



Program Review FY2008-2009



**Sparta Recovery Study
Department of Interior
Cooperative Conservation
Award Winner**



PROGRAM REVIEW ARKANSAS WATER SCIENCE CENTER —2008-2009

I. PRIORITY SCIENCE ISSUES

- **Major Current or Emerging Water Issues**

There continues to be major cones of depression in the potentiometric surfaces of the Sparta and the Mississippi River Valley Alluvial aquifers over their occurrence in Arkansas, Louisiana, Mississippi, and Tennessee due to long term over pumping. Heads have declined to the extent that industrial and municipal users of the Sparta water and the irrigation and agricultural users of alluvial water are very concerned. In Arkansas, the Natural Resources Commission (ANRC) has declared certain areas in both the Sparta and the alluvial aquifers to be "critical ground-water areas." Currently (2008) an additional area in the State is being considered for the "critical" designation. The adjacent states have similar concerns but, either do not have comparable ground-water strategies in place or, have not yet made such a declaration. There is an ever-increasing desire on the part of water-resource managers, legislators, and the public to understand how much ground water is available and what yields from the aquifers are sustainable. Of equal interest, at least in Arkansas, is the amount of "unmet demand"—the difference between projected demand for water and sustainable yield. The "unmet demand" will have to be met from alternative sources and delivered to the area of need by ditches, canals, and pipelines. We continue to work closely with partners and stakeholders who are concerned with providing for alternate sources of water to reduced dependence on ground-water supplies and still meet current and projected demands for water. Conservationists and outdoorsmen are very concerned about the quantity of water proposed to be withdrawn from rivers to meet unmet demand and the potentially negative impact those withdrawals may have if minimum flow constraints in the rivers are set too low.

Concern over nutrient enrichment in the Illinois River Basin in northwestern Arkansas and eastern Oklahoma has precipitated much concern on the part of environmentalists and recreators in Oklahoma where the Illinois is classified as a scenic river. In northwestern Arkansas, the basin is an area of rapid growth in human population and confined animal feeding operations. Waste treatment effluent and nonpoint source runoff from poultry litter spreading on pastures share in the "blame" for the enrichment. Political tension continues to be very high between the two States. A lawsuit brought by the state of Oklahoma against major poultry producers in northwest Arkansas makes meaningful negotiations between the two states very difficult at this time. This litigation is expected to come to trial this spring (2008). In addition, the State of Oklahoma is seeking an injunction prohibiting the spreading of poultry litter on pastures in northwest Arkansas and northeast Oklahoma for fertilizer because of bacterial concerns that may be hazardous to human health. This dilemma continues to prevail and is a significant part of the "growth issues" related to water resources in northwest Arkansas.

There are multiple competing demands on the White River System. The river system and its multiple reservoirs are areas of much concern for water scientists, water users, and water managers because of competing demands for recreation, fisheries, agriculture, navigation, flood

control, power generation, and wetlands. A comprehensive study is needed to collect sufficient data and to develop a set of simulation models to be used as planning tools. Funds have been allocated to the Corps of Engineers to conduct a comprehensive study of the White River. The Memphis District provides for project management of this effort. The USGS received White River Comprehensive Study funding to complete a 2-D water quality model of Beaver Lake, the most upstream reservoir on the White. Coop funding from Arkansas Department of Environmental Quality (ADEQ) was forthcoming to run nutrient management scenarios using the calibrated Beaver Lake model. This effort has been completed and a report published. Dr. Reed Green is working with the Water Resources Research Center (WRRC) at the University of Western Australia to do an initial calibration of a 3D reservoir model of Beaver Lake – initially using available data. This is a tool that WRRC has developed for decision support applications and is being used in several places around the world. Beaver Lake on the White River will be the first large scale application of this technology in the United States. When mature, this will be a fully 3-D, real-time model that will be accessible via the Web. We have some COOP funding and have installed one set of Lake Diagnostic System (LDS) instruments in the lake – the LDS transmits a suite of data real-time via phone modem. We are seeking additional funding sources, to continue with the 3-D modeling and all of the supportive data management tasks that are required.

Ground-water modeling of the Sparta aquifer that we completed several years ago yielded information to residents of Union County in south Arkansas that helped them understand how much pumping from the Sparta would have to be reduced to result in a rebound in water levels in the current (at that time) cone of depression to a level equal to or greater than the top of the formation. The residents (citizens, industry, and local government) set about creating the Union County Water Conservation Board which then began a massive water conservation education program. They also explored alternate sources of water to take the pressure off the Sparta. They have been very successful over the last 11 years and we are now seeing significant rebound in Sparta water levels. We have an ongoing project with the Board to monitor and verify “Sparta Recovery”. This Project is a recipient of the 2008 DOI Cooperative Conservation Award.

- **Future Program Opportunities for Involving Other USGS Resources**

We try to always be sensitive in our program development activities to look for opportunities for collaboration with other USGS entities. We often work with neighboring Science Centers and the use of the USGS National Water-Quality Laboratory is integral to multiple projects in the WSC. We have worked in a collaborative fashion with members of the National Research Program (NRP) whenever the opportunity (or need) arises and currently are finishing a project (Low Flow) where an NRP member has been integrally involved and will co-author the resulting Scientific Information Report. We have ongoing efforts where other (than Water) USGS disciplines are involved and are always looking for those opportunities. The following reflect potential for program growth that will/may involve collaboration with other USGS entities.

