Implementing Agricultural Practices, Stream Restoration, and Land Protection in the Southeast Missouri Ozarks

A Response to the Request for Proposals for Natural Resource Damage Restoration Projects for Riparian, Wetland, and Floodplain Habitat within Big and Black River Watersheds in the Southeast Missouri Lead Mining District




Submitted by:

The Nature Conservancy
Protecting nature. Preserving life.™

Missouri Department of Conservation

Ozark Regional Land Trust

15 December 2015

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INTRODUCTION

The Nature Conservancy (TNC), Missouri Department of Conservation (MDC), and Ozark Regional Land Trust (ORLT) respectfully submit this collaborative proposal under the request for proposals (RFP) for Natural Resource Damage Restoration Projects for riparian, wetland, and floodplain habitat within Big and Black River watersheds in the Southeast Missouri Lead Mining District, released October 14, 2014. We propose nine projects over a three-year (36 month) period that will comprehensively address the Southeast Missouri Ozarks Regional Restoration Plan and Environmental Assessment (SEMORRP) goals of restoring, acquiring, or protecting riparian forests, wetlands, and/or floodplains. These projects are interdependent and overlapping, where the implementation of successful conservation practices, on-the-ground restoration, and land protection projects described below are targeted for similar/same locations with similar/same landowners in the project area. As such, our proposal is structured to provide a synergistic approach to completing successful conservation practices, on-the-ground restoration, and land protection activities that maximize the ecological benefits and cost-effectiveness of restoration actions at watershed- to site-level scales. For example, we intend to implement riparian buffer revegetation, livestock fencing, alternative watering systems, and streambank stabilization projects in combination at specific locations with private landowners in order to provide optimal restoration outcomes. Under this collaboration, each partner will lead the implementation of projects based on expertise and experience, with TNC serving as the lead for project administration, management, and implementation (where applicable).

The projects are located chiefly in the Huzzah and Courtois Creek watersheds, but also include all watersheds identified as "Tier 1" and "Tier 2" priorities in the RFP ("project area"). The Huzzah and Courtois Creek watersheds are focal areas in our proposal for several reasons. First, we have a long history of conservation actions in these watersheds, having completed numerous protection, conservation, and restoration projects within the large existing network of public lands (e.g., Mark Twain National Forest) and designated conservation areas within the watersheds (e.g., Middle Meramec Conservation Opportunity Area; MDC 2005). Second, this area is recognized for its high biodiversity and quality within the Meramec River Basin (TNC 2014), including a number of Missouri Species of Conservation Concern as well as federally protected species that will benefit from the projects proposed herein (MDC 2014; TNC 2014). Third, the MDC has recently initiated the "Woodlands for Wildlife" partnership among private landowners, NGOs, and public agencies for improving native plant and animal communities on public and private lands within the Huzzah and Courtois Creek watersheds within the Middle Meramec COA (MDC 2014). This partnership has become a model of successful implementation of conservation projects on private lands, and has built a high-level of trust and a proven track record with private landowners. These strong relationships therefore provide us an excellent opportunity to quickly, efficiently, and fully implement our proposed projects on both public and private lands within the project area.

Finally, the Huzzah and Courtois Creek watersheds are identified as a priority conservation target in the Meramec River Conservation Action Plan, developed by 29 conservation stakeholders that defines a unified blueprint for ensuring the sustainability of aquatic resources in the Meramec River Basin (TNC 2014). Excessive suspended and bedded sediments ("excessive sediment") was identified as the most pervasive problem degrading aquatic resources in Huzzah and Courtois creeks, with livestock farming and ranching being the most critical source of excessive sedimentation. Our proposed projects directly address these threats, as well as the top-rated strategy identified in the Meramec River CAP (see Projects #6 – 8). In total, our proposal addresses among the highest priority geographic priority areas and restoration goals outlined in the SEMORRP and RFP.

DESCRIPTION OF PROPOSED RESTORATION PROJECTS

A summary of all projects is provided in Table 1. Total budget information is provided in Table 6 (see "Amount of Request and Budget" section below).

Restoration Category: Agricultural Practices

Project #1: Riparian Buffer Revegetation. Lead entity: Missouri Department of Conservation.

We propose to revegetate a minimum of 10 acres of riparian corridor with native trees and shrubs on private lands in the Huzzah and Courtois Creek watersheds. The goals of riparian buffers are to stabilize streambanks, regulate water temperatures, supply stream carbon and large woody material, reduce stream sediment and nutrient loading, and provide fish and wildlife habitat and travel corridors (Figure1). In order to achieve this goal, tree and shrub seedlings or potted plants that are suitable for soil and site conditions will be planted to create a minimum of a 50 to 100-ft. buffer. Tree seedlings will be planted according to NRCS Missouri Field Office Technical Guide standards (NRCS-MO 2014a). Potted trees and shrubs will be planted according to site specific plans developed by MDC Foresters, Private Land Conservationists, or Fisheries Management Biologists. Monitoring and evaluation information is provided in "Description of Experience in Biological Monitoring" below.

