

## 2011 State Wildlife Grant Pre-Proposal

### **Title of Project:**

**Stream Restoration of a Section of Turtle Creek in the Illinois River Watershed**

### **Project Summary:**

A 1,600 foot section of an urban stream, Turtle Creek, will be restored. Turtle Creek has been severely impacted by urbanization, which has resulted in severe streambank erosion (Figure 1). Aquatic habit is limited from severe sedimentation which has diminished riffle/pool features and from stream instability resulting in degradation of the riparian area. A natural channel design approach will be used to restore and enhance the channel in a manner that reduces streambank erosion, transports sediment efficiently, and improves the riparian area and aquatic habitat for Arkansas Darter, Least Darter and four other SGCN.

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### **Project Partners:**

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**Total Project Cost:** \$250,000

**Amount of SWG Funds Requested:** \$120,000

**Matching Funds:** Cash match of \$100,000 will be a combination of funding from the City of Rogers and private funds through the Illinois River Watershed Partnership. The City of Rogers will provide an additional \$10,000 of in-kind match by assisting with moving construction materials to the site. The Arkansas Game & Fish Commission will provide \$5,000 of in-kind services by providing technical assistance. The Watershed Conservation Resource Center will work with partners to organize a volunteer planting day and educational tours and will secure donation of supplies and materials that will result in \$15,000 in-kind match.



Figure 1 Accelerated streambank erosion on Turtle Creek in the Illinois River watershed.

### **2011 State Wildlife Grant Priorities:**

Stream restoration of Turtle Creek will result in an array of ecological improvements and help to meet several local environmental objectives in that the project will improve water quality by reducing sediment and nutrient loadings to the stream, enhance and restore both aquatic and terrestrial habitats, and reduce erosion and sedimentation from hydrological modifications and urban development. Because of the many improvements that will be achieved through this project, several of the 2011 State Wildlife Grant priorities will be address and include the following:

**1) Fish: Both the Arkansas darter and least darters are listed as priorities and protecting, maintaining, and restoring their habitat is listed as an action.**

The Arkansas Wildlife Action Plan (AWAP) shows habitat destruction and hydrological modification from urban development have impacted the Arkansas darter and least darter. The AWAP recommends the following conservation actions for both species: 1) Maintain and improve riparian buffers; 2) Protect water quality from point and non-point sources. Maintain or, where necessary, restore water quality to state standards/stormwater turbidity standards (High Importance); and 3) Provide education and outreach to local citizens and governments concerning this species and its habitat. This project will restore aquatic habitat, improve water quality, and restore/enhance riparian in an urban area where development and hydrological modification has impacted the habitat of the Arkansas darter and least darter. Because of its location, this project will also provide education and outreach to local citizens and government concerning these species. Other SGCN's (species of greatest conservation need) that will benefit are the redspot chub; crayfish, *Orconectes meeki brevis*; the midget crayfish, *Orconectes nana* which is listed because of habitat destruction, nutrient loading, and sedimentation from urban development; and the ringed crayfish, *Orconectes neglectus*.

**2) Habitat: Aquatic habitat with continue watershed planning process for high priority streams.**

This project is located in the Illinois River watershed, which is listed as a priority for improving aquatic habitat and water quality by many different entities. The IRWP is currently working on a comprehensive watershed management plan for the Upper Illinois River watershed in Arkansas, and their overarching goal of the plan is to preserve, protect, and restore water quality of the Illinois River Watershed in Arkansas. Turtle Creek is a tributary to Osage Creek, which flows to the Illinois River. Osage Creek and the Illinois River both have segments on the state 303 (d) list for total phosphorus and sediment, respectively. Also, the Illinois River watershed is listed in Arkansas as a priority watershed for reducing nonpoint source pollution. The Southeast Aquatic Habitat Plan lists the Illinois River in Arkansas as a priority watershed from a 2006 USGS workshop, wherein recognized experts ranked and prioritized by **extant rareness of species and species richness** those southeastern watersheds most in need of protection and restoration. This project will help to meet numerous watershed planning efforts by improving both water quality and restoring both aquatic and terrestrial habitat within the Turtle Creek watershed. The six SGCN listed in no. 1 will benefit from the project.