In response to changing needs for satellite field activities in the State and clearly evolving program growth opportunities in northwest Arkansas, we have continued to expand the size and scope of the Field Office in Fayetteville. We continue to see new doors of opportunity for increased collaboration with the U of A, general program development in northwest Arkansas, and new partnerships with other Bureau entities.

The Arkansas WSC is particularly pleased to be partnering with the Institute for Technology Development (ITD) in proposing to evaluate “The Use of ASTER Data for the Estimation of Nutrient Enrichment in Selected Arkansas Lakes and Reservoirs.” This technology could, at a minimum, prove beneficial to scientists and water resource managers in reconnaissance and qualitative comparisons of water bodies where possible nutrient enrichment is a concern. If the approach proves to be quantitatively viable, it could be very useful for nutrient monitoring – particularly with respect to TMDLs and/or other State or Federal nutrient management criteria.

The Arkansas WSC is developing a new and innovative project in northwest Arkansas to provide a decision support system to measure indices of sustainable environmental (stream, reservoir, ground water) functions within the upper White River (Beaver Lake) and Illinois River Basins. There will be a strong biological component in this project used as indicators of water quality.

We continue to be interested in participating in projects related to global climate change and how that phenomenon impacts water and ecological resources. We look for opportunities to secure funding and partner appropriately to address those issues.

II. TECHNICAL ISSUES

- **Status of Data Program**

The Surveillance and Analysis Section is under the general supervision of Reed Green. The Surveillance and Analysis Section personnel perform the majority of all Arkansas WSC surface-water and water-quality data collection. The total funding for the surface-water and water-quality data collection activities is \$3.2 million, with \$2.2 million for the streamgaging network and \$1.0 million for the water-quality monitoring network. The type and approximate number and cost of data-collection sites in the Arkansas WSC are shown in table 1. The Arkansas WSC has been able to hold the cost of streamgages, currently at \$13,900, steady (no COLA increases) for the past two years. This is due to several factors, such as the retirement of higher-grade technicians, increased efficiency in the field due to acoustic equipment, and replacing older DCPs and transducers with newer, more reliable instruments.

Table 1. Data Collection Program

Type	Number	Cost
Continuous streamflow	115	\$13,900
Partial streamflow	17	8,840
Stage	8	5,685
Crest-stage	0	--
Precipitation	66	Varies
DO/Temp monitor	9	Varies
DO, temp, pH, specific conductance, turbidity monitor	3	Varies
NASQAN II	1	40,410
Miscellaneous surface-water quality	67	Varies
Water quality Lake Diagnostic Station	1	Varies
Miscellaneous ground-water quality	73	Varies
Continuous ground-water levels	30	2,500
Miscellaneous ground-water levels	850	Varies
Monthly sediment	13	Varies

- **Successes/Opportunities/Needs**

The Arkansas WSC's surface-water program continues to increase substantially each year. Continuous daily streamflow stations increased from 106 in FY07 to 115 this fiscal year. No major reductions with any cooperating agencies are expected next year. Several high data rate (HDR) data collection platforms (DCP) were installed this year. More than 40 percent of our current daily stations are now equipped with HDR DCPs. We recently ordered 12 additional HDR DCPs and plan to install them this fiscal year. The increase in NSIP funding will be used to purchase needed equipment at the streamflow gaging stations and to help lessen the burden on some of our cooperating agencies.

This year, one hydrologic technician was hired from the Tampa, Florida, field office to work in the Little Rock field office. Two students in the Fayetteville field office were converted to full-time permanent hydrologic technicians. In addition, two students were hired for the same office to replace those vacancies. The data program currently employs four students (3-STEP, 1-SCEP).

Earlier this year, the Arkansas WSC partnered with the National Weather Service WFO in Little Rock to develop a system of proposed streamflow and precipitation gaging stations to serve as a flood warning system to residences and businesses in Hot Springs, Arkansas. We have received a signed JFA from the city of Hot Springs and are scheduled to begin the installation of four streamflow and precipitation gages and two precipitation-only gages during March 2008. In addition, we are also in the process of obtaining an IAG from the Buffalo National River, National Park Service (NPS) to install, operate, and maintain two streamflow and precipitation gaging stations on the upper Buffalo River. The data from these new gages, combined with current streamflow and precipitation gages, will be used as a flood-warning system for the Buffalo River NPS to warn canoeists and campers of possible flooding conditions on the Buffalo River.

The Arkansas WSC is currently installing five streamflow gaging stations on a research watershed area in northwestern Arkansas. The location, the Watershed Research and Education Center (WREC), is being constructed by the University of Arkansas in Fayetteville and is located on the Arkansas Agricultural Research and Extension Center's research farm. This location will allow scientists at the WREC and the USGS to monitor the amount of stormwater, sediments, nutrients, and potential contaminants entering the watershed (drainage basin of entire study area) through urban drainage ditches and what is leaving the system at the watershed's outlet.

