FOR ARKANSAS:

S. Keith Jackson
Committee Member

John Luce
Committee Member
(Alternate)

FOR OKLAHOMA:

Glade R. Kirkpatrick
Committee Member

Milton Craig
Committee Member
(Alternate)

Approved: Trigg Twichell
Trigg Twichell, Representative
United States of America

Attest: Willard B. Mills
Willard B. Mills, Secretary

ARKANSAS RIVER BASIN COMPACT

ARKANSAS-OKLAHOMA

APPENDIX I

Computation of Annual Yield

Article II J of the Arkansas River Compact - Arkansas-Oklahoma described "annual yield," which is a term basic to the allocations of this Compact. It refers to the runoff which would occur from any specified area under unaltered natural conditions - i.e., where there would be no artificial man-made depletions of or additions to the original supply and no regulation of that supply.

The only time this could be measured absolutely would be before any facilities to utilize, import or impound water were constructed; and before any of man's activities altered rainfall-runoff relations. Land management practices, while possibly significant for some areas, are difficult to evaluate and will be disregarded, at this time, in the computations to meet the requirements for the administration of this Compact. The accuracy of annual yield determinations will be dependent upon how accurately depletions, and their ratio to total water yield, can be computed. Fortunately, present depletions for most of the compact area are small in relation to the original yield and, until such time that additional developments are made, only reasonable estimates will suffice to assure that terms of the Compact are being met.

Basically, the determinations that are required are as follows: (1) the measurement or computation of the actual runoff from each of the several "sub-basins" as defined by the Compact for each water

year; (2) the computation of the corresponding total depletions and/or accretions in each of the respective sub-basins; (3) the sum of items (1) and (2) to obtain the "annual yield" for each basin; and (4) multiply item (3) by 100 minus the percent depletion allowed in Article IV of the Compact; and (5) compute deficiency, if any, by comparing item (4) with item (1). The following outlines procedures for computing each of these items:

Item 1. Reliable estimates to meet this requirement can be readily made for the several sub-basins on the basis of the existing (1970) stream-gaging stations. (See figure 1 for location of stations). All of the larger streams draining from the State of Arkansas into the State of Oklahoma are gaged in or near the stateline, and acceptable estimates for the total outflow from each sub-basin can be made on the basis of these records plus estimated flows from ungaged areas.

The computation of actual runoff from the Arkansas River Sub-basin will need to take into account both the inflow and outflow from the area. This computation can be made by application of the following equation:

$$Q_A = Q_V - [Q_M + Q_W + Q_2 + Q_3 + Q_4]$$

in which

Q_A = Total annual discharge originating from the Arkansas River Sub-Basin.

Q_V = Total annual discharge of the Arkansas River immediately below the mouth of Lee Creek presently measured at Van Buren gaging station.

Q_M = Total annual discharge of the Arkansas River immediately below the mouth of the Grand Neosho River, presently measured at the Muskogee gaging station.

Q_W = Total annual discharge of the Canadian River at Eufaula Dam, presently measured at Whitefield gaging station.

Q_2 = Total annual outflow from the Illinois River Sub-basin.

Q_3 = Total annual outflow from the Lee Creek Sub-basin.

Q_4 = Total annual outflow from the Poteau River Sub-basin.

Item 2. The total annual depletion in each sub-basin will be the sum of the following:

(a) Total stream diversions minus return flows.
(b) Depletions and/or accretions by major reservoirs.
(c) Evaporation losses from other than major reservoirs.
(d) Pumpage of ground water from alluvium aquifers.

The following comments relate to each of the above:

(a) Reliable data on this item are not generally available at this time but will need to be firmed up as development of the area's resources progresses. The principal items will be diversions for irrigation and for municipal and industrial water supplies. In the case of small irrigation uses, satisfactory estimates of consumption can be made on basis of acres and types of crops irrigated. Withdrawals for municipal and industrial uses are generally available but estimates of return flows may be necessary. So long as these diversions are small in relation to total runoff no high degree of accuracy will be required.