Figure 1. Riparian buffer revegetation by on Huzzah Creek before (2009, above) and after (2013, below) plantings, Crawford Co., MO.

Table 1. Proposal project summary.

					RFP Restoration Goals							
Project #	Project Name	Restoration Category	Lead Entity	Geographic Area	Promoting & implementing riparian conservation practices among land owners	Restoring degraded riparian areas & streambanks	Property acquisition of high quality riparian corrdidors	Placement of easements or other institutional controls on restored or aquired areas	# of Units	Unit Measure	Cost/Unit	Subtotal
1	Riparian Buffer Revegetation	Agriculture Practices	MDC	Huzzah & Courtois creeks	X	X			10	Acres	$1,200	$12,000
2	Riparian Buffer Livestock Fencing	Agriculture Practices	MDC	Huzzah & Courtois creeks	X	X			16,667	Feet	$1.50	$25,000
3	Alternative Livestock Watering System	Agriculture Practices	MDC	Huzzah & Courtois creeks	X				1	System	$25,000	$25,000
4	Reinforced Stream Crossing	Agriculture Practices	MDC	Huzzah & Courtois creeks	X	X			1	Crossing	$15,000	$15,000
5	Streambank Stabilization	Stream Restoration	TNC	Huzzah & Courtois creeks	X	X			3,500	Feet	$100	$350,000
6	Prioritizing Watershed Restoration Locations	Stream Restoration	TNC	NRDA Tiers 1 & 2		X			1	N/A	$120,000	$120,000
7	Prioritizing Streambank Restoration Locations	Stream Restoration	TNC	Huzzah Creek		X			25	Miles	$1,750	$43,750
8	Prioritizing Streambank Restoration Locations	Stream Restoration	TNC	Courtois Creek		X			25	Miles	$1,750	$43,750
9	Private Lands Easement	Land Protection	ORLT	Huzzah & Courtois creeks				X	67	Acres	$750	$50,250
	10% of Agricultural Practices & Stream Restoration	Maintenance & Monitoring	MDC, TNC									$42,700

** Note that funds allocated for Project 9 will result in the total protection of 322 acres under conservation easements.*

Project #2: Riparian Buffer Livestock Fencing. Lead entity: Missouri Department of Conservation. We propose to exclude livestock from approximately 16,667 feet (3.17 miles) of newly established or existing riparian buffers with electric or barbed-wire fences on private lands in the Huzzah and Courtois Creek watersheds. The goal of livestock fencing is to exclude cattle from riparian buffers and stream channels (Figure 2). Riparian buffer fencing will be a minimum of 50 to 100-ft. wide. The ecological benefits of a riparian buffer are described in Project #1. Fencing will be installed according to Missouri NRCS Field Office Technical Guide standards (NRCS-MO 2014a). Monitoring and evaluation information is provided in "Description of Experience in Biological Monitoring" below.

Figure 2. Riparian buffer livestock fencing on Huzzah Creek, Crawford Co. MO, 2013.

Project #3: Alternative Livestock Watering System. Lead entity: Missouri Department of Conservation. We propose to implement at least one alternative livestock watering system on private lands within the Huzzah and Courtois Creek watersheds. The ecological goals of this practice are to reduce stream erosion, sedimentation, and nutrification by removing cattle from stream channels. The commodity production goal of this practice is to provide strategic watering locations to distribute nutrients and forage utilization across pastures. In order to achieve this goal, we will develop a water source (e.g., well, pond, or spring) and distribute it by trenching and piping to livestock watering tanks. Erosion potential around the livestock watering tanks will be addressed by installing reinforced livestock watering pads (Figures 3 and 4). Livestock producer(s) that are eligible for this practice must also agree to exclude cattle from their streams and establish a minimum of 50 to 100 feet of wooded riparian buffer if one does not currently exist. Livestock watering system components including pipelines, watering facilities, and wells will be installed according to Missouri NRCS Field Office Technical Guide standards (NRCS-MO 2014c; NRCS-MO 2014e; NRCS-MO 2014f). Monitoring and evaluation information is provided in "Description of Experience in Biological Monitoring" below.

Figure 3. Spring branch serving as an existing watering source before (left) and after fencing and alternative livestock watering system (right), Crawford Co. MO, 2012.

Figure 4. Alternative livestock watering system, Crawford Co., MO, 2012.

