Fourche Creek Watershed Recovery and Restoration Project

Project FY 02-810

Final Report

By

Audubon Arkansas
201 East Markham Street
Suite 450
Little Rock, AR 72201
Tel: 501-244-2229
Fax: 501-244-2231
www.ar.audubon.org

January 2005
# Table of Contents

Executive Summary

- Nonpoint Source Pollution | 1
- Goals and Objectives | 1
- Fourche Creek Watershed Project Timeframe (tables) | 2 & 8
- Cooperators and Their Roles | 3
- Funding Breakdown | 6
- Best Management Practices | 6

Fourche Creek Watershed

Recovery and Restoration Project’s Chronology

- Project Highlights | 7
- Monitoring Data | 9
- Obstacles | 10
- Measures of Success | 11

Lessons Learned

- Contributions to Project Success | 12
- Contributions to Project Difficulties | 13

Technical Transfer | 13

EPA Feedback | 14

Conclusions | 14

Appendix | 16

- Maps
- Pictures
- Fourche Creek Water Quality Analysis
- Rock Creek Water Quality Analysis
- List of Acronyms
- Sources of Information
Executive Summary

Fourche Creek, HUC 11110207 (Lower Arkansas - Maumelle), drains Central Arkansas’ eastern Saline and Pulaski counties, including most of the city of Little Rock where it receives the majority of its surface flow. The watershed drains 167 square miles, which is distinguished primarily as urban, in land use characterization. Because of this, the watershed is faced with many terminal challenges that are directly associated to nonpoint source (NPS) pollution.

The Fourche Creek Watershed is currently found to be in a critical state, which depends on intensive management, restoration, and conservation efforts in order to maintain continual natural functioning ecosystems (aquatic or terrestrial), unimpaired water quality, and the geomorphic-hydrological operations that it historically has evolved with over time. Otherwise, due to intensive anthropogenic impacts and activities, this watershed will likely change into less desirable physical, chemical, and biological characteristics. With guidance and assistance from Arkansas Soil and Water Conservation Commission (ASWCC), Audubon Arkansas has graciously begun the required management, restoration, and conservation efforts of the Fourche Creek Watershed through the allocation of 319 dollars.

Non Point Source Pollution

This Fourche Creek Watershed Project set out to address specific NPS problems that are occurring throughout the watershed. Audubon believes the overall reduction, or even elimination of NPS pollution occurring in the watershed will occur with time through intensive education campaigns, the implementation of technologically advanced best management practices (BMP), significant stream restoration projects, and conservation of natural landscapes within the watershed. This project addressed and focused on reducing the following NPS problems: streambank failures, destruction and loss of natural riparian zones, occurrences of floatable trash and potentially hazardous chemical runoff, construction and development site runoff including sedimentation and increased stormwater quantities, the deficiency of precisely understanding problematic areas and physical locations of NPS problems, and the lack of NPS education and curriculums in the school systems within the watershed.

Having an ability to work with key stakeholders, interested parties, and vital partners provided Audubon with capacity to coordinate amongst numerous “cogs that make up the wheel” with the groups whose everyday actions impact the Fourche Creek Watershed’s quality. Working with these key groups and helping to create a sense of ownership and pride of the Fourche Creek Watershed will help manage, reduce, and eliminate the occurrences of NPS problems generated from our activities.

Goals and Objectives

This project specifically detailed its objectives in a work plan. The objectives that Audubon defined to improve water quality and reduce NPS pollution in the Fourche
Creek Watershed consisted of 1) Improving the quality of the stream and its functions by reducing non-point source pollution through restoration; 2) Removing solid waste and creating, establishing, and facilitating a continual trash clean-up program with community involvement; 3) To educate students, groups, and the general public of Central Arkansas the importance and significance of their backyard resources. Use restoration opportunities as demonstrations in presenting and disseminating information to Fourche Creek partners to ensure a better understanding non-point source pollution; 4) To record and map all sites of significant NPS activity and/or sites identified as needing attention in the Fourche Creek Watershed.