(b) Depletions caused by major reservoirs will probably be most significant. The depletion from such reservoirs for a given period will be the difference between inflow and outflow and can be determined from the following (all terms expressed in acre-feet):

The inflow, I, at damsite that would have occurred if reservoir had not been in place, can be computed by the following:

$$I = O \pm \Delta S + E + D - P + p,$$

in which

O = Outflow as measured at gaging station below dam, or from gate and spillway ratings.

ΔS = Change in storage volume at beginning and end of period.

P = Precipitation on reservoir surface.

p = Runoff that would have occurred from area covered by reservoir, computed by a derived rainfall-runoff factor, c times P, or cP.

E = Evaporation from reservoir surface.

D = Direct diversions from reservoir storage, not included in outflow; seepage from reservoir may also be a factor and, if not included in measured outflow as at gaging station below dam, should be estimated.

As the depletion is inflow minus outflow, this can be written:

$$I - O = -P + p \pm \Delta S + E + D.$$

(c) Evaporation from small lakes, such as those not designed for water supply, including flood-detention structures, farm ponds, and recreation lakes, may be estimated on basis of average water surface area and appropriate data from evaporation-pan records.

(d) Pumpage from stream alluviums may cause appreciable depletions in stream flow. This is not believed to be a factor at the present (1969) time, but could conceivably be in the future for some stream reaches.

CONCLUSION

The Arkansas River Compact Commission, with the assistance of a Technical Advisory Group, should include, as part of their annual

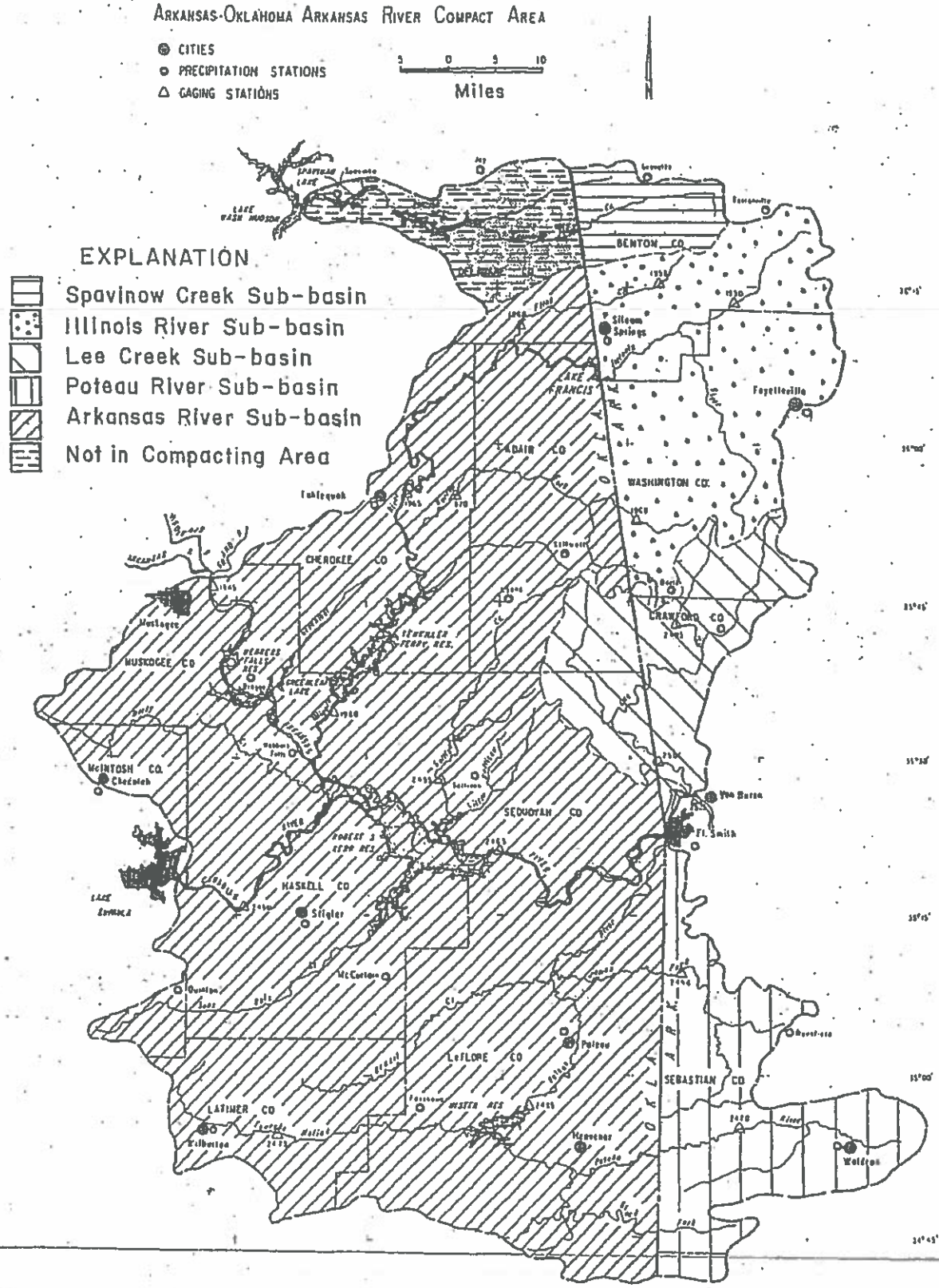
report, information on basin yields and depletions. Until such time as available data reveal that allocations between the States for any of the several sub-basins is in prospect of not being met, only generalized information will be adequate. As additional developments occur, the Commission should take steps to assure that the collection of basic data will be adequate to meet the needs of administration. As a minimum, the Commission should require the installation of instrumentation at such new reservoirs as will permit accurate determination of sub-basin inflow-outflow records.