Project #4: Reinforced Stream Crossing. Lead entity: Missouri Department of Conservation.
We propose to install one reinforced stream crossing within the Huzzah and Courtois Creek watersheds. The ecological goal of this practice is to reduce streambank and streambed erosion when livestock and equipment cross a stream. The commodity production goal of this practice is to safely and efficiently move livestock and equipment across a stream. Livestock producer(s) that are eligible for this practice must also agree to exclude cattle from their streams and establish a minimum of 50 to 100-ft. wooded riparian buffer if one does not already exist. Reinforced stream crossings will be installed according to Missouri Department of Conservation stream restoration specifications (MDC 2012) and/or site specific engineering recommendations. Monitoring and evaluation information is provided in "Description of Experience in Biological Monitoring" below.

Figure 5. Reinforced stream crossing on Huzzah Creek, Crawford Co., MO, 2013.

Restoration Category: Stream Restoration

Project #5: Streambank Stabilization. Lead Entity: The Nature Conservancy.

We propose implementing streambank stabilization and/or similar in-stream and stream corridor restoration actions for approximately 3,500 feet in the Huzzah and Courtois Creek watersheds. The goals of these projects are to reduce sedimentation and nutrient pollution (e.g., phosphorus) and create/maximize fish and wildlife habitat in actively eroding or otherwise degraded stream reaches in the project area. In order to achieve this goal, we will employ stream restoration design and implementation approaches using natural channel design techniques and state-of-the-art bioengineering approaches in accordance to state (Doll et al. 2003) and federal guidance documents (NRCS 2007a, b, c). These methods best maximize both the physical and ecological outcomes versus traditional hard-engineering practices such as rip-rap and other hard materials, are typically less expensive to employ, and are increasingly used by public and private entities nationwide (See Admiraal 2007 for recent review). This approach is also more self-sustaining than traditional engineering approaches because it directly addresses the factors resulting in streambank erosion (e.g., bank to bankfull ratio, steep bank angle, lack of rooting density and depth) using bank grading and enhancing floodplain access, use of natural materials, and revegetation for long-term site stabilization, ecological benefits, and sustainability (Doll et al. 2003; NRCS 2007b; Figure 6).

We anticipate implementing streambank stabilization at five project locations on private and/or public property at approximately ~700 ft. per site for a total of 3,500 ft., though actual number of locations and length restored per reach will likely vary based on site characteristics, opportunities, cost, and other factors. We have already identified at least two private landowners with three degraded streambanks that are interested in implementing stabilization projects in the project area, and anticipate no issues in

Figure 6. Streambank stabilization using bioengineering (toe wood) according to natural channel design techniques, before (above, 2011) and after (below, 2014) restoration, Kings River, Carroll Co., AR.

collaborating with other private landowners/sites for similar actions during the project period. In consultation with U.S. Forest Service Staff, we have also identified at least one site in the Huzzah Creek drainage within the Mark Twain National Forest for streambank stabilization. We will attempt to align these projects at locations near-to protected areas and that will provide the greatest sediment and nutrient reduction per Projects #6 – 8 as described below.

The cost of streambank stabilization construction (materials, mobilization, equipment, labor only) using NCD and bioengineering techniques can vary widely depending on watershed- and site characteristics. Missouri streambank stabilization using bioengineering guidelines do not include the use of root wads, toe wood (Rosgen 2010), or similar woody material – important components for ensuring maximum stability and ecological outcomes – in its cost calculations (NRCS-MO 2014d); therefore, we referenced other states that included these elements to best estimate costs (NRCS-AR 2014; NRCS-OK 2014; NRCS-WY 2014). Because Arkansas, Missouri, and Oklahoma guidelines provide cost estimates for 6-ft. tall streambanks, we calculated cost/ft. by extrapolating costs for 10-ft. tall streambanks typical to the mainstem of Huzzah and Courtois creeks (Wyoming toe wood guidelines are price fixed regardless of streambank height). Adjusted streambank stabilization costs for bioengineering including woody materials is $66 – $70 per foot per AR, OK, and WY NRCS guidelines (Table 2). These costs are less

Table 2. Streambank stabilization using bioengineering cost comparisons for construction activities (materials, mobilization, equipment, and labor). Note that Wyoming uses a fixed rate for implementing toe wood regardless of bank height.

State	6-ft. High Bank ($/ft.)	10-ft. High Bank (adj. $/ft.)
Bioengineered estimates that include use of woody material		
Arkansas	$40.12	$66.80
Oklahoma	$39.68	$66.10
Wyoming	$70.21	$70.21
Bioengineered estimates that do not include use of woody material		
Missouri	$20.04	$33.40

expensive compared to rip-rap and other hard engineering approaches for stabilizing streams the size of those in the project area (NRCS-AR 2014; NRCS-MO 2014d; NRCS-OK 2014; NRCS-WY 2014). Our streambank stabilization cost estimates include (1) plan, design, permitting, and NEPA (where applicable) and (2) construction per NRCS standards (including materials, mobilization, equipment, labor) per project. As such, we used $100 per foot as our overall estimate per restoration site (Table 3). We will make every effort to reduce the cost per project and extend funding to complete additional feet of restored streambanks as funding allows. We expect to execute to cooperative agreements with private landowners to maintain the restoration/stabilization projects.