Many of these objectives had tasks and subtasks associated with them, which were designed as tools to ensure success in accomplishing objectives to improve water quality and reduce NPS pollution. Examples of these include; reduce sediment loadings and NPS pollution through streambank stabilizations and vegetative plantings that treat approximately 1200 square feet and 300 square feet, respectively; create vegetative buffers and vegetative filter strips along Fourche Creek and its’ immediate tributaries that experience accelerated runoff by treating approximately 3125 square feet with vegetative buffers, and create or enhance filter strips; develop and facilitate mentoring and intern programs through schools and universities that reach at least 300 students with environmental education experiences directly related to the restoration of the Fourche Creek Watershed that focuses on the reduction of non-point source pollutants and improvements to Fourche Creek’s water quality.

Audubon Arkansas strategically planned the implementation of tasks that made up this project. Because the organization had been privileged with conducting a prior project many of the foundations, partnerships, and recognition work that were required to successfully implement a project to this magnitude had already taken place. This allowed greater levels of success to be achieved in the most efficient and effective manner possible. The project’s original timetable follows in Table 1.

### Fourche Creek Watershed Project Timeframe

<table>
<thead>
<tr>
<th>Task</th>
<th>Subtask Number</th>
<th>Description</th>
<th>Start Date</th>
<th>Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.1</td>
<td>Stream bank stabilization &amp; seedling plantings</td>
<td>Month 1</td>
<td>Month 24</td>
</tr>
<tr>
<td></td>
<td>1.2</td>
<td>Buffers</td>
<td>Month 1</td>
<td>Month 24</td>
</tr>
<tr>
<td>2</td>
<td>2.1</td>
<td>Trash Removal</td>
<td>Month 1</td>
<td>Month 24</td>
</tr>
<tr>
<td>3</td>
<td>3.1</td>
<td>Mentoring</td>
<td>Month 1</td>
<td>Month 12</td>
</tr>
<tr>
<td></td>
<td>3.2</td>
<td>Development of Demonstration Materials</td>
<td>Month 1</td>
<td>Month 12</td>
</tr>
<tr>
<td></td>
<td>3.3</td>
<td>PowerPoint Presentations</td>
<td>Month 1</td>
<td>Month 12</td>
</tr>
<tr>
<td>4</td>
<td>4.1</td>
<td>Locate and mark all activity sites for GIS</td>
<td>Month 1</td>
<td>Month 24</td>
</tr>
<tr>
<td></td>
<td>4.2</td>
<td>Locate and mark all activities outside of project</td>
<td>Month 1</td>
<td>Month 24</td>
</tr>
<tr>
<td></td>
<td>4.3</td>
<td>Produce Final Project Maps</td>
<td>Month 1</td>
<td>Month 24</td>
</tr>
<tr>
<td>5</td>
<td>5.1</td>
<td>Prepare and submit quarterly reports</td>
<td>Month 3</td>
<td>Month 24</td>
</tr>
</tbody>
</table>
Cooperators and Their Roles

Audubon worked with a diverse group of partners to ensure project success. One of Audubon’s strengths is its ability to bring groups and agencies to the “table” to work in new and innovative partnerships. Audubon is working with state and federal agencies, private environmental companies, universities and schools, and other nonprofit groups to formulate and carry out a watershed wide restoration effort in the Fourche Creek Basin. This partnership is drawing many of the state’s best restoration experts and the public alike into a long-term commitment to revitalize the Fourche Creek Watershed. Audubon Arkansas contributes its success associated with the Fourche Creek Project to the numerous partnerships and their provided commitments. These collaborated efforts have together, helped to improve the quality of the Fourche Creek Watershed and its environment, and without these vital partnerships the Fourche Creek Project would be at a standstill. Below is a comprehensive list of partnerships and their key roles in the project.
1. **U.S. Environmental Protection Agency (EPA). Role in project:** The EPA provided funding for the first and second year of Fourche Creek watershed restoration and education project. Their funding has been vital to the program’s existence.

2. **Arkansas Soil and Water Conservation Commission (ASWCC). Role in project:** The ASWCC participated in a critical role of the project. Their team provided support, management, technical assistance, and guidance to ensure project success and longevity.

3. **Arkansas Highway and Transportation Department (AHTD). Role in project:** Audubon is working and will continue to work with department employees to reduce sediment loading at Fourche Creek project sites. Audubon is providing technical assistance with best management practices. Audubon is also coordinating with the AHTD to provide access to Fourche Creek.

4. **Arkansas Department of Environmental Quality (ADEQ). Role in project:** ADEQ has committed to technical assistance through its staff; the restoration of riparian areas; and conducting water quality testing before, during, and after the project.

