

## **1. Cover Page: 2017 State Wildlife Grant Pre-Proposal**

### **a. Title of Project: Phase II: Stream and Wetland Restoration of Tanyard Creek**

#### **b. Project Summary:**

Within a karst area along Tanyard Creek in Benton County, Arkansas, 1,000 feet of stream channel, 2000 feet of associated riparian, and a wetland area will be restored. NW Arkansas is one of the fastest growing areas in the country. Tanyard Creek is known for its natural karst features of limestone bluffs, in-stream ledges, and adjacent caves. This project addresses 2017 priorities and will help to protect this karst area from the impacts of urbanization. The Ozark Highlands stream is a tributary to Little Sugar Creek where 15 SGCNs have been found in or near the basin (12 SGCNs are associated with karst). The Bella Vista Village POA proactively developed a “Restoration and Maintenance Plan” for 3,500 feet of Tanyard Creek in an effort to initiate restoration of areas of stream instability that impact both aquatic and terrestrial habitat and degrade water quality. Utilizing a 2012 State Wildlife Grant (SWG), 2,500 feet of Tanyard creek was successfully enhanced and restored using natural channel design techniques, removing woody debris, and enhancing riparian by incorporating native plants and removing invasive vegetation. This proposal addresses the remaining 1,000 feet where there is additional stream instability. Both aquatic and terrestrial habitat of this karst area are compromised with aquatic habitat limited from sedimentation that 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 and aquatic habitats for 15 SGCNs.

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#### **d. Project Partners:**

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#### **e. Project Budget:**

SWG Funds Requested: \$95,000 (41.3%); Matching Funds: \$135,000 (58.7%);  
Total Cost: \$230,000

## 2. Project Statement

### **a. Need**

Tanyard Creek is rich in karst features and flows to Little Sugar Creek, a major tributary of the Elk River that lies in both Arkansas and Missouri (Figure 1) and is part of the Arkansas River Basin. As is Little Sugar Creek, Tanyard Creek is a spring-influenced basin, resulting in a year-round flow. Unstable streambanks and excessive woody debris are compromising the aquatic and terrestrial habitat of this karst environment and accelerated streambank erosion contributes

excessive amounts of sediment and phosphorus, annually, to the Little Sugar Creek watershed, which threatens 'species of greatest conservation need (SGCN).'

Restoration of this Ozark Highlands stream addresses 2017 State Wildlife Grant Priorities: **1) Restore and maintain native terrestrial habitats in karst recharge zones and groundwater/spring habitats:**

Tanyard Creek is rich with karst features, such as, limestone bluffs and in-stream ledges with a nearby cave and the basin is spring-influenced. The project will restore, enhance, and protect 2,000 feet of terrestrial habitat that includes a

wetland and 1,000 feet of stream channel needed to protect the terrestrial area and improve water quality. **2) The project has the potential to benefit 15 SGCNs with 12 SGCNs associated with karst:** The project is located in NW Arkansas, one of the fastest growing areas in the country. Urbanization is stated as one of the biggest threats to karst SGCNs. The project will improve water quality along with terrestrial and aquatic habitat and will protect this unique karst environment from urbanization through the implementation of the two highest conservation actions recommended in the Ozark Highlands Ecoregion of the AWAP: 1) Habitat Restoration/Improvement, and 2) Habitat Protection. **3) Addresses Emerging Issue under Habitats:**

**Aquatic Habitat and Wetland Habitat.** Recognizing the unique qualities of the Tanyard Creek watershed and its karst environment, the Bella Vista POA has dedicated financial resources to develop and implement a stream management plan for Tanyard Creek to protect and improve aquatic habitat and water quality by restoring streambanks, riffles, pools, runs and glides, while implementing ongoing stewardship to protect the site into the future. The WCRC was awarded a 2012 SWG grant and successfully restored/enhanced 2,500 feet of Tanyard Creek and its riparian area. The Bella Vista POA continues to commit ongoing stewardship of the site (\$30,000 to date). This project will complete the restoration recommendations of the plan. Restoring stability to the channel will reduce sediment and phosphorus in Little Sugar Creek watershed, a primary source in the Elk River (a Missouri 303 (d) listed stream).