The Arkansas WSC's water-quality program has increased as well over the last few years. As some of the water-quality data collection efforts have been discontinued, new work has developed. We continue to operate and maintain a continuous water-quality monitor to develop surrogate relations for estimating ambient concentrations of various water-quality constituents, mainly nutrients, sediment, and fecal indicator densities. This instrument is located at a high-profile site located 1 hour west of the office on the Middle Fork of the Saline River. The Arkansas WSC hopes to highlight the operations and success of this project to strengthen and build a continuous monitoring program, distinct and separate from the existing water-quality (0300) and streamgaging (0100) programs. Two additional continuous water-quality monitors were installed last year. These monitors were installed along the main stem of the Maumelle

River. Maumelle River feeds Lake Maumelle, which serves as a water-supply reservoir for 400,000 residents that live in the greater Little Rock area.

Nonpoint-source pollution has been and continues to be a major issue in Arkansas. We continue to seek ways to increase our water-quality monitoring program in northwestern Arkansas (the fastest growing area in Arkansas and one of the fastest in the United States). We are currently preparing a funding agreement to sample several streams in the upper White-River basin in northwestern Arkansas during base- and stormflow conditions. Much of the water-quality data collection work is storm-event driven. The staff has become conditioned to stay prepared to mobilize to collect water-quality samples and streamflow measurements each time it rains. With the number of stations now requiring storm-event samples to be collected, it is critical that samples be collected at some of the sites during each event regardless of whether it is day or night, weekday, or weekend. The Arkansas WSC continues to be very successful at collecting storm-event samples. Increasing staff at the Fayetteville Field Office has helped us be more successful in obtaining storm samples in northwestern Arkansas.

Ground-water data collection activities in the State continue with high visibility resulting from increasing public and agency concerns over drawdown in the Sparta and alluvial aquifers. Continuing ground-water programs include: a cooperative program to monitor the ground-water levels of Arkansas' eight major aquifers on a rotating basis, collection of specific conductance samples, the CBR ground-water level program, the "master well" ground-water quality program, operation of 17 continuous ground-water recorders including 12 real-time stations, geophysical logging of wells, and conducting 1 aquifer test on a yearly basis. In FY08, the Arkansas WSC will be collecting specific conductance from 50 wells, 300 water levels from the alluvial aquifer as part of our 2-year rotating ground-water program, and 80 water-level measurements in the Tokio-Nacatoch aquifers in eastern Arkansas.

- **WSC-Specific Data Issues**

The Arkansas WSC continues to refine its records working process in order to meet the 120-day PART requirements. The goal is to have 100 percent records worked and finalized within 120 days of the field measurement. The greatest hurdle has been bringing new personnel up to speed with record-working capabilities.

- **Investments in New Capabilities and Progress toward Automated Measurements and Data Processing**

The Arkansas WSC continues to rely solely on acoustic instrumentation for all discharge measurements. We currently are using 7 ADCPs for boat and bridge measurements, and 10 acoustic flow trackers for wading measurements. Also, we have five side-looking acoustic index velocity stations and plan to install one more by the end of this fiscal year. The use of these instruments enables us to monitor continuous discharge at these sites more efficiently by eliminating the time it takes using conventional methods to compute flow at sites where backwater occurs. This reduction in time results in a savings to our cooperators who fund these types of sites.

Ground-water data collection has improved by converting continuous ground-water recorders to real-time stations. Transmission of data is primarily through cell phone modems and we are installing or replacing the old dial-up modems with the newer IP address modems. All annual water-level measurements are stored in the field on a PDA using MONKES and downloaded at the office.

- **Date that SW Data were Finalized in NWIS and Plan for Reporting/Publishing other Data**

The Arkansas WSC continues to work towards working records real-time. After field trips, personnel are scheduled time in the office to work records. With few exceptions, all records are being worked up following field trips. The Arkansas WSC continues to refine its records-working process in order to meet the 120-day PART requirements. This year, the surface-water, water-quality, and ground-water data for the ADR were finalized January 31 and are on schedule to submit to the ADR by April 1.

- **Status of Studies Program**

The hydrologic studies program in Arkansas is very dynamic and scientifically diverse. Hydrologic studies are managed mostly by staff in the Hydrologic Investigation Section (Studies) although several projects are directed out of the Hydrologic Surveillance and Analysis Section (Data).

Several changes occurred with personnel in the studies section recently. Two Hydrologists who have been in liaison positions with the NRCS National Water Management Center (NWMC, one full-time and one half-time) for 12 and 8 years respectively are, as of January 18, 2008, no longer in those positions because of reduced NWMC funding. Future work planned with the NWMC will be on a project-by-project basis. A GS-11 Hydrologist took the VSIP/VERA buyout in March.

The following is intended to provide a short description of innovative studies that utilize new technology, tackle a 'new' problem, have a high degree of transfer to other WSCs, or utilize scientists from other USGS disciplines.