5. **The City of Little Rock. Role in project:** City agency partners include: the Parks and Recreation Departments landscape design; support of created wetlands and site restoration; planning and facilitating of educational field events; media events, workshops, and transportation to such events. The Waste Management Division -- clean up and removal of trash collected in the watershed. The Public Works Division-- restoration mapping and the strategic development of non-point reduction from street and parking lot run-off. These projects are commitments extraordinary to the city’s work plan. The City Maintenance Staff—assistance with hands on restoration activities, trash clean up events, event staffing, equipment operations, and creek enhancements.
6. **Arkansas Game and Fish Commission (AGFC).** *Role in Project:* The AGFC continued aquatic inventory and research assistance; helped with the development and coordination of a Stream team for Fourche Creek; assisted with training and education for volunteers, project partners and area schools. Additionally, the agency assisted in streambank restoration and aquatic habitat enhancement.

7. **Arkansas Natural Heritage Commission (ANHC).** *Role in Project:* ANHC’s staff of 15 includes specialists in floodplain management and partnerships, scenic rivers and watersheds, entomology, biology, zoology and plant community ecology. This technical expertise is available for the project.

8. **Little Rock School District (LRSD).** *Role in Project:* LRSD and Audubon Arkansas have together developed programs that provide students and teachers with environmental education opportunities through the Fourche Creek Project. The LRSD provides its students and teachers state of the art technology that allows interaction in the Fourche Creek Project.

9. **Arkansas Watershed Advisory Group (AWAG).** *Role in project:* AWAG’s partnership allowed the project access to an influential and broad constituency for watershed restoration education/information dissemination.

10. **Arkansas Canoe Club (ACC).** *Role in Project:* The Arkansas Canoe Club contributed volunteers to support clean-up efforts in the Fourche Creek Watershed and also provided the project with access to an important constituency for support and information dissemination.

11. **Audubon Society, Central Arkansas Chapter.** *Role in project:* With over 1,500 members in the Little Rock area, this group will be a significant shareholder of the Audubon Nature Center and its long-term watershed education activities. This group helped ensure long-term sustainability of the watershed restoration project.

12. **Pulaski County Ozark Society.** *Role in project:* The society provided knowledgeable and committed volunteers to assist in Fourche Project workshops, demonstrations and clean-up activities.

13. **Sierra Club.** *Role in project:* Provided volunteers for clean-ups and also provide access to supportive constituencies.

14. **U.S. Army Corps of Engineers (COE).** *Role in project:* The Corps of Engineers is a committed partner throughout the completion of the project. And they have committed to assisting in expanding the restoration efforts through Fourche Creek. The Corps of Engineers is the process of acquiring an additional 400-500 acres to be included in Audubon’s restoration program.
15. **Pulaski County Quorum Court. Role in Project:** The Pulaski County Quorum Court in resolution No. 02-R-48 of September 10, 2002 recognized and expressed gratitude to the Audubon Society for implementation of the Fourche Creek Restoration and Education Project. The Court noted the project would “not only improve the environment, but will also provide financial benefits and recreational opportunities for not only Central Arkansas, but for all Arkansans.”

16. **The Nature Conservancy – Arkansas Field Office (TNC). Role in Project:** The Nature Conservancy’s Arkansas Field Office has given its full support to Audubon Arkansas’ restoration efforts of Fourche Creek. TNC has committed expertise in hydrology, wetland ecology, and botany.

17. **JA Riggs Inc. – Role in Project:** The JA Riggs company has contributed its professional staff and its equipment to the success of constructing demonstrations projects throughout the watershed. Riggs has donated tens of thousands of in-kind match to the project.
Funding Breakdown