### **b. Purpose and Objectives:**

The purpose of the project is to restore and maintain a healthy riparian, stream, and wetland of a karst and spring-influenced landscape that supports aquatic and terrestrial habitat for 15 SGCNs

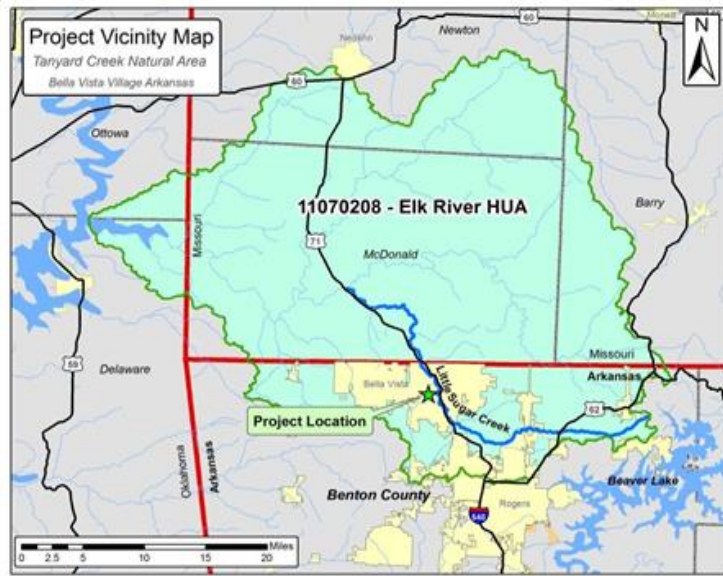


Figure 1 Project Location

and other wildlife. The project objectives are:

- 1) Restore 1,000 feet of unstable stream and a wetland area to improve habitat for 15 SGCNs (listed below) in a karst landscape and spring influenced basin.
- 2) Restore and enhance 2,000 feet of riparian area in a karst landscape for 15 SGCNs.
- 3) Improve water quality by reducing sediment and nutrient loadings from streambanks by 80%.
- 4) Improve hydrology and create a stable channel and adjacent flood plains in karst area.
- 5) Strengthen local and regional partnerships and provide hands-on outreach.

### c. Location

Tanyard Creek is located in Benton County (Figures 1 & 2) and the Ozark Highlands Ecoregion, which has the greatest number of SGCN. The project can benefit 11 SGCNs found either in or near the Little Sugar Creek basin, one SGCN recently found in Tanyard Creek, and three potential in the basin. The two priority terrestrial habitats will be improved and protected: 1) Caves, Mines & Karst Habitat and 2) Springs and Ground-water along with high ranking Ozark- Ouachita Riparian and Ozark Highlands – Arkansas River aquatic habitat.

### d. Approach

The Tanyard Creek plan identified several areas in need of restoration and woody debris problems for over 3,500 ft of Tanyard Creek and a major tributary (Figure 2). Using a SWG grant, 2,500 feet of the plan was successfully implemented from 2013-2015 resulting in sediment and nutrients loads being reduced by over 90%, and the post-restoration physical habitat and macroinvertebrate assessment indicated a high quality stream. Also, a SGCN, the Neosho Midget Crayfish, population was found post-restoration in the restored area. The proposed project will complete the plan recommendations by restoring the remaining 1,000 feet of stream channel and 2,000 feet of riparian area. Natural channel design principles will be used to address stream instability at problem area R7 and large woody debris creating streambank erosion (W6-W9) will be removed and reused (Figure 2). A new channel pattern will be developed to create a stable, sustainable stream channel that will improve pool, riffle, run, and glide bed features needed for SGCNs and to protect the karst riparian areas. Toe-wood stabilization techniques, that maximize aquatic habitat and protect streambanks will be utilized, and abandoned channel areas will be restored to wetlands. Constructed floodplains and other riparian areas will be restored and enhanced by incorporating native plants and trees and invasive vegetation will be removed. Biological sampling will be conducted pre- and post-restoration activities. AG&FC and other local experts will be consulted on incorporating sampling techniques to help identify karst SGCNs.