Cooperative Projects

Lake Diagnostic Station to Develop a Real-Time Decision-Support System at Beaver Lake

A Lake Diagnostic Station (LDS) was installed near the Beaver Water District (BWD) water-intake structure in the upper end of Beaver Lake, Arkansas. The LDS is a long-term water-quality monitoring instrument developed by the Centre for Water Research (CWR) at the University of Western Australia and Precision Measurement Engineering, Inc. (PME) in Carlsbad, California (LDS; <http://www.pme.com/HTML%20Docs/LDS%20Home.html>; in Beaver Lake (<http://www.cwr.uwa.edu.au/news/index.php?id=1943>). The meteorological station sitting above the water surface records wind speed, wind direction, air temperature, relative humidity, shortwave and net longwave radiation every 30 seconds. Sixteen thermistor nodes are arranged vertically in the water column on a cable along with eight luminescent dissolved oxygen probes, recording measurements every 30 seconds. Programs are being developed to push the raw data into NWIS for storage and retrieval. In the mean time, real-time data are available on the CWR website (<http://rtm.cwr.uwa.edu.au/olaris/index.php?source=LDS&extras=extras&lake=Beaver&screenwidth=1280&screenheight=1024>). The water temperature data will open up in a depth/time-series plot. To add DO and others (wind speed, direction, solar rad. etc.) click on the "Data Streams"

button and select the parameter you want. A second plot will open in a window below the temperature data. These data will be used to support the real-time 3D hydrodynamic and water quality model, the basis of the real-time decision-support system for sustainable and adaptive management of Beaver Lake. Funding is still being sought to purchase and install the second LDS to be positioned near the dam wall in the forebay. In addition, further funding is being sought to support real-time model development and validation.

Ground-Water Flow Modeling of the Ozark and Springfield Plateau Aquifers

The tri-State area of Kansas, Missouri, and Oklahoma is experiencing rapid population growth and corresponding increases in water use and declining water levels in the Springfield Plateau and the Ozark aquifers. These aquifers underlay parts of Kansas, Missouri, Oklahoma, and a small corner of northwest Arkansas. A ground-water flow model of these carbonate aquifers has been constructed and is being calibrated in 2008 to simulate the effects to future ground-water levels resulting from various pumping scenarios and to evaluate flow paths to selected well fields. Development of a conjunctive use optimization model that could provide estimates of optimal pumpage given agreed upon constraints and pumping limits, is optional as of the last Technical Advisory Committee (TAC) conference call. The project's TAC, made up of multi-state members, will choose to have "more than originally planned" flow-model simulations or an optimization model. Project-wide water quality sampling in both aquifers has been done and an assessment of the current water-quality conditions will be completed. This is a joint study between the Arkansas WSC whose staff is building the model, with the assistance of a Minnesota hydrologist, and the Kansas WSC who is coordinating the water-quality work. The project began in late FY05 and is designed to continue for a period of 3.25 years. Funding for this study includes the Kansas Water Office, Congressional earmark thru the Office of Ground Water, and Coop dollars from both Arkansas and Kansas WSCs.

Alluvial Ground-Water Modeling

Three ground-water flow and conjunctive-use optimization models - one for the Alluvial aquifer north of the Arkansas River, one for the Alluvial aquifer south of the Arkansas River, and one for the Sparta aquifer - were completed in 2003-04 to help better understand how these systems function and to provide an estimate of "sustainable yield" to the Arkansas Natural Resources Commission (ANRC). ANRC has funded, since 2005, a continuing "modeling technical assistance" project that provides for assistance to ANRC personnel at public meetings, presentation preparation and delivery, publication of reports and fact sheets, running of additional scenarios, and for keeping the models updated and current. The modeling technical assistance study is currently validating the north alluvial ground-water flow model using updated water-level observations and water use from 1998-2005.

Other cooperative projects in FY2008 include:

Little Rock Water Supply

Sparta Aquifer Recovery

Web Enabled, Site Specific Water Use Data Program

Geophysical Log Database and Aquifer Surfaces in NW Arkansas
ANRC Well Completion Database
Data Mining of Chlorides in the Alluvial Aquifer
Water-Quality Assessment of the Middle Fork of the Saline River, Central Arkansas
Preliminary Characterization of Thermal Waters East of Hot Springs National Park
Beaver Lake and watershed water quantity and quality monitoring
Flood Warning System for the City of Hot Springs

Federal Program

A Method for Identifying the Major Factors that Determine the Occurrence of Karst Features in the Ozarks

This project is developing a method of mapping the probability of the occurrence of karst features such as sinkholes, caves, and springs in the Ozarks. This project is focusing on two national park locations: the Ozark National Scenic Riverways (OZAR) in southern Missouri, and the Buffalo National River (BUFF) in northwestern Arkansas. The results of this project will provide natural resource managers with digital data layers and maps showing the probability of occurrence of karst features within the contributing watersheds of both park units. The project is anticipated to last approximately 5 years from FY07 through FY11 with total funding expected to be \$725,000. Funding is from the CRISP DOI Science on the Landscape and includes collaborators Jeffrey Spooner (USGS-Geog), Mark Hudson (USGS-GD), Tim Kresse and Phil Hays (USGS-WRD), and Esther Stroh (USGS-BRD).

Mississippi Embayment Regional Aquifer Study (MERAS); A Model Derived Assessment of Water Availability in Portions of Eight States

A ground-water flow model of the northern Mississippi Embayment is being developed to aid in answering questions about ground-water availability. The study area covers approximately 70,000 square miles in portions of eight states including Arkansas, Louisiana, Mississippi, Tennessee, Alabama, Missouri, Illinois, and Kentucky. Funding for the MERAS project is over \$1.2M from the Office of Ground Water- Ground Water Resources Program and will be completed in 2009. Currently model calibration is ongoing. The calibrated model will be used to estimate ground-water availability and to run scenarios to simulate system response to various changes in stress - including climate change. Over 2,700 geophysical logs were compiled for the study area in the Mississippi embayment to create digital surface tops and thickness maps for ten hydrogeologic units. These digital data are being included in a Web accessible data base in support of the MERAS project and will be maintained as a valuable resource for other projects as well.