Although allocations are to be based on annual yields, to be determined by December 31 of each year, current records will be required in the event provisions of Article V(B) need to be met, i.e., the delivery of sixty percent of current runoff to make up a deficiency.

The Commission should make continuing studies of the hydrology of the Basin for improvements or expansions in the collection of basic data as are needed to meet the changing needs for the administration of the Compact.

FIGURE 1

ARKANSAS-OKLAHOMA ARKANSAS RIVER COMPACT AREA



Revised March 3, 1972

NOVEMBER 25, 1969

Rules, Regulations, and Modes of Procedure

ARKANSAS-OKLAHOMA
ARKANSAS RIVER COMPACT COMMISSION

RULES, REGULATIONS AND MODES OF PROCEDURE

(As Amended September 25, 1985, September 25, 1991, September 24, 1993, and September 27, 2012)

ARTICLE I
THE COMMISSION

1.1 The "Commission" is the "Arkansas-Oklahoma Arkansas River Compact Commission" referred to in Article VIII of the Arkansas River Basin Compact, Arkansas-Oklahoma.

1.2 The credentials of each Commissioner shall be filed with both the Chairman and the Secretary of the Commission. When the credentials of a new Commissioner are received, the Secretary shall promptly notify all other Commissioners of the name and address of the new Commissioner.

1.3 Each Commissioner shall advise the Commission in writing of the address to which all official notices and other Commission communications shall be sent for their receipt and shall further promptly advise in writing the office of the Commission of any changes in address.

ARTICLE II
COMMISSION OFFICERS

2.1 The officers of the Commission shall be a Chairman, a Secretary and a Treasurer.

2.2 The Commissioner (or "alternate") representing the United States shall be the Chairman of the Commission. The Chairman shall preside at meetings of the Commission. His duties shall be those usually imposed upon such officers and as may be assigned by these rules or by the Commission from time to time.