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Budgeted Units</th>
<th>Unit Cost</th>
<th>Total Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Streambank stabilization and plantings</td>
<td>5</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>1.1</td>
<td>Stream filter strips</td>
<td>3</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>1.2</td>
<td>Vegetative buffers</td>
<td>5</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>1.2</td>
<td>Buffer enhancement</td>
<td>4</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>2.1</td>
<td>Trash removal</td>
<td>7 Miles</td>
<td></td>
<td>Not to exceed $</td>
</tr>
<tr>
<td>3.1</td>
<td>Mentoring and Intern program</td>
<td>300 students</td>
<td></td>
<td>Not to exceed $</td>
</tr>
<tr>
<td>3.3</td>
<td>PowerPoint presentations</td>
<td>10</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>4.1</td>
<td>Locate and mark all project activity sites with GPS</td>
<td>20</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>4.2</td>
<td>Locate and mark sites needing future action</td>
<td>3</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>4.3</td>
<td>Produce before and after maps of the project area</td>
<td>2</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>5.1</td>
<td>Quarterly Report</td>
<td>8</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>5.2</td>
<td>Annual Report</td>
<td>2</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>5.3</td>
<td>Final Report</td>
<td>1</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>$</td>
</tr>
</tbody>
</table>

Best Management Practices

This project focused on incorporating numerous BMP to affectively reduce NPS pollution in the Fourche Creek Watershed. “Short-term” BMP, such as sediment fencing and hay bails were implemented during the construction of all project activities, including the implementation of “long-term” BMP such as streambank stabilizations, stream filter strips, or vegetative buffers.

BMP development and implementation is a great concern for Audubon in the Fourche Creek Watershed due to its ability to positively affect the water quality and stormwater quantity, therefore in all public presentations and outreach campaigns Audubon focused on educating, and even demonstrating, the importance of BMP implementation.
Fourche Creek Watershed
Recovery and Restoration Project’s Chronology

Project Highlights

The implementation of numerous BMP within the Fourche Creek Watershed, such as streambank stabilization and stream corridor enhancements, along with the Fourche Creek team’s partnership formation, public outreach and education campaigns were all climatic points of this project.

Audubon’s Fourche Creek Team and its partners conducted the implementation of numerous streambank stabilizations, which reduce and eliminate erosion and sediment from entering the stream by adhering faulty streambanks. The team constructed a total of five stabilizations that overtime will protect more then 11,000 square feet of land. Audubon depended heavily on its partners to assist in the construction of these streambank stabilizations. Employees from the ADEQ, the AGFC’s Stream Teams, the City of Little Rock’s Parks and Recreation and Riggs Construction Company assisted in the construction of the stabilizations. Without these strong partnerships, there is little doubt that success rates would not be as high as they are. In order to reduce instream impact during the construction phase of each stabilization, Audubon conducted its work during dry season and/or low flow periods. Numerous techniques and methodologies were adopted from national hydrology experts to stabilize the streambanks. Methods include rock vanes, live cribwalls, and bank sloping.

Another project highlight was accomplished when Audubon assisted and guided changes in the City of Little Rock’s traditional riparian management techniques through the creation of a management program that allows for vegetative buffers along the creek and its tributaries. Vegetative buffers are successful at reducing erosion; they contribute to onsite storage of stormwater, sediment fallout, and an increase of wildlife habitat. The city’s Parks and Recreation Department adopted and supported efforts of Audubon to provide riparian management areas along Fourche Creek and its tributaries. After recognizing the positive impact of these areas, the city incorporated similar practices outside of the Fourche Creek Watershed without the guidance of Audubon employees. Methodologies varied in form, however; typically lands that had previously been heavily manicured and maintained with mechanical mowing devises or even herbicide applications were allowed to revegetate themselves, or in some instances, Audubon revegetated the areas with native herbaceous plants and trees.

Audubon was successful at forming multiple partnerships during the past year that have provided very important contributions in its restoration activities. Without these, the Fourche Creek Project would not be as successful as it is. Coordinating assets from different partnerships is highly recommended to any watershed group conducting restoration activities. Partnership building is a constant ongoing task for Audubon’s Fourche Creek Team. Partnerships range between multiple federal, state, and local agencies, localized corporations and businesses, not for profit organizations, neighborhood associations and individuals.
Outreach has been a vital role to the success of this project too. Distributing Fourche Creek material and information has been a key component that successfully introduced the population of Central Arkansas to NPS pollution and watershed issues. Media coverage has been equally important to the project and has helped ensure its success. Local media provided multiple avenues for outreach. They included Arkansas’ largest newspaper the Arkansas Democrat Gazette, biweekly publications such as the Arkansas Times, and monthly publications such as Arkansas Outdoor and Little Rock Monthly. Finding opportunities for publicizing Fourche Creek information is continual activity of the Fourche Creek Team. Also, having opportunities to present information regarding the creek and project to local groups has been important role in this effort. Audubon gave more then 15 PowerPoint presentations disseminating information related to the Fourche Creek Project.