Other Federal program projects in FY2008 include:

Ozark Plateaus NAWQA
NWIS Application Programming Support
Principal Aquifer Modeling

Other Federal Agency Programs

Lower Mississippi River National Rivers and Streams Assessment

An Interagency Agreement between the AR WSC and the USEPA will support field sampling for an ecological assessment of the Lower Mississippi River for USEPA Office of Water's National Rivers and Streams Assessments (NRSA). The data will be used by States to assess the condition of biological assemblages, water quality, and physical habitat in the Mississippi River from the confluence of the Ohio River near Cairo, IL to the Arkansas-Louisiana state-line. The specific objectives are to collect water quality, fish, phytoplankton, macroinvertebrate, and riparian physical habitat as indicators of biological condition from approximately 25 sites on the Lower Mississippi River. The probability design sampling sites will be sampled in July-October, 2008 in a joint effort between the AR and MO WSCs. Depending on the availability of funding, USGS may participate in the compilation, analysis, and reporting of data.

Other OFA projects in FY2008 include:

USEPA Reference Lake Study
USEPA REMAP Fish/Bugs and Water Quality
Buffalo National River Flood Warning

Potential New Studies

Real-Time Water-Level Monitoring Network and Reporting for Horseshoe Lake

Horseshoe Lake, located in east-central Arkansas, lake stage has been declining for a number of years. The current practice of pumping ground water from the alluvial aquifer to fill the lake will have a profound affect on the hydrology of the area. At a minimum, a ground- and surface-water, water-level monitoring network is needed to assess current and future hydrologic information needs. The proposed study includes: 1) a field survey to locate existing wells in the alluvial aquifer suitable for ground-water level measurements; 2) five monitoring wells will be instrumented with a down-hole pressure transducer connected to a digital data logger for real-time water levels; 3) network of 25 wells will be selected based to monitor seasonal ground-water level changes; 4) install two real-time lake stage monitoring sites on Horseshoe Lake; 5) install a real-time Mississippi River stage monitoring site adjacent to Horseshoe Lake; 6) a Scientific Investigations Report series describing the data collected, results, and interpretations will be prepared. Reimbursable funding from the Horseshoe Lake Drainage and Irrigation District and potentially the Tunica River Park and Museum is planned.

Interaction with Environmental Managers of Major Food and Agricultural Suppliers

Wal-Mart is the world's largest retailer and the largest grocery retailer in the United States. They see a responsibility to promote more sustainable practices in the food and agriculture industries. Wal-Mart is encouraging best management practices in farming and food processing across the supply chain and seeking improvement in overall eco-efficiency ranging from reducing agro-chemical usage to improving water and soil management. Arkansas WSC staff have been meeting regularly with the Wal-Mart Food and Agriculture Network in northwest Arkansas (Wal-Mart is headquartered in Bentonville, Arkansas). The Food and Ag Network consist of a constellation of Wal-Mart associates, entrepreneurs, NGOs (Conservation International, Environmental Defense, National Council of Farm Co-ops, World Wildlife Fund), government officials (Natural Resources Conservation Service, USGS), academics (University of Arkansas) and suppliers (Del Monte, General Mills, Land 'O Lakes, Welch's, Nestle Water, Kraft, Mars, Unilever, Pilgrim's Pride, Cargill, Johnson Diversey). During the meetings, the network reports on their progress highlighting some of the challenges and opportunities they face and brainstorm new initiatives to pursue. Three Arkansas WSC staff attended a Water Forum in March and sponsored an exhibit booth highlighting USGS efforts in water use and the water census. The Arkansas WSC sees a connection with Wal-Mart's and their supplier's sustainability efforts and USGS's expertise with earth science information and reporting.

The Use of ASTER Data for the Estimation of Nutrient Enrichment of Selected Arkansas Lakes and Reservoirs

The proposed study will examine relations between spectral information extracted from ASTER data and nutrient enrichment in selected lakes in Arkansas. ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer) is an imaging instrument flying on Terra, a satellite launched in December 1999 as part of NASA's Earth Observing System. Some Arkansas lakes and reservoirs are sampled periodically for nutrient concentrations and related water-quality characteristics. Spectral information will be extracted from ASTER data at lake monitoring locations. Statistical relations between archived ASTER data and nutrient-related water-quality data will be established. This will provide information that can be used to address the applicability of remote sensing for predicting degrees of nutrient impairment. This information could potentially be used as a means of determining compliance to existing water-quality criteria and for developing Total Maximum Daily Loads (TMDLs). A proposal was presented to NASA through an RFP by the Institute for Technology Development at the Stennis Space Center in conjunction with the Arkansas WSC.

Additional Opportunities Still in the Formative Stages

- Wadeable streams sampling – partnering with EPA and ADEQ
- Additional water quality and quantity studies in northwest Arkansas – multiple partner potential

III. ADMINISTRATIVE ISSUES

The Arkansas WSC has no unresolved or unmanageable administrative issues.