**3) Habitat: Streambank habitat with measured regional streambank erosion rates.**

Streambank erosion rates associated with this site will be measured before and after restoration. Sediment and nutrient analysis of streambank material will be conducted. This information will be added to the existing streambank erosion data in the Osage Creek watershed. The six SGCN listed in no. 1 will benefit.

**4) Emerging Issues: Invasive Species with identify and develop conservation actions.**

The project site was likely a savanna and tall grass prairie. As part of the stream restoration, a re-vegetation and on-going stewardship plan will be developed for the site in which invasive plants will be identified and removed and native vegetation will be planted and managed.

**Objectives:** The objective of the restoration project is to restore a section of an urban stream in the upper Osage Creek watershed of the Illinois River basin using a natural channel design approach in a visible location as a demonstration to the community that shows the following:

- 1) Create an urban stream restoration site that is visible and will increase public awareness on the importance of restoring aquatic habitat that can support healthy populations of fish and

- macroinvertebrates and provide an opportunity for the repopulation of species, such as, the Least Darter and Arkansas Darter and other SGCNs that have been impacted by urban development.
- 2) Restore physical in-stream habitat for the entire length of the restoration, 1,600 feet. Due to excessive sedimentation at this site, riffle and pool features are not well defined. The 1,000 foot section would include construction of distinct riffles and pools along with runs and glides. Also, aquatic habitat within the other 600 feet of the restoration area will be enhanced.
  - 3) Restore and maintain healthy riparian areas that support aquatic and terrestrial wildlife and filter sediment and nutrients from stormwater run-off. A conservation plan for the riparian area that maintains native species and reduces invasive vegetation will be developed. Trees, shrubs, grasses, and wildflowers native to the area will be established on both sides of the stream through plantings and distribution of seeds.
  - 4) Improvements to water quality by reducing sediment, phosphorus, and nitrogen loadings from accelerated streambank erosion to Turtle Creek, Osage Creek, and the Illinois River. Based on a study conducted by the WCRC for the City of Rogers, approximately 155 tons/yr of sediment and 139 lbs/yr of phosphorus are entering Turtle Creek from streambank erosion at the project site. The stream restoration project will create a stable channel and the pollutants from streambank erosion will be reduced by 90% or more.
  - 5) Improve water quality by creating a stable stream that re-oxygenates the water column and better assimilates nutrients.
  - 6) Restoration of this site will be the first step in an overall effort to improve the function of Turtle Creek and the connectivity between high quality segments located in the upper Osage creek watershed. The proposed action would result in the restoration of 1,000 feet of low quality stream that will then be connected to the existing spring run of 600 feet that will be enhanced.
  - 7) Improve the hydrology of the site by creating flood plains to reduce stream power at high flows and to retain water for longer periods of time. Creation of a stable channel will result in well-developed pools that should retain water throughout the year.

### **Expected Results and Benefits**

The expected results and benefits from this project are summarized as follows:

- Upper watershed tributaries of the Illinois River watershed serve as nurseries for darters, minnows, and other small fish. Creating and enhancing aquatic habitat in this section of Turtle Creek, that includes a spring, creates the opportunity for many species to repopulate this degraded system. For example, the least darter and the Arkansas darter have been found in upper Osage Creek at around 30 mi<sup>2</sup> and their habitats are natural pools and spring runs in headwater streams. This project will create natural pools and implement several recommended conservation actions related to these species, such as, maintain and improve riparian buffers; protect and restore water quality; and provide local outreach. Also, the restored water quality and habitat will support SGCNs – Redspot Chub, crayfish-*Orconectes meeki brevis*, midget crayfish, and ringed crayfish that have also been found in upper Osage Creek at 30 mi<sup>2</sup>. The creation of aquatic habitat will also benefit the common species and potentially create more biodiversity.
- 1,600 feet of stream will be restored or enhanced and a minimum of 3 acres of riparian area will be restored and maintained with native vegetation.
- Water quality will be improved in Turtle Creek and the Illinois River watershed by reducing sediment approximately 140 tons/year and phosphorus by approximately 125 lbs/year from accelerated streambank erosion for an average flow year.
- The stream restoration will serve as a demonstration site in a highly visible area where there will be a walking and bike trail that will increase community and government awareness on 1) the impacts of urban development on the Arkansas darter and least darter and four other SGCN; 2) aquatic and terrestrial habitat needed for healthy aquatic communities; and 3) management of riparian areas for propagation of native plant species and removal of invasive vegetation.