The education component of this project has easily reached more then 300 students. Audubon has continued to build relationships with the Little Rock School District, which allowed Audubon to work within the local schools teaching students about NPS pollution, watersheds, sensitive habitats and restoration activities. Audubon believes if the next generation understands the complex interrelationships of their environments, and how they interact, then they will be better prepared to take the required precautions to insure protection of natural habitats, environments, and the longevity of mankind. By introducing interactive software and technical tools such as Nature Mapping, Audubon illustrates to students a better understanding of natural systems.

### Project Time Line

<table>
<thead>
<tr>
<th>Task</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Streambank Stabilization</td>
<td>J</td>
<td>A</td>
<td>N</td>
</tr>
<tr>
<td>1.1 Vegetative Filter Strips</td>
<td>D</td>
<td>N</td>
<td>D</td>
</tr>
<tr>
<td>1.2 Buffers</td>
<td>D</td>
<td>N</td>
<td>D</td>
</tr>
<tr>
<td>2.1 Trash Removal</td>
<td>D</td>
<td>N</td>
<td>D</td>
</tr>
<tr>
<td>3.1 Mentoring Program</td>
<td>D</td>
<td>N</td>
<td>D</td>
</tr>
<tr>
<td>3.2 Distributing Materials</td>
<td>D</td>
<td>N</td>
<td>D</td>
</tr>
<tr>
<td>3.3 PowerPoint Presentations</td>
<td>D</td>
<td>N</td>
<td>D</td>
</tr>
<tr>
<td>4.1 Locate Activity Sites</td>
<td>J</td>
<td>A</td>
<td>N</td>
</tr>
<tr>
<td>4.2 Locate Future Action Sites</td>
<td>J</td>
<td>A</td>
<td>N</td>
</tr>
<tr>
<td>4.3 Produce Maps</td>
<td>J</td>
<td>A</td>
<td>N</td>
</tr>
<tr>
<td>5.1 Produce Quarter Reports</td>
<td>J</td>
<td>A</td>
<td>N</td>
</tr>
<tr>
<td>5.2 Produce Annual Report</td>
<td>J</td>
<td>A</td>
<td>N</td>
</tr>
<tr>
<td>5.3 Produce Final Report</td>
<td>J</td>
<td>A</td>
<td>N</td>
</tr>
</tbody>
</table>
Monitoring Data

The Fourche Creek Project incorporated surficial water quality analysis throughout the project. The analysis was conducted to determine basic water quality of Fourche Creek. Because prior studies of Fourche Creek had been conducted, an analysis of its second largest tributary, Rock Creek, was conducted to determine loadings contributing from Rock Creek. Also, Kelly Neff a graduate student at the University of Arkansas at Little Rock was incorporating a Rock Creek study into her thesis. Audubon provided guidance and technical expertise for her sample collection and analysis. In return, she shared the collected data with Audubon.

The data generated by these analyses is used to better understand the ecology of the Fourche Creek Watershed and the effectiveness of nonpoint source best management practices. It is understood that the dynamic system of Fourche Creek may undergo change as a result of implemented BMP, but that those changes will possibly be prolonged with time.

Audubon has collected water, soil, and fish samples from the Fourche Creek Watershed for an extended two-year period and throughout this project to better understand the watershed’s quantifiable measurements and environmental quality. Of the three mediums, water samples are the most frequently collected and analyzed.

To date, more than 300 water samples have been logged into Audubon’s database. An average of 40 parameters are analyzed, 26 of those are compared to Hodges and Wiggins 1972-1974 Fourche Creek Watershed study. Please see water quality analysis sections in the appendix for parameters, monitoring stations and analysis results.

Audubon depends heavily on a cooperative agreement with ADEQ, who conducts the laboratory analysis of the samples and also periodically uploads the results into STORET. The agreement has proven beneficial for both Audubon and ADEQ.

Audubon and Arkansas Game and Fish Commission have collected fish samples throughout the watershed to determine community diversities. In 2003, fifty-one species of fish were found in the creek.

Audubon Arkansas established eight permanent water quality-monitoring sites along Fourche Creek. These sites were selected as the most appropriate monitoring sites because of specific criterion that includes physical locations, accessibility, specific tributary confluences, land use characteristics, ecoregion distributions, and professional judgment. It is considered that these sites are representative of the diverse and fluctuated biological, chemical, and physical characteristics that contribute to Fourche Creek’s composition. Please see Figure 1 and 2 in the appendix for monitoring site locations.