Table 3. Cost rate ($/ft.) for stream stabilization using woody materials assuming a 10-ft. high bank. Planning, design, permitting, and NEPA (where applicable) rate based on average estimates for practice implementation. Construction activities are according to rates in Table 1.

Activity	Cost/ft.
Planning, design, permitting, and NEPA (where applicable)	$30.00
Construction (materials, mobilization, equipment, labor)	$70.00
Total cost/ft. =	**$100.00**

A general Before-After-Control-Impact assessment design based on physical streambank data using the Bank Assessment for the Non-Point-Source Consequences of Sediment (BANCS; see Projects #7 – 9 for details) and comparative cross-sectional bank profiles (per Rosgen 2006) will be used to monitor the success of each streambank project at least once per year for at least three years following completion. Effectiveness of restoration actions and recovery to or towards baseline conditions will be measured relative to baseline information defined during Projects #6 – 8 below. Post-restoration reconnaissance monitoring to identify any damage or similar issues needed for the site will be completed 2-3 times per year for at least three years following completion at a given site.

Project #6: Prioritizing Watershed Restoration Locations. Lead entity: The Nature Conservancy
We propose prioritizing all terrestrial and aquatic restoration locations within the RFP Tier 1 and Tier 2 geographies in the Big River, Black River, Huzzah Creek, and Courtois Creek watersheds. The goals of this project are to prioritize areas most contributing excessive sediment, nutrient, and other pollutants to guide all current (all projects described herein) and future restoration actions described in the SEMORRP, as well as other local, state, federal, and non-governmental conservation plans and funding programs in the project area. Importantly, this project will develop an essential template for all current and future restoration actions under the SEMORRP by providing scientific data that will maximize the ecological benefits and cost-effectiveness of restoration actions, improve decision making and accountability, and other benefits to public and private resources and stakeholders in the project area. We will achieve these goals by prioritizing areas most contributing sediment, nutrient, and other point- and non-point-source pollutants at the catchment scale (HUC-12 or finer) using a combination of the Soil and Water Assessment Tool (SWAT; SWAT 2014), Watershed Assessment of River Stability and Sediment Supply (WARSSS; Rosgen 2006), and/or MIKE-SHE Watershed Model (MIKE 2012). These federally (SWAT and WARSSS) and privately (MIKE-SHE) developed tools use hydrology, topography, soils, land cover, land management, weather, and other spatial data to predict water yields, numerical estimates of sediment, erosion, and runoff contribution (yds^3 or tons) and rates, and nutrient contribution (lbs.) and rates in specific locations with catchments. In combination, outputs prioritize areas that are the greatest contributors to point- and non-point-source pollution and habitat degradation (Figure 7), as well as numerical effectiveness of various actions for restoring degraded aquatic and terrestrial systems (Table 4). These analyses are used nationwide and have recently been used by the MDNR in the Spring River Basin in southwestern Missouri for achieving similar goals (MDNR 2014). Of note, data for prioritizing reach-scale streambank erosion processes and restoration locations, which are not defined using these watershed-scale models, will be completed as described in Projects #7 – 9 below. Projects #7 – 9 will provide information that will further improve prioritization of watershed areas under defined in this project.

Figure 7. Spring River target areas for sediment and nutrient reduction, showing catchments with greatest impairment (Priority 1) to least impairment (Priority 4), southwestern MO. Adapted from MDNR (2014).