**Approach**

A natural channel based on reference reach conditions will be designed. The channel will be reshaped to a dimension, pattern and profile that will create a stable, sustainable stream channel. The stable channel will result in reduced streambank erosion, high quality riparian areas, and improve the aquatic habitat for a 1,000 foot section of Turtle Creek. The restoration design will include constructing bankfull benches (small floodplains) within the larger channel, structures made from rock and logs that deflect flow away from banks, and defined riffles and pools along with glides and runs. For the other 600 feet of stream, pools will be enhanced using woody material and stone. Soil mattresses will be constructed on flood plains from biodegradable materials and soil to hold soil medium until vegetation becomes reestablished. Grasses, shrubs, and trees native to the restoration site will be planted during and following construction and native grass and wildflower seeds will be planted in the riparian area. An access point will be created to attract visitors and signage providing education on the stream restoration, aquatic habitat, riparian, and water quality will be developed. Upon completion of the project, field tours will be given to developers, contractors, students, and other interested parties. Also, the City will be building a walking and bike trail through this site.

**Location**

The project site is located in the Ozark Highlands Ecoregion, which has the highest conservation priority in the AWAP based on having the greatest number of SGCN. The site lies in the Springfield Plateau, whose upland potential natural vegetation is primarily oak-hickory; savannas and tall grass prairies also occurred and were maintained by fire. Turtle Creek flows through the City of Rogers and is a tributary of Osage Creek which flows to the Illinois River (see Figure 2 for site location). The site is located behind Home Depot on West New Hope Road where there were once savannas and tall grass prairies in the area.

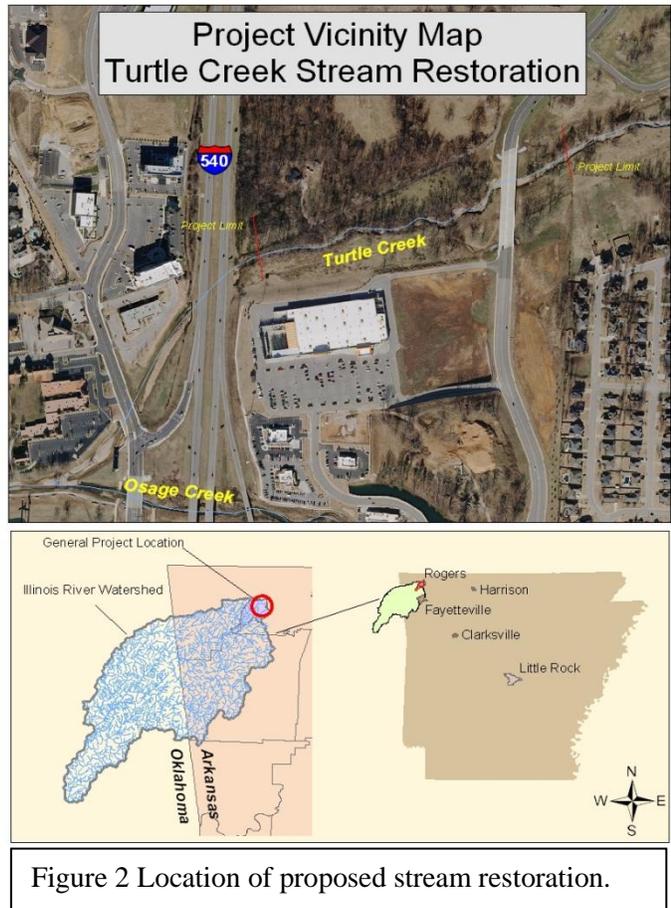


Figure 2 Location of proposed stream restoration.