All water samples were collected and preserved according to the criteria in EPA Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act, 40 CFR Part 136, October 26, 1984 and/or in accordance with the 20th Edition of Standard Methods, 1060 A-C
Obstacles

Occasionally, the Fourche Creek Team and Project were faced with minor obstacles to overcome throughout the project period. Learning from such experiences is not only expected, but also has proven beneficial and acceptable.

The effectiveness of the trash removal component of the project is difficult to assess. Fourche Creek is bombarded with floatable trash from its headwaters to the confluence with the Arkansas River. Being an urban watershed makes matters worse. The most significant loads of floatable trash are transported into the Fourche system from Rock Creek as they are picked up from roadways and parking lots and transported via stormwater. Audubon has successfully facilitated ongoing trash cleanups along Fourche Creek and will continue, however it is thought that the addition of preventative measures throughout the city, such as storm drain grates or instream collection devices are required to significantly reduce the problem of floatable trash in Fourche Creek.

Little Rock Public Works manages Fourche Creek and its tributaries in conjunction with the U.S. Army Corp of Engineers (COE) for stormwater quantity. The COE has provided guidelines and procedures in an Operation and Maintenance Manual to routinely maintain the system’s stream channels and ditches, some of which are outdated and detrimental to the ecology and water quality of Fourche Creek and its tributaries. Obtaining permits from the city’s Public Works Department and COE to conduct streambank restorations and riparian zone management without violating the existing O&M criterion has proven difficult and time consuming throughout the project period. In the near future, Audubon will jointly work with the COE, Little Rock Public Works, and ADEQ to revise portions of the outdated O&M to allow for improved management practices to occur within the Fourche Creek Watershed.

The implementation of BMP by developers and contractors is limited throughout the Fourche Creek Watershed and is associated with the degradation of Fourche Creek and its tributaries. Audubon and its partners have conducted numerous events and trainings to address this issue. Assuring the implementation of BMP and stormwater management throughout the watershed at construction sites has been ongoing for Audubon. Little Rock Public Works does not have appropriate resources necessary to manage or enforce its stormwater management code.

Another downfall during the project time period occurred when Mr. Buddy Coleman offered the BFI Landfill Inc. the right to purchase his 100 plus acreage dairy farm. The property is located in a significant hydrological area within the Fourche Creek Watershed. The two major confluences of Rock Creek and Coleman Creek intersect Fourche Creek on the Coleman Dairy Farm. Audubon had previously discussed plans with the Coleman family to turn their farm into an inner city park. Unfortunately, the Coleman family renegotiated.
Measures of Success

Streambank Stabilizations-
The streambank stabilizations constructed during the project period indicated to be successful in reducing NPS pollutant loadings. ASWCC assisted Audubon in calculating load reductions. *Region 5* model was used to calculate load reductions. This model is an Excel workbook that provides a gross estimate of sediment and nutrient load reductions from the implementation of agricultural and urban BMPs.

Findings:
N: 296.3 lb/yr
P: 148.1 lb/yr
Sediment: 148.1 tons/yr

Vegetative Filter Strips and Buffers-
The implemented filter strips and vegetative buffers indicated to be successful in reducing NPS pollutant loadings. Again, ASWCC assisted Audubon in calculating load reductions. *Spreadsheet Tool for Estimating Pollutant Load* was used to calculate load reductions. This model employs simple algorithms to calculate nutrient and sediment loads from different land uses and the load reductions that would result from the implementation of various best management practices.

Findings:
N: 35.24 lb/yr
P: 4.23 lb/yr
Sediment: 2.86 tons/yr
BOD: 178 lb/yr
Lessons Learned

Contributions to Project Success

Audubon knows that this restoration process is a long-term commitment and will take many years of hard work. Audubon cannot stress enough the importance of partnerships’ commitment to the project, and the state’s need for a national model of this nature that increases public involvement and appreciation for natural resources. Audubon owes its success to the diverse group of partners that have worked on this project. These partnerships have drawn many of the state’s best restoration experts and the public alike into a long-term commitment to revitalize the Fourche Creek Watershed.