2.3 The Secretary shall be selected by the Commission. The Secretary shall serve for the term, and shall perform the duties, as the Commission shall direct. In case of a vacancy in the office of the Secretary, the Commission shall select a new Secretary as expeditiously as possible.

2.4 The Treasurer shall be selected by the Commission. The Treasurer shall receive, hold and disperse all funds of the Commission which shall come into his hands, and shall furnish a fidelity bond in an amount satisfactory to the Commission. The cost of the bond shall be paid by the Commission.

2.5 As the Commission may determine and direct, the various Commission officer positions may be joined and simultaneously held by the same person.

ARTICLE III
PRINCIPAL OFFICE

3.1 The principal office of the Commission shall be the office of the Chairman or the Secretary, as the Commission shall direct.

3.2 All official files, books and records of the Commission shall be kept and maintained in the principal office of the Commission. All such files, books and records shall be open to inspection by the public at the principal office of the Commission.

ARTICLE IV
COMMISSION MEETINGS

4.1 The annual meeting of the Commission shall be held on the fourth Thursday in September of each year. By prior agreement of all Commissioners, the Commission may select and designate a different date for holding the annual meeting.

4.2 Special meetings of the Commission may be called by the Chairman at any time. Upon written request of a majority of the Commissioners of either of the signatory states setting forth the matters to be considered at a special meeting, it shall be the duty of the Chairman to call a special meeting. Notice of all special meetings shall be sent by the Secretary to all members of the Commission by ordinary mail at least ten days in advance of the meeting and such notice shall state the purpose thereof.

4.3 Emergency meetings of the Commission may be called by the Chairman at any time upon request of either signatory state. For purposes of this rule, an "emergency" situation, for which an emergency meeting may be called, is understood to mean a situation involving an imminent threat of injury to persons or injury and damage to public or personal property or threat of imminent financial loss when time requirements make prior notice procedures impractical and, if adhered to, would increase the likelihood of injury, damage or financial loss.

4.4 Except as otherwise provided herein, prior notice of all Commission meetings shall be given by the Secretary to all Commissioners. Such notice shall advise of the date, time and place of the meeting and shall include an agenda for the meeting or, as may be applicable, a statement of the purpose of or matters to be considered at the meeting. Upon receipt of such notice, it shall be the responsibility of the signatory state to, in-turn, furnish notice to the public in its state such as may be required or provided under the laws of that state. Except as may be otherwise required under the laws of a signatory state, no advance public notice shall be required for the calling and conducting of emergency meetings. At the earliest possible time following any emergency meeting, the public will be notified of any Commission action taken at the meeting.

4.5 Meetings of the Commission shall be held at such places as shall be agreed upon by the Commissioners.

4.6 Minutes of Commission meetings shall be made and preserved in a suitable manner. Until approved by the Commission, minutes shall not be official and shall be furnished only to members of the Commission, its employees and committees.

4.7 A majority of the Commissioners of each state, and the Commissioner (or alternate) representing the United States, must be present to constitute a quorum.

4.8 In taking any Commission action, each signatory state shall have a single vote representing the majority opinion of the Commissioners of that State. The Commissioner (or alternate) representing the United States shall not have the right to vote in any of the deliberations or actions of the Commission.

4.9 In the case of a tie vote on any of the Commission's determinations, orders, or other actions, a majority of the Commissioners of either state may, upon written request to the Chairman, submit the question to arbitration. Arbitration shall not be compulsory, but, in the event of arbitration, there shall be three arbitrators chosen as follows:

(1) One named by resolution duly adopted by the Arkansas Soil and Water Conservation Commission, or such other State agency as may be hereafter responsible for administering water law in the State of Arkansas; and

(2) One named by resolution duly adopted by the Oklahoma Water Resources Board, or such other State agency as may be hereafter responsible for administering water law in the State of Oklahoma; and

(3) The third chosen by the two arbitrators who are selected as provided above.