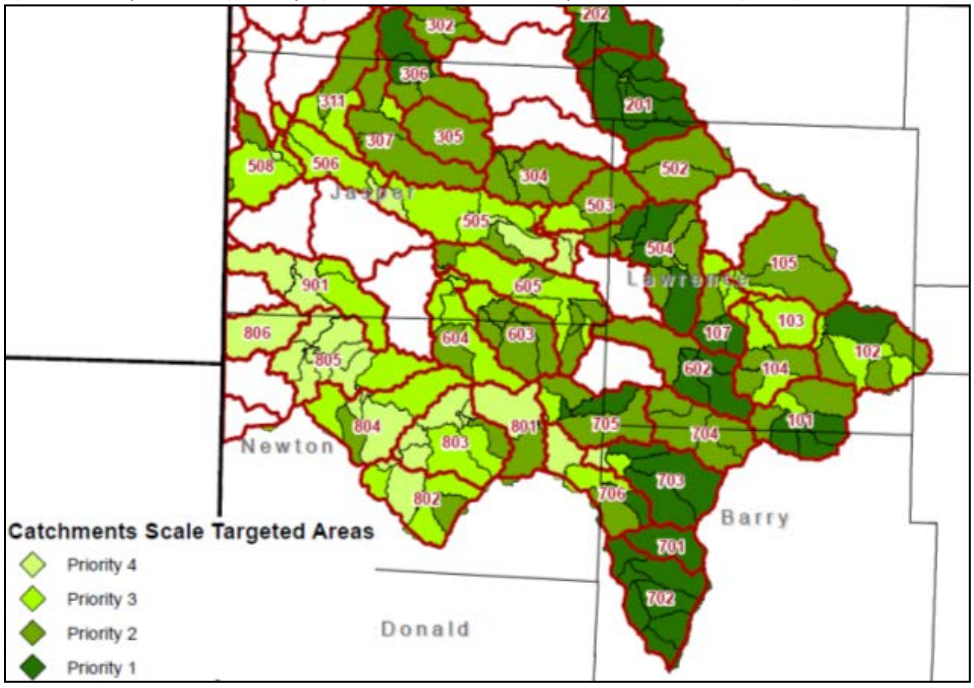

Table 4. Predicted sediment load reduction resulting from streambank stabilization in the Spring River, southwestern Missouri. Adapted from MDNR (2014).

Year	Streambank Stabilization (feet)	Soil Load Reduction (tons)	Cumulative Erosion Reduction (tons)
1	300	600	600
2	300	600	1,200
3	300	600	1,800
4	300	600	2,400
5	300	600	3,000
6	300	600	3,600
7	300	600	4,200
8	300	600	4,800
9	300	600	5,400

Project #7: Prioritizing Streambank Restoration Locations, Huzzah Creek. Lead entity: The Nature Conservancy

We propose to prioritize reach-specific locations for streambank restoration for approximately 25 miles of the mainstem of Huzzah Creek. The goals of this project are to develop a portfolio of streambank locations contributing the greatest amounts of excessive sediment and nutrient pollution and prioritize those areas for restoration during current (see Project #5) and future project periods. This project will thus further maximize the ecological benefits and cost-effectiveness of restoration actions under the SEMORRP. In order to achieve these goals, we will complete in-field data collection of streambank condition and restoration potential using the Bank Assessment for the Non-Point-Source Consequences of Sediment (BANCS; Rosgen 2006). The BANCS is a field-specific component of the WARSSS (see Project #6) for efficiently predicting streambank erosion potential using variables such as bank height and angle, sediment composition, depth and density of rooted vegetation, and near-bank stress to predict erosion rates within a given stream reach (yrd^3 or tons/ft./year). The BANCS is an efficient yet accurate method for collecting this information over long distances (tens of miles) in a relatively short time period, making it an ideal approach for prioritizing streambank restoration areas in the SEMORRP. We will also establish permanent monitoring stations at key sites to validate erosion predictions, providing important benchmark data that will help predict streambank erosion rates and sedimentation at other sites in the SEMORRP. This information will be combined with Project #6, as well as local information (e.g., land ownership for each reach), to generate a portfolio that will map (Figure 8) and list (Table 5) the highest-priority reaches for streambank stabilization and restoration in the mainstem of Huzzah Creek. We will complete this project concurrently with Project #8, if possible.

Figure 8. Map of streambank erosion areas using BANCS prioritization (Rosgen 2006), where green = “Low”, yellow = “Moderate”, orange = “High”, and red = “Very High” bank erosion risk in a given reach for the Chipola River, FL. Adapted from Herrington (2012).