Obtaining support of the Fourche Creek Project specifically from state governmental agencies has contributed to the success of the project. Project match, technical guidance, project designs and required permits were all provided to the project from numerous state agencies and personnel. Audubon sincerely appreciates the Government of Arkansas and its dedication to the success of the Fourche Creek Project.

Media coverage has been a positive voice to Audubon and the Fourche Creek Project. Success in addressing NPS pollution first starts with recognition of the problem. Through the media, Audubon had an ability to identify and verbalize to the citizens of Central Arkansas awareness of NPS pollution and its associated environmental degradation, as well as, the problematic solutions that Audubon has undertaken as a result of the Fourche Creek Project. Media coverage of different components of the Fourche Creek Project has occurred in more then two newspapers, three local magazines, two radio stations and two television stations during the project period. Audubon received an enormous amount of responses to each of these publications and certainly contributes this coverage to its success.

Creating a clear and a realistic plan of action for restoration activities is vital to project success. In the case of the Fourche Creek Project, Audubon identified and prioritized areas and concerns needing to be addressed. Those included a wide range of items that filtered into the work plan and were individually addressed through task and subtasks. For example, bank failures are a concern in Fourche Creek. Streambank Stabilizations were included in the work plan as a corrective action. To efficiently address and implement streambank stabilizations a detailed plan was written and followed. This included a thorough understanding of site identification and prioritization, methodologies to be utilized, permits requirements, construction equipment requirements, and estimated time of construction. These detailed plans enabled Audubon to efficiently and effectively implement all components of the Fourche Creek Project.
Contributions to Project Difficulties

Change is difficult to overcome. Management of the lands, stormwater, land use activities, and other NPS contributing factors within the Fourche Creek Watershed have been approached with traditional management practices that often lack conscientious concerns for environmental quality. Introducing a concern for Fourche Creek and its feeding tributaries has taken some by surprise. During the Fourche Creek Project changing conceptions through the introduction of alternative management practices was a difficult task. Often the Fourche Creek Team’s motive was questioned and challenged.

Additional challenges that Audubon was faced against include; receiving required permits to conduct instream and floodway work in timely manners; numerous construction sites and operators neglecting compliance of stormwater management laws (Phase II of NPDES Permits); urban-wetlands being filled for developments; and a general lack of public understanding for stormwater management practices and NPS pollution.

Technical Transfer

Audubon obtained various forms of information and knowledge during the implementation of the Fourche Creek Project that can easily be applied to similar watershed restoration projects to improve project effectiveness and even reduce project costs.

Obtaining community support for the project is an important tool. Introducing the community to problems that are occurring within the watershed and following with realistic corrective measures that can remediate those problems help obtain community support. This can be carefully accomplished through appropriate media coverage and outreach. Also, ensuring the community has a sense of pride or ownership in its watershed or natural resource will gain support for a restoration project.

Technical data that has been obtained as a result of this project and that is transferable to groups participating in other watershed restoration projects includes sampling plans, analytical data, best management methodologies, GIS data, and educational literature. This information has been dispersed throughout Arkansas primarily by way of watershed coordinators and community meetings.

Many components of the Fourche Creek Project have been promoted and modeled in all corners of the state. Providing helpful information to newly forming watershed groups and sharing ideas with established watershed groups has become a reoccurring activity of the Fourche Creek Coordinator. Dispersing technical information (GIS information, ecological and biological community datasheets, bio-assessment procedures, sampling methodologies and data) and publications on Fourche Creek to students routinely occurred during the project’s educational and outreach activities.
EPA Feedback

Audubon feels this project received adequate support of the EPA and ASWCC during the project period. The provision of models, literature, and technical methodologies were all made by the agencies through their websites and regional offices. At all times during the project period that direction, advice, or comments were requisite from either EPA or ASWCC, each agency positively and quickly responded. Acting with such positive advisory roles ensured success in the Fourche Creek Project.