If the two arbitrators fail to select a third within sixty (60) days following their selection, then the third arbitrator shall be chosen by the Chairman of the Commission.

4.10 At each annual meeting of the Commission, the order of business, unless agreed otherwise, shall be as follows:

Call to Order;
Introductions and Announcements;
Approval of Agenda;
Reading, Correction and Approval of the Last Meeting;
Report of the Chairman;
Report of Secretary;
Report of Treasurer;
Report of Commissioners;
Report of Committees;

Unfinished Business;
New Business;
Adjournment.

4.11 All meetings of the Commission, except executive sessions, shall be open to the public. Executive sessions shall be open only to members of the Commission and such advisers as may be designated by each member and employees as permitted by the Commission; provided, however, that the Commission may call witnesses before it when in executive session. The Commission may hold executive sessions only for the purposes of discussing:

(1) The employment, appointment, promotion, demotion, disciplining or resignation of a Commission employee or employees, members, advisers, or committee members.

(2) Pending or contemplated litigation or litigation settlement offers, and matters where the duty of the Commission's counsel to its client, pursuant to the Code of Professional Responsibility, clearly conflicts with the public's right to know.

(3) The report, development, or course of action regarding security, personnel, plans, or devices.

No executive session may be held except on a vote, taken in public, by a majority of a quorum of the members present. Any motion or other decision considered or arrived at in executive session shall be voidable unless, following the executive session, the Commission reconvenes in public session and presents and votes on such motion or other decision.

ARTICLE V
COMMITTEES

*** **5.1** There shall be the following standing committees:
(a) Budget Committee;
(b) Engineering Committee;
(c) Environmental and Natural Resources Committee;
(d) Legal Committee.

*** **5.2** The Committees shall have the following duties:
(a) The Budget Committee shall prepare the annual budget and advise the Commission on all fiscal matters that may be referred to it.
(b) The Engineering Committee shall advise the Commission on all engineering matters that may be referred to it.
(c) The Environmental and Natural Resources Committee shall advise the Commission on all environmental and natural resource matters including: (1) the identification of common areas of environmental concerns and potential solutions to shared environmental and natural resource problems; (2) the promotion of environmental awareness and sustainable economic development; and (3) other environmental and natural resource matters that may be referred to it.

(d) The Legal Committee shall advise the Commission on all legal matters that may be referred to it.

5.3 Members of the standing committees shall be appointed by the Commission. The number of members of each committee shall be determined by the Commission. Each state shall be represented by an equal number of members on each committee with the Chairmanship for each committee alternating annually between the States of Arkansas and Oklahoma. Each state shall nominate the member or members representing the state to serve on each committee.

5.4 Formal committee reports shall be made in writing by the Chairman thereof, and shall be filed with the Commission at least ten days prior to the meeting scheduled for its discussion.

ARTICLE VI
RULES AND REGULATIONS

6.1 So far as is consistent with the Arkansas-Oklahoma Arkansas River Basin Compact, the Commission may adopt rules and regulations and may amend them from time to time. Amendments and/or revisions to the rules, regulations and modes of procedure may be made at any meeting of the Commission.

6.2 Rules and regulations of the Commission may be compiled and copies may be prepared for distribution to the public under such terms and conditions as the Commission may prescribe.

ARTICLE VII
FISCAL

7.1 All Commission funds shall be deposited in a depository, or depositories, designated by the Commission under the name of the "Arkansas-Oklahoma Arkansas River Compact Fund." Such funds shall be initiated and maintained by equal payments of each state into the fund.

**** 7.2 Disbursements of funds in the hands of the Treasurer shall be made by check signed by the Treasurer and another authorized signatory upon voucher approved by and reported to the Commission. All Commissioners are authorized signatories.

7.3 At each annual meeting of the Commission, the Commission shall adopt and transmit to the Governors of the two states the budget covering an estimate of its expenses for the following fiscal year. For purposes of this rule and requirement, the signatory states may individually assume and carry-out the responsibility of transmitting the Commission's adopted budget to that state's respective Governor.