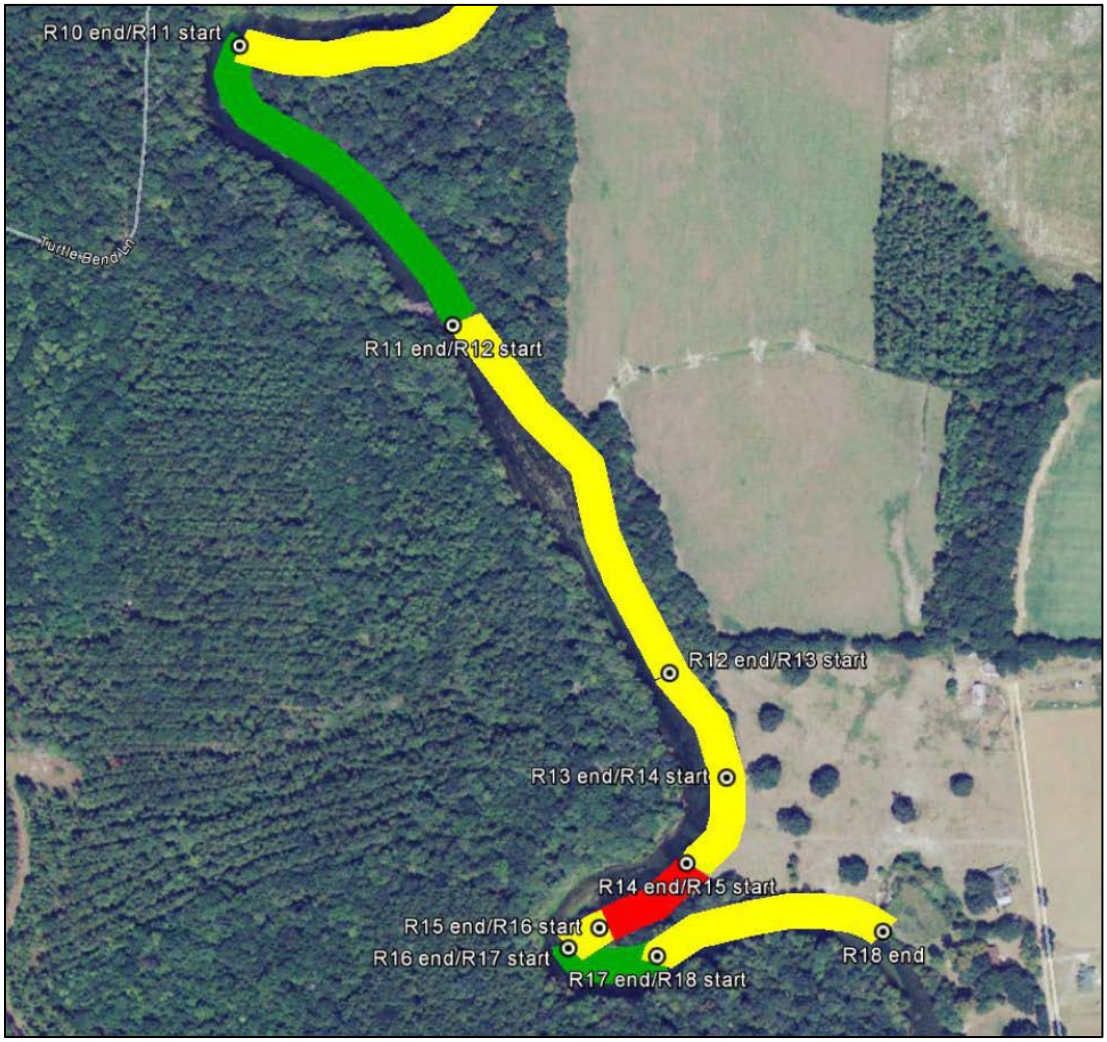

Table 5. Ranking of select reaches with highest predicted streambank erosion rates (tons/reach/year) using BANCS prioritization (Rosgen 2006) in the Chipola River, FL. Adapted from Herrington (2012).

Severity Rank	Location	Property Owner	Erosion Rate (tons/reach/year)
1	Reach 15	Stevens	57.0710
2	Reach 2	Baggett	33.2222
3	Reach 10	Baggett	7.9263
4	Reach 12	Baggett	7.7610
5	Reach 1	Baggett	6.0775
6	Reach 6	Baggett	5.4606
7	Reach 18	Stevens	4.6650
8	Reach 5	Baggett	4.6231
9	Reach 3	Baggett	4.2517
10	Reach 13	Stevens	2.3945

Project #8: Prioritizing Streambank Restoration Locations, Courtois Creek. Lead entity: The Nature Conservancy

We propose to prioritize reach-specific locations for streambank restoration for approximately 25 miles of the mainstem of Courtois Creek. Justification and methodology are as described for Project #7, except in Courtois Creek. We will complete this project concurrently with Project #7, if possible (see "Timeline" below).

Restoration Category: Land Protection

Project #9: Private Lands Easement. Lead entity: Ozark Regional Land Trust

The ORLT proposes to purchase conservation easements on two properties along Huzzah Creek totaling 322 acres and over a mile of creek frontage (Table 5). The Yocom parcel is contiguous to land that was protected by ORLT in 2011, whereas the Dollard parcel is contiguous to another landowner interested in protecting his land with a conservation easement and who is also contiguous to the same parcel protected in 2011. Together with the adjoining Mark Twain National Forest, the conservation easement from 2011, and an additional interested landowner, completion of these projects would create a 1,000-ac. contiguous block of undeveloped land and protect nearly three miles of creek riparian corridor (Figures 9 and 10).

Table 5. Proposed conservation easement and practices parcels on Huzzah Creek, Crawford Co., MO.

Yocom easement project	Dollard easement project
• 162 acres • 4,000 feet of stream frontage • ½ forested • Conservation practices installed in partnership with the MDC. • Adjoins 2011 easement and two additional prospective easement projects	• 160 acres • 1,760 feet of stream frontage • ½ forested • A portion of the property will be under NRCS-Farm and Ranch Lands Protection Program conservation easement. • Adjoins Mark Twain National Forest and another landowner interested in a conservation easement.