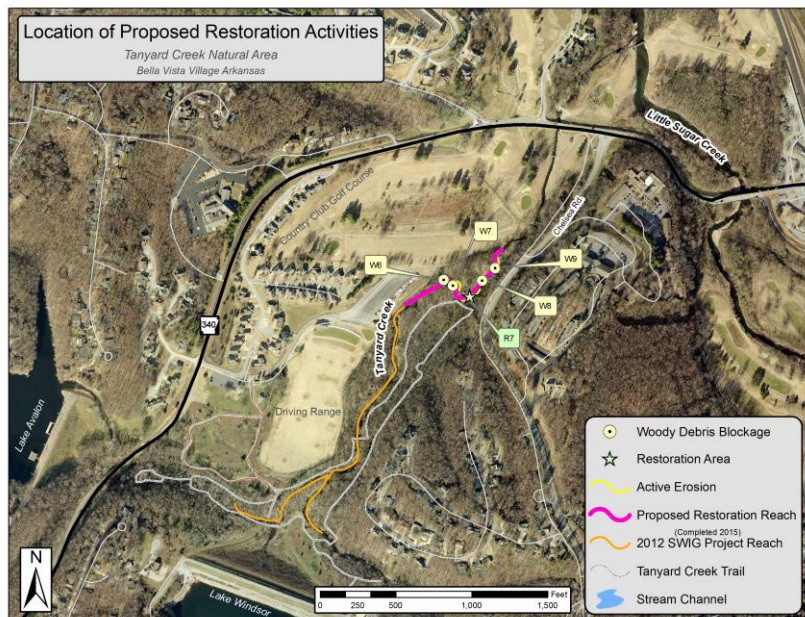


Figure 2 Locations of proposed restoration activities on Tanyard Creek

**e. Expected Results and Benefits**

<p><b>The 15 SGCNs (12 associated with karst) that will potentially benefit from the project are:</b>  <i>Found in Little Sugar Creek Basin &amp; associated with karst and spring/groundwater (listed 2017 priorities noted with *):</i> 1) <b>Caecidotea ancyla*</b> – isopod, PS 27, G3G4, S2;                  2) <b>Stygobromus ozarkensis*</b> – Ozark Cave Amphipod, PS 23, G4, S2;</p>
<p><i>Found in Ozark Highlands Ecoregion near Little Sugar Creek Basin &amp; associated with karst and spring/groundwater:</i> 3) <b>Troglichthys rosae</b> - Ozark Cavefish, PS 43, G3, S1;                  4) <b>Cambarus aculabrum</b> – crayfish, PS 80, G3, S1; 5) <b>Cambarus setosus</b> – Britly Cave Crayfish, PS 34, G3, S1; 6) <b>Caecidotea steevesi</b> – isopod, PS 31, G3G4, S1; 7) <b>Caecidotea stiladactyla</b> – isopod, PS 23, G3G4, S3; 8) <b>Dendrocoelopsis Americana</b> – cave obligate planarian, PS 42, G2G3, S1; 9) <b>Crosbyella roeweri</b> – cave obligate harvestman, PS 65, G1G2, S1; 10) <b>Gastrocopta rogerensis</b> – land snail, PS 27, G3G4, S2 (endemic to AR &amp; MO) No Record but expected to be in Ozark Highlands &amp; associated with karst and spring/groundwater: 11) <b>Pymarrhopalites clarus*</b> – Springtale, PS 25, G4, S1S2;                  12) <b>Caecidotea dimorpha*</b> - Isopod PS 38, G2G3, S2</p>
<p><i>Found in Tanyard Creek -</i>13) <b>Orconectes macrus</b> – Neosho Midget Crayfish, PS 23, G4, S2  <i>Found in headwater pools, riffles, and spring runs: Found in or near the Little Sugar Creek Basin:</i> 14) <b>Orconectes meeki brevis</b>–crayfish, PS 30, G4T3, S2(No record, may be in NW AR).                  15) <b>Nocomis asper</b> – Redspot Chub, PS 23, G4, S2</p>