** 7.4 All Commission receipts and disbursements shall be audited at least once every two years by a qualified independent certified public accountant to be selected by the

Commission, and the report of the audit shall be included in, and become a part of, the annual report of the Commission.

7.5 An up-to-date inventory of all Commission property shall be kept at the principal office of the Commission.

7.6 The fiscal year of the Commission shall begin July 1 of each year and end June 30 of the next succeeding year.

ARTICLE VIII
ANNUAL REPORT

8.1 The Commission shall annually make and transmit as soon as available to the Governors of the signatory states, and to the President of the United States, a report covering the activities of the Commission for the preceding fiscal year.

*** **8.2** The annual report shall include the following:

(a) Minutes of all regular, special or emergency meetings held during the year;
(b) All findings of facts made by the Commission during the preceding year;
(c) Recommendations for actions by the signatory states;
(d) Statements as to any cooperative studies made during the preceding year;
(e) All data which the Commission deems pertinent;
(f) The budget for current and future years;
(g) The most recent audit or financial statement of the Arkansas-Oklahoma Arkansas River Compact Fund;
(h) Name, address and phone number each Commissioner and each member of all standing committees;
(i) Such other pertinent matters as the Commission may require.

ARTICLE IX
MISCELLANEOUS

9.1 The Commission shall on request make available to the Governor of each of the signatory states any information within its possession at any time.

9.2 All contracts or other instruments in writing to be signed for and on behalf of the Commission, except matters related to the receipt or disbursement of funds, shall be signed by the Chairman when authorized by the Commission and attested to by at least one Commissioner from each State.

9.3 The Commission shall have the power to employ such engineering, legal, clerical and other personnel as in its judgment may be necessary for the performance of its functions under the Compact.

ARTICLE X

HEARINGS BEFORE THE COMMISSION

* **10.1(A)** As the Commission may determine and direct, the Commission may hold hearings for the purpose of taking testimony and receiving evidence for the identification of interstate problems within the purposes of this Compact and issuing such appropriate orders as it deems necessary for the proper administration of the Arkansas-Oklahoma Arkansas River Basin Compact. Any interested person or entity may make application to the Commission requesting that a hearing be held on any matter arising under, or otherwise within the purview of, the Compact, provided, such applications must meet the following requirements:

(a) The application must be in writing and filed with the Chairman, with a copy thereof being simultaneously furnished, by the applicant, to all Commissioners.

(b) The application must state and describe the identity and address of the applicant(s) and, where appropriate, the applicant's representatives in pursuit of the application; the interest of the applicant(s) in presenting the application and requesting that a hearing be held; the purpose, subject matter, issues, concerns and/or allegations sought to be entertained and considered through the hearing applied for; and, as may be appropriate to the purposes of the hearing sought, the relief or other official Commission action being requested through the hearing.

Unless determined and directed otherwise by the Commission, applications for Commission hearings shall be placed, for Commission review and consideration, on the agenda for the next regularly scheduled annual meeting of the Commission following the filing of the application. Applicant(s) shall be notified, in advance by the Chairman, of the date, time and place of the meeting at which the application will be considered and acted upon by the Commission.

10.1(B) All hearings shall be open to the public and may be scheduled and conducted as part of an annual or special meeting of the Commission or as may be determined otherwise by the Commission. The presiding officers at such hearings shall be one Commissioner from each state designated and appointed to serve as presiding officer by the respective state.

10.2 Orders of the Commission shall be enforceable upon the request of the Commission or any other interested party in any court of competent jurisdiction within the county wherein the subject matter to which the order relates is in existence, subject to the right of review through the appellate courts of the state of situs.

10.3 Any hearing held for the promulgation and issuance of orders shall be in the county and state of the subject matter of said hearing.