IV. MANAGEMENT ISSUES

A. Human Resources

- **Staffing**— Optimally we would like to have sufficient staff with appropriate skills, sufficient funding, and such a good relationship with all potential partners that we would be involved in all important water-related issues in the State. When we have found ourselves lacking in any of those ingredients, we sought to fill those voids and have “prioritized” our work accordingly so that we continue to provide the highest quality results in a timely manner that meet stakeholder needs and contribute, to the extent possible, toward fulfilling our mission as defined in the Strategic Science Plan. Our professional staff remains strong in technical ability and productivity. We continue to have an eager and productive “student” component to our staff from which we have hired into permanent positions several over the last few years. Our Field Service Unit, which resulted from combining our former Surface-Water and Water-Quality Field Units has, as expected, provided for better flexibility and efficiency within the Data Program. Field technicians continue to be cross trained in both streamgaging and water-quality techniques and new hires are indoctrinated that way from the beginning. Our current FTE average level is at 48.42. We anticipate our average to increase to 50.66 by the end of FY2008 as students increase their hours during the summer. We feel we are maintaining a staff that is consistent with and that meets the needs reflected in our Science Plan.
- **Organization Chart** (see next page)

Table 2--Permanent and Non-permanent Employees

Type	Permanent, full-time	Permanent, part-time	Term	Student	Contract
Number	43	0	1	8	0

ARKANSAS WATER SCIENCE CENTER ORGANIZATION CHART

March 2008

OFFICE OF THE DIRECTOR

J. E. Terry, Director-15

**USGS Geospatial Liaison
NSDI Partnership Office**
W.D. Sneed, Cartographer-13

National Water Information System
M.L. Farmer, ITSpec(SysAnalysis)-13¹⁵

Lafayette Publishing Service Center
B.L. Louthian, Writer-Editor-9

- 1 – Ground-Water Specialist
- 2 – Surface-Water Specialist
- 3 – Water-Quality Specialist
- 4 – Water Use Specialist
- 5 – Ozark Plateau NAWQA Chief
- 6 – Computer System Admin
- 7 – Safety Officer
- 8 – Training Officer
- 9 – GIS Specialist
- 10 – Report Specialist
- 11 – Hazardous Waste Coordinator
- 12 – Outreach Coordinator
- 13 - UofA Adjunct Professor
- 14 – Part-time NWIS Support
- 15 – NWIS ADAPS Team Lead

Hydrologic Investigations Section
D.A. Freiwald, SupvHyd-14, **Section Chief and Associate Director**
J.C. Petersen, Hyd-13^{5,10,12}
J.B. Czarnecki, Hyd-13¹
B.G. Justus, Bio-12
A.L. Pugh, Hyd-12
T.P. Schrader, Hyd-12¹¹
T.W. Holland, HydTech-12⁴
B.R. Clark, Hyd-12⁹
T.M. Kresse, Hyd-11
R.F. Montanus, HydTech-9
J.A. Gillip, Hyd-9
R.M. Scheiderer, Hyd-9
J.E. Wallace, HydTech-7
A.L. Beck, HydTech-5
J.M. Blackstock-STEP-3

Administrative Services Section
S.R. Dolls, AdminOff-11, **Section Chief**
S. Abernathy, BudAnalyst-9
R.K. Childers, AdmOpsAsst-7⁸
R.F. Bowling, OffAutClk-3

Hydrologic Surveillance & Analysis Section
W.R. Green, SupvHyd-13¹⁴, **Section Chief and Assistant Director**
J. M. Galloway, Hyd-13³
J.E. Funkhouser, Hyd-13²
D.A. Evans, HydTech-12
R.A. Blanchard, HydTech-9
J.M. Clark, STEP-3

Field Service Unit
T.H. Brossett, SupvHydTech-12, **Unit Chief**
R.J. Freret, HydTech-11
J.A. Heavener, HydTech-11
W.E. Baldwin, HydTech-9
J.L. De Lanois, HydTech-9
M.L. Gipson, HydTech-9
A.D. Lasker, HydTech-9
P.L. Stephens, HydTech-9
E.A. Beavers, HydTech-8
K.W. Davis, HydTech-7
S.B. Franks, HydTech-6
B.K. Martin, HydTech-5
J.T. Mays, STEP-3

Information Management and Software Development Section
Vacant, SupvIT Spec-12
J.R. Cole, ITSpec-12⁶
D.S. Davidson, ITSpec-12¹⁴
B.T. Jackson, ITSpec-11
M.P. Smith, ITSpec-5

<u>Fayetteville Project Office</u>		
<p><u>Investigations</u> S.E. Bolyard, Hyd-7</p>	<p><u>Senior Hydrologist</u> P.D. Hays, Hyd-13¹³</p>	<p><u>Fayetteville Field Operations</u> K.M. Hubbs, HydTech-11 D.M. Wagner, Hyd-7 W.F. Killion, HydTech-6 C.M. Ransom, HydTech-4 B.K. Breaker, SCEP-3 C.B. Reinhardt, STEP-3</p>

B. Information Dissemination

- **Reports**

Arkansas WSC reports personnel is limited to a part-time Reports Specialist. Arkansas is now in the Lafayette Publishing Service Center (PSC) which includes Arkansas, Texas, Oklahoma, Louisiana, and Mississippi. Bobbie Louthian, who was the WSC’s writer-editor, has been transferred to the Lafayette PSC but continues to work in an office at our WSC. An extremely important role in our products and information dissemination effort is our Outreach and Media Coordinator. Jim Petersen fills that position and is also our Reports Specialist. The Arkansas WSC continues to use the Missouri WSC GPO printing contract.