The conservation value of these tracts is in its quality forest land, river frontage, productive agricultural lands, and in its potential contribution to improving the water quality of Huzzah Creek by reducing agricultural runoff and sedimentation, requiring sustainable forest management in designated forest areas, requiring a minimum 100' protective riparian buffer, and excluding livestock from the stream. Ongoing outreach by ORLT, MDC, and the Woodlands for Wildlife Partnership is leading to more conservation work, protected land and engaged landowners.

The tools used in these projects will be *conservation easements* and *conservation practices*. Conservation easements will limit development and help prevent forest fragmentation and land disturbance with relatively modest public investment, while also keeping land in private ownership and productive use. These projects will also improve riparian habitat and water quality in the project area by creating permanent forested riparian corridors, excluding livestock from streams and riparian corridors, requiring Best Management Practices (BMPs) on farms and sustainable forest management in designated forest areas. The conservation easement will be a permanent agreement between a landowner and ORLT that restricts future development on a property to a mutually agreed upon level. Each easement will be negotiated to maximize the benefit to natural resources in the SEMO and to meet the land protection goals of the landowner within broad guidelines set forth by the ORLT and the IRS (to ensure that the easement is eligible for various tax deductions). The landowner will maintain ownership of the land and the right to use the land for agricultural or natural resource purposes, whereas ORLT will be responsible for monitoring and defending all conservation easements and lands that it holds. These

Table 7. Projects timeline.

Project #	Project Activity	Lead Entity	2015				2016				2017			
			January - March	April - June	July - September	October - December	January - March	April - June	July - September	October - December	January - March	April - June	July - September	October - December
1	**Riparian Buffer Revegetation**	**MDC**					■			■	■			■
2	**Riparian Buffer Livestock Fencing**	**MDC**					■	■	■	■	■	■	■	■
3	**Alternative Livestock Watering System**	**MDC**			■	■								
4	**Reinforced Stream Crossing**	**MDC**			■	■								
5	**Streambank Stabilization**	**TNC**												
	Site selection and assessment		■	■	■	■								
	Conceptual design plans			■	■	■	■	■						
	Technical design plans, contracting, easements, permits, NEPA				■	■	■	■	■	■				
	Construction					■			■	■			■	■
	Monitoring					■	■	■	■	■	■	■	■	■
6	**Prioritizing Watershed Restoration Locations**	**TNC**												
	Start-up & data compilation		■	■										
	Data analyses			■	■	■	■							
	Draft report & review						■	■						
	Final report								■	■				
7	**Prioritizing Streambank Restoration Locations: Huzzah Creek**	**TNC**												
	Start-up & reconnaisance		■	■										
	Data collection			■	■	■								
	Data analyses				■	■								
	Draft report & review					■	■							
	Final report						■	■						

Table 7 <cont.>. Projects timeline.

Project #	Project Activity	Lead Entity	2015				2016				2017			
			January - March	April - June	July - September	October - December	January - March	April - June	July - September	October - December	January - March	April - June	July - September	October - December
8	**Prioritizing Streambank Restoration Locations: Courtois Creek**	**TNC**												
	Start-up & reconnaisance													
	Data collection													
	Data analyses													
	Draft report & review													
	Final report													
9	**Private Lands Easement**	**ORLT**												

DESCRIPTION OF RIPARIAN, WETLAND, AND FLOODPLAIN RESTORATION AND MANAGEMENT EXPERIENCE AND CAPABILITIES

The MDC is the state agency responsible for the management of fish, forest, and wildlife resources. MDC natural resource professionals composed of resource foresters, private land conservationists, fisheries, wildlife, and wetland biologists, working as a team, are responsible for restoring and managing riparian, wetland, and floodplain habitats and associated species. Staff has extensive experience with establishing/protecting wooded riparian corridors, bottomland forests, and enhancing/creating wetlands. Within the SEMO, MDC staff and partners have established/protected more than 350 acres of riparian buffers and installed over 35 miles of riparian corridor fence to date.

Lead TNC staff has over 25 years' combined experience in direct implementation and contracting of assessment, design, and implementation of stream restoration including streambank stabilization using NCD and bioengineering practices. We have a certified Professional Engineer specializing in stream restoration and staff certified in NCD and dam removal techniques (Rosgen, N.C. State Stream Restoration Program, University of Wisconsin). Our knowledge and experience in is this area is somewhat unique, as implementation of such state-of-the-art restoration techniques – while increasingly common nationwide – is rare in the State of Missouri. Notable projects include two dam removal and full stream re-channeling/rehabilitation in the southeastern US (Kelley Branch and Puddin Head Lake, see http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/florida/explore/restoring-kelley-branch-and-puddin-head.xml) and streambank stabilization for protection of critical habitat of federally listed fish and mussels from excessive sedimentation (http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/florida/howwework/florida-for-love-of-sturgeon.xml). We have also completed an NCD-based technical restoration design for restoring Elm Spring, a historically channelized spring and spring branch in the Gasconade River Basin, MO, and improving habitat for two state Species of Special Concern. Once implemented (restoration per design criteria to be completed in Fall 2015), it will be among the first known full stream restoration using NCD and bioengineering techniques ever completed in Missouri.