10.4 In the event the Commission directs that a hearing be held, all interested parties shall be afforded an opportunity to be heard after reasonable notice. Such notice shall include, among other matters deemed appropriate:

(a) A statement of the date, time, place, and nature of the hearing;
(b) A statement of the legal authority and jurisdiction under which the hearing is to be held;
(c) A reference to any particular matter or any statute and/or rules involved; and
(d) A short and plain statement of the matters asserted or which are the subject or purpose of the hearing.

If the Commission, or any other interested party, is unable to state the matters in detail at the time the notice is served, the initial notice may be limited to a statement of the issues. Thereafter, and upon application, a more definite and detailed statement shall be furnished.

10.5 A record of the hearing shall be kept and maintained and shall include:
(a) All pleadings, motions and intermediate rulings;
(b) Evidence received or considered;
(c) A statement of matters officially noticed;
(d) Questions and offers of proof, objections, and rulings thereon;
(e) Proposed findings and exceptions thereto;
(f) Any decision, opinion or report by the officers presiding at the hearing; and
(g) All staff memoranda or data submitted to the Commission in connection with their consideration of the matter before such hearing.

10.6 Findings of facts shall be based exclusively on the evidence and on the matters officially noticed by the Commission.

10.7 Oral proceedings or any part thereof shall be transcribed on request of any party and the cost of transcription shall be paid by the requesting party.

10.8 At its hearings, the Commission may admit and give probative effect to evidence which possesses probative value commonly accepted by reasonably prudent men in the conduct of their affairs. It shall give effect to the rules of privileged communications recognized by law. No greater exclusionary effect shall be given any such rule or privilege than would be obtained in an action in court. The Commission may exclude incompetent, irrelevant, immaterial and unduly repetitious evidence. Objections to evidentiary offers may be made and shall be noted in the record. Subject to these requirements, when a hearing will be expedited and the interest of the parties will not be prejudiced substantially thereby, any part of the evidence may be received in written form.

* **10.9** Documentary evidence may be received in the form of copies or excerpts if the original is not readily available. Upon request, the parties shall be given an opportunity to compare the copy with the original. The record of hearings may be held open for a reasonable length of time to afford either party time to submit additional written statements and/or evidence. An original and two copies (or three copies) of each document sought to be introduced into

evidence by a party at a Commission hearing must be presented to the officers presiding over the hearing by the party desiring and moving its admission.

10.10 A party may conduct cross-examination required for a full and true disclosure of the facts.

10.11 Notice may be taken of judicially recognized facts. In addition, notice may be taken of generally recognized technical or scientific facts within the Commission's specialized knowledge. Parties shall be notified, either before or during the hearing or be referenced in preliminary reports or otherwise, of the material noticed, including any staff memoranda or data, and they shall be afforded an opportunity to contest the material so noticed. The Commission's experience, technical competence and specialized knowledge may be utilized in the evaluation of the evidence.

10.12 In the case of hearings involving alleged or apparent violations of the Compact, the following procedures shall apply:

(a) If there is an alleged or apparent violation of the Compact, it should be made known to the Commission;

(b) Alleged violators shall submit an explanation for, or response to, the alleged violation to the Commission within thirty days of receipt of written notification of said violation from the Commission;

(c) The Commission shall refer the alleged violation to the Engineering and/or Legal Committee for investigation and review;

(d) After due investigation has been made, the Engineering and/or Legal Committee shall refer the matter to the Commission with recommendations concerning the action to be taken.

10.13 Any party shall at all times have the right to counsel, provided that such counsel must be duly licensed to practice law in one of the signatory States, or associated with an attorney thereof.

ARTICLE XI
PUBLICITY

11.1 Prior to the close of each meeting, the Chairman may draft a press release as directed by the Commission and submit it to the Commission for approval. All approved releases may be made available to the press by any member of the Commission.