The Arkansas WSC published 11 reports in calendar year 2007 and approximately 15 reports are either initial drafts being written by authors or are in the report processing or review system in 2008.

- **Table 3—Status of Past-Due Reports (as of 1-01-08)**

Project Number	Project End Date	Report Title and Authors	Report Series	Reason for Being Late; Status and Plans to Complete	Estimated Delivery Date
BWB00	12/31/07	Illinois River Organic/Inorganic J.M. Galloway	SIR	Data collection delayed for QAPP development; report in review	May 2008
BTLCA	9/31/07	Cave Recharge J.M. Galloway	SIR	Data collection and funding delayed; drafting report	May 2008
CP300	9/31/07	Low Flow J.E. Funkhouser	SIR	Project chief change; Regional approval late March	June 2008

- **Table 4—Status of Reports Approved, but not yet Delivered**

Project number	Report title; Authors; Publication Number	Date Approved	Status	Estimated Delivery Date
CRN89	Simulations of ground-water flow, transport, age, and particle tracking near York, Nebraska, for a study of transport of anthropogenic and natural contaminants (TANC) to public-supply wells by B.R. Clark, M.K. Landon, L.J. Kauffman, and G.Z. Hornberger, SIR 2007-5068	4/18/07	Waiting on approval of related report before publishing	June 2008

- **Dissemination of products/information that has made a difference in program/project success, science impact and that was or should be considered for wider distribution locally or in the region**

Several hydrologists and hydrologic technicians were interviewed and filmed by the Arkansas Educational Television Network (AETN) for a 1-hour documentary on Arkansas water resources that will be shown on AETN in April. Preliminary information from AETN indicates that USGS studies and data collection activities will be featured prominently in this documentary. Topics with USGS input include ground-water depletion and modeling, water-quality of Lake Maumelle, water-quality of Ozark streams, streamflow measurement, water use, and water-quality sampling.

Heavy rainfall of up to 10 inches in northern and western Arkansas on March 17-18 caused major flooding in some areas. On March 19, river and stream levels were above flood stage at 17 U.S. Geological Survey (USGS) streamflow-gaging stations. The Buffalo River at the U.S. Highway 65 bridge crested at 49.5 feet which is just 4 feet lower than the historic December 1982 flood. USGS crews were out all week collecting flood data needed for flood forecasts and water-quality samples. A cell phone video taken by an Arkansas WSC hydrologic technician of a house washing beneath a bridge on the White River was requested by CNN and FOX News.

C. Funding

- **Table 5—Customer Funds Reported by Customer, FY2008**

See next page

- **Table 6 —Projects to be Completed during FY2008**

Project Number	Project Name	Customer Number	Customer Name (source of funding)	Funding Amount	Plans for Reprogramming Coop Funds
03RL	Reference Lake Study	AR005	ADEQ	19,500	unmatched
00203	Alluvial Chlorides	AR038	Boeuf-Tensas Regional	48,900	unmatched

- **Table 7 —DOI Cost-Share Program, FY 2008 Usage**

Project Number	Short Project Name	Name of DOI Customer	Data or Study	Funds from DOI	Cost-Share Funds	End Date
9K7	SW	Hot Springs NPS	Data	10,993	3,607	None
CEM	Pueblo Reservoir	BOR	Study	15,995	4,393	Sept 08

Table 5 —Customer Funds Report by Customer, FY2008

ACCNT NO/PRJ CODE	CUSTOMER NAME	FED FUNDING	NON-DIRECT/NON-REIMB	OFA FUNDING	REPAY	DIRECT SERVICES	UNMATCHED	FED MATCH	OFA MATCH	TOTAL FUNDING
0001A	Federal	1,169,326								1,169,326
123AB	Entergy			18,250						18,250
160CL	Audubon Arkansas			12,234						12,234
21008	NPS			65,893					3,607	69,500
35004	Little Rock COE			110,000						110,000
35029	Memphis COE			526,950						526,950
48251	USDA WMC			67,065						67,065
25006	BOR			15,995					4,393	20,388
51016	EPA Region 6			301,975						301,975
9x401	COE Streamgaging			496,940						496,940
AR001	AGC				98,540			98,540		197,080
AR002	AR St Hwy						236,500	0		236,500
AR003	AG&FC				4,930		30,210	4,930		40,070
AR005	ADEQ				87,182		274,793	87,182		449,157
AR007	ANRC				522,050		483,711	522,050		1,527,811
AR010	Parks & Tourism				1,375			1,375		2,750
AR013	CAW				84,000		306,954	84,000		474,954
AR015	Fort Smith				5,950		71,500	5,950		83,400
AR016	U of A Fayetteville				20,000		50,255	20,000		90,255
AR025	Batesville						7,065			7,065
AR026	Fayetteville				7,705		10,864	7,705		26,274
AR027	BWD				76,245		44,696	76,245		197,186
AR030	Rogers						13,900	0		13,900
AR031	Union Co. Dist						7,590			7,590
AR034	Grand Prairie						3,100			3,100
AR035	Union Co. Board						62,280			62,280
AR036	Cabot Water Works				2,000		2,750	2,000		6,750
AR037	New Port						6,500	0		6,500
AR038	Boeuf-Tensas Reg						48,900			48,900
AR039	Little Rock						12,234			12,234
AR040	Hot Springs				5,000		93,750	5,000		103,750
KS001	Kansas Wtr Office				16,000		77,500	16,000		109,500
	Uncommitted Funds				50,605			50,605		101,210
	Total	1,169,326		1,615,302	981,582		1,845,052	981,582	8,000	6,600,844

NOTE: Total \$6,600,844 less \$253,596 AMF = \$6,347,248. Federal match includes AMF.