**Budget**

|                | Federal   | City & IRWP Cash Match | In-Kind Match |          |         | Totals    |
|----------------|-----------|------------------------|---------------|----------|---------|-----------|
|                |           |                        | WCRC          | CITY     | AGFC    |           |
| Personnel      | \$0       | \$75,000               | \$0           | \$0      | \$5,000 | \$80,000  |
| Supplies       | \$5,000   | \$0                    | \$0           | \$0      | \$0     | \$5,000   |
| Contract       | \$15,000  | \$0                    | \$0           | \$0      | \$0     | \$15,000  |
| Construction   | \$100,000 | \$0                    | \$10,000      | \$10,000 | \$0     | \$120,000 |
| Volunteer Time | \$0       | \$0                    | \$5,000       | \$0      | \$0     | \$5,000   |
| Indirect       | \$0       | \$25,000               | \$0           | \$0      | \$0     | \$25,000  |
| Totals         | \$120,000 | \$100,000              | \$15,000      | \$10,000 | \$5,000 | \$250,000 |

## **Qualifications**

The Watershed Conservation Resource Center (WCRC) is a non-profit organization whose mission is “to protect, conserve, and restore natural resources by utilizing the watershed approach, environmental outreach, and providing planning and technical assistance to landowners, communities, and government.” The co-founders and principals of the Watershed Conservation Resource Center, Sandi J. Formica and Mathew Van Eps have extensive backgrounds and are leading regional experts in watershed management, watershed assessment, stream stability analysis, natural channel restoration design and the utilization of GIS for inventory and evaluation of natural resource condition. The staff has a broad range of experience with the watershed approach and has spent many years working throughout Arkansas on a variety of issues. The WCRC is engaged in several watershed assessment and stream restoration projects.

Sandi J. Formica, executive director of the WCRC has B.S. and M.S. degrees in Chemical Engineering, with an emphasis on the transport of contaminants in the water, soil, and air. She will be the overall project manager. She will oversee the data collection, evaluation, and analysis portions of the project. Ms. Formica has been the project manager of numerous 319 projects, including two successful stream restoration projects, developed to address non-point source pollution on a watershed basis. She was the principal investigator and developed the overall approach to assessing nutrients and sediment on a watershed basis. Ms. Formica possesses unique technical skills developed over many years’ experience in the field of environmental and watershed management. Ms. Formica has extensive training in the area of fluvial geomorphology and stream restoration and has assisted in the development and instruction of basic field techniques to determine stream morphology course.

Matthew A. Van Eps, associate director of the WCRC is a registered Professional Engineer in the State of Arkansas who holds a M.S. Degree in Environmental Engineering. He will be the project engineer and responsible for managing field data collection activities, data analysis, development of the natural channel design, and implementation of the design. He has 15 years of technical and practical experience utilizing the watershed approach. He has been the project engineer for numerous successfully completed studies including watershed assessments and stream restoration projects. He has extensive experience in collecting and analyzing fluvial geomorphology data for estimating streambank erosion and stream stability. Mr. Van Eps has extensive training in the area of fluvial geomorphology and stream restoration and has assisted in the development and instruction of basic field techniques to determine stream morphology course.

The Illinois River Watershed Partnership (IRWP) is a non-profit 501(C) 3 organization established in 2005, working to improve the integrity of the Illinois River watershed through strong voluntary partnerships with landowners and managers, technical advisors, area jurisdictions, government agencies, advocates, and others. Delia Haak is the executive director of the IRWP and has extensive experience in developing conservation based outreach programs and engaging with the public on improving and protecting the water quality of the Illinois River. She has also worked to implement better riparian management and rain gardens throughout the watershed.

The City of Rogers has participated in several 319 projects to assess and reduce nonpoint source pollution from urban sources. Steve Glass has served as the planning and transportation director for seven years and has recently worked with local developers and conservation organization to develop a stormwater management guide that will improve stormwater quality and prevent further degradation of urban streams.

Steve Filipek of Arkansas Game & Fish Commission is one of the leading biologists in Arkansas for protecting and conserving aquatic species. He has been introducing stream restoration and riparian improvement techniques to environmental professionals for over ten years and is responsible for improvements in aquatic habitat throughout the state.