11.2 The Commissioners shall not be restricted from participation in a press conference or interview, conducted at the request of a member of the press or other news media, but may not speak on behalf of the Commission without the prior approval of the Commission.

ARTICLE XII
POLLUTION

12.1 The Commission may provide a forum for the identification and discussion of pollution occurring in the Arkansas River Basin to the end that the signatory states will cooperate with each other and jointly encourage the maintenance of an active pollution abatement program in each of the two states.

12.2 The Commission shall encourage each individual state to take positive steps in the abatement of pollution identified by the Commission to exist in the Arkansas River Basin; provided however, neither state may require the other to provide water for the purpose of water quality control as a substitute for adequate waste treatment.

12.3 The Commission shall collect, analyze and report on data pertaining to water quality within the basin. For this purpose the Commission may enter into contracts as provided by Article IX A(2) to be approved at a Commission meeting. Unless formally approved by the Commission, no such report shall be published or have any validity.

*As amended at the annual meeting, September 25, 1985.
**As amended at the annual meeting, September 25, 1991.
***As amended at the annual meeting, September 24, 1993.
****As amended at the annual meeting, September 27, 2012.

Interested Others

FEDERAL AGENCIES / MISCELLANEOUS

Division Engineer
Department of the Army
Southwest Division, COE
1114 Commerce Street
Dallas, Texas 75242-0216

District Engineer
Department of the Army
Corps of Engineers
Little Rock District
P. O. Box 867
Little Rock, Arkansas 72203

Col. Richard Pratt, District Chief
Department of the Army
Corps of Engineers, Tulsa District
1645 South 101 East Avenue
Tulsa, Oklahoma 74128

U. S. Geological Survey, WRD
401 Hardin Road
Little Rock, Arkansas 72211
Phone: (501) 228-3600
Fax: (501) 228-3601

U. S. Geological Survey, WRD
Building 7, 2020 Northwest 66th Street
Oklahoma City, Oklahoma 73116

U. S. Fish and Wildlife Service
9041 E. 21st
Tulsa, Oklahoma 74127

Gary O'Neill
State Conservationist
100 USDA
Stillwater, OK 74074
Office 405-742-1000
Fax: 405-742-1005

John Gage, Bureau of Reclamation
4149 Highline Boulevard, Suite 200
Oklahoma City, Oklahoma 73108

Bob Portiss, Director
Port of Catoosa
5350 Cimarron Road
Catoosa, Oklahoma 74105

Scott Robinson, Director
5201 Three Forks Road
P.O. Box 2819
Ft. Gibson, OK 74434

Waterways, ODOT
P. O. Box 660
Tulsa, Oklahoma 74101

State Conservationist
Arkansas NRCS
Room 3416 Federal Building
700 W. Capitol
Little Rock, Arkansas 72201
PH: 301-3100

Steve Filipek
Arkansas Game & Fish Commission
#2 Natural Resources Drive
Little Rock, Arkansas 72205

Dave Evans
US Fish and Wildlife Service
1500 Museum Road, Suite 105
Conway, AR 72032
(501) 223-6300

Terry Lamb
Hydrologic Information Services
3458 Heron Drive
Jacksonville Beach, Florida 32250

Jim Reese, Secretary
Oklahoma Department of Agriculture
2800 North Lincoln
Oklahoma City, OK 73015
PH: (405) 521-3864
FAX: (405) 521-4912
jim.reese@ag.ok.gov

Ed Fite, Administrator
Oklahoma Scenic Rivers Commission
P.O. Box 292
Tahlequah, OK 74464
PH: (918) 456-3251,
FAX: (918) 456-8466
Ed.fite@osrc.ok.gov

John Sparkman, Cherokee Nation
P.O. Box 948
Tahlequah, OK 74465
(918) 458-5496

Mr. David Justice, Cherokee Nation
P.O. Box 948
Tahlequah, OK 74465
(918) 458-5496

Office of the Attorney General
313 N.E. 21st
Oklahoma City, Ok 73105