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

- A karst area will be improved and protected by restoring and enhancing 2000 feet of riparian, 1000 feet of stream channel, and a wetland area. Flow from limestone ledges along Tanyard Creek is an ideal condition to support several SGCNs. The activities proposed will also keep the stream and riparian in this karst area from further degradation.
- Water quality will be improved in Tanyard Creek and Little Sugar Creek watersheds by reducing sediment and phosphorus loads by approximately 267,000 and 32 lbs/yr respectively.
- Completion of the stream management plan recommendations will serve as a demonstration of how assessment and implementation can direct funding to needed areas to protect SGCNs.
- The Tanyard Creek restoration provides the opportunity for organizations in both Arkansas and Missouri to work together on improving the ecology of Little Sugar Creek watershed.
- The project will provide needed data on SGCNs in karst and headwater streams.
- The restoration work will be maintained for 5 years to allow for vegetation establishment.

**f. Budget:** Total cost is \$230,000 - \$95,000 (41.3%) federal & \$135,000 (58.7%) matching:

Category	Federal	Bella Vista POA Cash Match	In-Kind Match				Totals
			POA	WCRC	AGFC	Multi-Basin	
Personnel	\$23,750	\$0	\$5,000	\$0	\$5,000	\$0	\$33,750
Supplies	\$5,000	\$0	\$0	\$5,000	\$0	\$0	\$10,000
Contract	\$0	\$40,000	\$0	\$0	\$0	\$0	\$40,000
Construction	\$59,225	\$0	\$65,000	\$0	\$0	\$0	\$124,225
Volunteer	\$0	\$0	\$0	\$10,000	\$0	\$5,000	\$15,000
Indirect	\$7,025	\$0	\$0	\$0	\$0	\$0	\$7,025
Totals	\$95,000	\$40,000	\$70,000	\$15,000	\$5,000	\$5,000	\$230,000



### 3. 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. The WCRC has designed and successfully implemented over 10 stream restoration projects in Arkansas and is known for their thoughtful attention to creating high-quality aquatic habitat and terrestrial habitats.

***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 and she will be the project manager. She has been the project manager of numerous projects, including successful stream restorations that were developed to address non-point source pollution and restore habitat on a watershed basis. She was the principal investigator and developed the overall approach to assessing nutrients and sediment at a watershed scale. Ms. Formica has extensive training and experience in the area of fluvial geomorphology and river restoration.

***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 18 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.

***Mike Taggart of the Bella Vista Property Owners Association*** worked closely with the WCRC in implementing the 2012 SWG grant. The POA will again provide construction operators, heavy equipment, and labor to assist with the construction of the stream restoration project and Mike will coordinate this effort. The Bella Vista POA will organize outreach events as well.

***Bill Posey of Arkansas Game & Fish Commission*** is a leading biologist in Arkansas for protecting and conserving aquatic species. He and his staff are experts on conducting biological assessment of streams and rivers in Arkansas and will assist with the biological assessments.

***Angela Danovi is the President of the Multi-Basin Regional Water Council.*** They help to protect water quality in watersheds that share state boundaries in NW Arkansas, SW Missouri, SE Kansas, and NW Oklahoma. ***David Casaletto is president of Ozarks Water Watch*** that works to protect and maintain water quality in the Ozarks region through collaboration, partnership, and projects. Both will assist with organization of planting days, invasive species removal, and organizing meetings to present project results to interested citizens of Arkansas and Missouri.