EPA clearly understands the plentiful problems associated with NPS pollution. When focusing and applying pressure to correct NPS problems, EPA must diversify its corrective strategies. Managing NPS, truly means managing stormwater. There is a lack of understanding and public support for the management of stormwater, especially in urban settings. It is suggested that EPA focus more attention to NPS in urban and suburban areas, similarly how it has successfully focused past attention on agricultural areas. Managing construction site runoff is becoming an increasingly important component of NPS management. As rural areas become transformed into urban areas, via development, reducing those areas’ stormwater runoff and NPS contributions must be adequately and strategically addressed. It is thought that a governmental certification for stormwater management and NPS management from construction and development companies would improve this problem. It is thought, for EPA to be more effective in addressing NPS, an increase in “model” programs are needed. Continuing to provide (and increasing) hands on demonstrations to community developers that illustrate financial incentives and ideal methodologies that successfully address NPS and stormwater is advisable.

Conclusions

The Fourche Creek Project was successful in accomplishing its objectives and goals to reduce and eliminate occurrences of NPS pollution during this project period. Through implementation of the project’s work plan, which defined predetermined task Audubon strategically completed all undertakings of the Fourche Creek Recovery and Restoration Project. Reduction of NPS pollution in the Fourche Creek Basin was accomplished as a result of implementing the project’s tasks.

The utilization of best management practices, such as streambank stabilizations, buffer zones, and vegetative filter strips proved effective in reducing NPS pollutants. Audubon demonstrated these BMP to government agencies, organizations, and private groups as alternative practices to stormwater and NPS pollution management in urban streams. Models indicate that these combined BMP will reduce sediment loadings more then 150 tons per year, 300 pounds per year of nitrogen, and 150 pounds per year of phosphorous.

Public education and outreach of NPS issues related to Fourche Creek were effective components of this project. Audubon reached more then 300 students in the Fourche
Creek Watershed through its education campaign. Audubon worked in more than five schools and two school districts throughout the watershed teaching issues that relate to Fourche Creek, wetland functionality, urban environments, and NPS pollution. Audubon taught analytical and technical procedures at all schools.

This project enabled Audubon to elevate the awareness of Fourche Creek and NPS pollution to the citizens of Central Arkansas. During this project time period, Audubon had media outreach in more than two newspapers, three magazines, two radio stations and two television stations. Introducing NPS pollution and its relationship to Fourche Creek to the population of Central Arkansas has been a very successful undertaking of the Fourche Creek Team.

Audubon was successful at partnering with a diverse range of stakeholders during the project. These partnerships allowed for the Fourche Creek Project’s objectives and goals to be reached in a more effective and efficient manner. Project partners include agencies and personnel of federal, state, and local governments; national and local nonprofit organizations; neighborhood association groups, private corporations and individual partners. Audubon and the Fourche Creek Project would not be successful without the earned support and guidance provided by project partners.

Audubon sincerely appreciates the opportunity to have worked so closely with the ASWCC and their NPS Program. This opportunity has developed what once was a turbid vision of an urban stream into a nationally modeled restoration project. Because of the ASWCC endorsement and subvention to the Fourche Creek Project, Audubon has had the privilege to implement a restoration project that has earned national attention.

The U.S. EPA recently prioritized the Fourche Creek Watershed as one of fourteen Targeted Watersheds within the nation. The Targeted Watershed Program is designed to encourage successful community-based approaches and management techniques to protect and restore the nation's waters. The listing of Fourche Creek as a Targeted Watershed ensures continuation of project activities and funding for at least three years. Audubon, ASWCC, and all other participating partners should be proud of the accomplishments fulfilled as a result of the 319- Fourche Creek Recovery and Restoration Project.
Sources of Information

02-800 Annual Report 2002-2003
03-810 Fourche Creek Annual Report 2004
03-810 Fourche Creek Quarter Report

http://it.tetratech-ffx.com/stepl/
http://www.adep.state.ar.us
http://www.aswcc.arkansas.gov/NPS_Webpage
http://www.cast.uark.edu/cast/geostor/
http://www.epa.gov
http://www.epa.gov/OW/
http://www.gis.state.ar.us

List of Acronyms

ADEQ Arkansas Department of Environmental Quality
AGFC Arkansas Game and Fish Commission
AHTD Arkansas Highway and Transportation Department
ASWCC Arkansas Soil and Water Conservation Commission
BMP Best Management Practice
COE Corp of Engineer
EPA Environmental Protection Agency
GIS Global Information System
HUC Hydrologic Unit Code
NPDES National Pollutant Discharge Elimination System
NPS Nonpoint Source
O&M  Operation and Maintenance Manual
STORET  Storage and Retrieval - Computerized Environmental Data Center
TNC  The Nature Conservancy