D. Safety

All safety training in the Arkansas WSC was conducted and was up-to-date for last year, but training will be needed for this year. Jeanne De Lanois was appointed the WSC Collateral-Duty Safety Program Coordinator beginning July 7, 2007, and has focused on establishing a method for tracking training needs, purchasing personal protective equipment (PPE), and resolving the issues raised by the Regional Safety Review of July 12, 2007.

- All but four required and recommend actions from our latest safety review have been completed for the Fayetteville Office and all but eight required and recommended actions from our latest safety review have been completed for the Little Rock Office. Actions are being taken to resolve these.
- No manned cableways are operated in the Arkansas WSC.
- All JHAs are reviewed annually. The Studies and Data Chiefs review and approve the Project JHAs.
- Safety is a topic of discussion in WSC internal project and quarterly program reviews.
- Management is informed of local safety issues.
- The WSC Safety Committee is very active and assists management in safety performance issues.
- The WSC is developing a written call-in procedure for management to approve.
- Comprehensive Continuity of Operation Plan “COO Plan” is in the process of being reviewed and updated. An updated chemical inventory will be included with this plan.
- Safety training in the WSC last year:
All WSC personnel took Defensive Driving Training online.
Eighteen WSC personnel were certified or recertified on First-Aid and CPR during training on July 16, 2007.
Five Motor Boat Operators were recertified using the online refresher course and three were trained as Motorboat Operators in the 1st time course, NTC.
B. Kane Martin, our MOCC instructor, underwent the train-the-trainer course in September 2007 and plans to teach in the upcoming year.

Accomplishments

- A Gage-Cleaning Plan (Hantavirus eradication) was developed and approved by the Field Services Unit Chief.
- A Hearing Conservation Plan was approved by the Arkansas WSC Director
- A program has been initiated to centralize chemical inventories. All project chiefs are aware that funds are needed in each project to dispose of unused chemicals.
- A battery recycling station has been established and all batteries are being recycled.
- Annual cableway inspections have been done.
- All WSC boat inspections have been done.
- All inflatable PFDs were inspected and inspections were documented.
- All JHAs are on the Arkansas WSC internal home page for easy access.
- External audits were done for Arkansas WSC--Little Rock and Fayetteville.

Issues and Concerns:

- Keeping all our safety plans reviewed and updated.
- Make sure all new employees are properly trained in all safety procedures.
- Make sure all employees are kept up-to-date on their safety training.
- With the new Field Office established in Fayetteville--the lab, warehouse, and field equipment needs to be maintained in safety compliance.

E. Outreach

- Dave Freiwald and Jim Petersen paid information visits to the Arkansas Congressional delegation in DC in May of 2007. Handouts describing USGS Arkansas Water Science Center activities and water-resources issues pertinent to the four Congressmen and two Senators were provided during the visits.
- Phil Hays gave an oral statement describing USGS activities of WRD and BRD science centers in Arkansas and Missouri at an informal hearing on water quality in northwestern Arkansas and southwestern Missouri. The hearing was held by Arkansas Congressman John Boozman and Missouri Congressman Roy Blunt. Information for the statement was provided by the Arkansas and Missouri Water Science Centers, the Columbia Environmental Research Center, and the Arkansas and Missouri Cooperative Fish and Wildlife Research Units. A written statement was also provided to the Congressmen and the public. Assistance was provided by Dave Ozman and Kathleen Gohn with the Office of Communications.
- Several hydrologists and hydrologic technicians were interviewed and filmed by the Arkansas Educational Television Network (AETN) for a one-hour documentary on Arkansas water resources that will be shown on AETN in April. Contact information for cooperators was provided to the AETN producer.
- WSC staff has attended numerous planning meetings over the last year or so with Wal-Mart representatives and their food and agricultural suppliers related to Wal-Mart's sustainability efforts. These meetings are attended by a constellation of Wal-Mart Associates, entrepreneurs, NGOs (Conservation International, Environmental Defense, National Council of Farm Co-ops, World Wildlife Fund), government officials (Natural Resources Conservation Service, USGS), academics (University of Arkansas) and suppliers (Del Monte, General Mills, Land 'O Lakes, Welch's, Nestle Water, Kraft, Mars, Unilever, Pilgrim's Pride, Cargill, Johnson Diversey). A Water Forum and Water Festival were held on March 26-28 in Rogers, Arkansas attended by approximately 300 environmental managers of Wal-Mart's food and beverage suppliers. Dave Freiwald was on a panel discussion and a USGS exhibit booth displayed.
- Several hydrologists and hydrologic technicians staffed a table at the Fourche Creek Watershed Appreciation Day in Little Rock. The Fourche Creek Watershed Appreciation Day was a free event sponsored by the Arkansas Department of Environmental Quality and Arkansas Audubon to promote conservation of Fourche Creek. Fourche Creek is probably Arkansas' most important urban watershed. USGS staff described USGS work in the watershed and other parts of Arkansas. Two streamflow gages were recently installed on Fourche Creek.