DESCRIPTION OF EXPERIENCE WITH EASEMENTS AND CAPABILITIES

The ORLT is a 30-year-old non-profit land conservation organization that protects farms, forests, river corridors, caves, springs, and other natural resources in the Ozark Region of Missouri and Arkansas. Since its inception, the ORLT has completed 114 projects protecting 25,600 acres. The primary tools used to accomplish its mission are the acquisition of land and conservation easements. In the Meramec River Basin, we also offer assistance with conservation practices. The ORLT has a 20-person board of directors, a four-person staff, and a membership organization between 700 and 1,000 paid members.

DESCRIPTION OF EXPERIENCE WITH ENROLLMENT IN STATE AND FEDERAL COST-SHARE PROGRAMS

MDC staff has extensive experience with enrolling landowners in a variety of state, federal, and non-governmental cost-share and incentive programs. Through the MDC Landowner Assistance Program (LAP), staff currently assists landowners with installing BMPs through cost-share. Recently installed landowner BMPs in the proposed focal area includes funding from the U.S. Fish and Wildlife Service, U.S. Forest Service, Natural Resources Conservation Service, MDC LAP, Soil and Water Conservation District, National Fish and Wildlife Foundation, Fishers and Farmers Partnership, Missouri Conservation Heritage Foundation, TNC, and ORLT.

TNC has extensive outreach experience in working with private landowners to secure conservation outcomes, including education, outreach, and assistance to secure public and private incentives for management. For example, we are currently completing a two-year project funded through a U.S. Forest Service State and Private Forestry grant to conduct landowner outreach, education, and activities to secure conservation outcomes and promote and deploy available support programs and resources among landowners in the Current River watershed within the SEMO. From 2009-2013, TNC conducted intensive private landowner outreach and education to secure participation in state and federal conservation support and incentive programs in the Grand River Grasslands, a 70,000 acre grassland conservation landscape spanning northwestern Missouri and southwestern Iowa, through funding from the Doris Duke Foundation, MDC, and Wildlife Conservation Society. Additionally, TNC has a long history of working on an individual basis with private landowners in key priority landscapes throughout the state (including the SEMO) to facilitate enrollment in conservation programs. As a landowner of 34 sites across the state, TNC has also been involved as a participant in a variety of public programs, including Conservation Reserve Program, Wetland Reserve Program, Partners for Fish and Wildlife, and others for over 50 years.

Matching funds are discussed in “Amount of Request and Budget” above.

DESCRIPTION OF EXPERIENCE IN BIOLOGICAL MONITORING

The MDC has extensive research and monitoring experience to assess the biotic and abiotic factors of terrestrial and aquatic ecosystems. MDC staff currently assess aquatic communities through the use of Resource Assessment Monitoring (RAM) sampling. Sport fish populations are sampled from Huzzah and Courtois creek, including smallmouth bass population estimates and exploitation rates. In addition, a botanical survey and woodland health index is being developed for a portion of the project area.

The MDC projects will be evaluated on their conservation output performance. Conservation output performance is simply the measurement of how much of a particular practice was installed and sustained during the term of the agreement. Riparian buffer revegetation, riparian buffer livestock fencing, alternative watering systems, and reinforced stream crossings that are installed will be documented, and all practices will be monitored by using pre- and post-photo-points over a three year

period and beyond. If tree seedling survivorship is determined to be less than 50% by year three, additional trees will be established within the riparian forest buffer. Ideally, BMPs produce conservation outcomes which are a measure of ecological improvement. MDC will use RAM protocols to monitor biological stream trends with Index of Biological Integrity (IBI) scores (goal > 37; Doisy et al. 2008). In essence, RAM IBI scores measure the aquatic health outcomes resulting from the cumulative effects of stressors and remedial actions. Although RAM sampling will take place during the three-year granting period, it is improbable that meaningful trends will occur during this time.

Project #5 will require monitoring of water quality parameters (e.g., sedimentation rate) before and after implementation (biological monitoring will not be completed). TNC has extensive training, experience, and necessary materials and supplies for designing and implementing science-based evaluations of stream restoration projects as described above. Monitoring protocols will be included in all actions as described in Project #5 above. TNC will complete all monitoring either directly or per supervision of third-party contractor requirements.

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