Title:	# Maries River Watershed Restoration for Private Landowners and Niangua Darters
Objectives:	Improve water quality and aquatic habitat for Niangua darters through implementing technically and socially beneficial Best Management Practices in three sub-basins in the Maries River Watershed. Protect and restore riparian and in-stream habitats by reducing streambank erosion rates; regulating water temperatures; providing in-stream cover and carbon; reducing stream sedimentation and bed load, and filtering nutrients. Demonstrate how an ecosystem based approach to land management can benefit both private landowners and Niangua darters.
Duration:	Anticipated time needed to complete project is 2 years. Cooperating landowners will sign a 10 or 15 year agreement depending on practices installed; however, the anticipated duration of benefits from many of these practices will far outlive the agreement period.
Cost Summary:	Estimated Total Project Cost $225,400 (100%) Private Stewardship Grant: $175,404 (78%) In-Kind Match: $49,996 (22%)

Project Description

Location

The Maries River Watershed is located in portions of Osage, Maries, and Pulaski counties in south-central Missouri within the Salem Plateau of the Ozark Plateau. (Pulaski County drains approximately 2 square miles of the upper end of the watershed). Sub-basins in the watershed include the upper and lower Maries rivers, Little Maries River, and Little Maries Creek basins which combined drains 285 square miles (See enclosed watershed site map – page 12). For the purposes of project implementation, we will target three sub-basins (upper and lower Maries river basins, and Little Maries River basin). These sub-basins drain 258 square miles of the Maries River Watershed and encompass 27 miles of the federally-listed threatened Niangua darter range (See enclosed Niangua darter range map – page 12). The remaining two miles of Niangua darter range will not be included in the Private Stewardship Grant (PSG) proposal which is located in the Little Maries Creek sub-basin but we will pursue opportunities here as they arise.

Land Use History, Trends, and Consequences

The three targeted Maries River sub-basins are over 99% in private ownership. In fact about 98% of the entire range (only 8 small basins in Missouri) of the Niangua darter is in private ownership. The agricultural land-use and water that make up these three targeted basins are of critical economic importance to those landowners. Livestock production, in particular beef cattle production, has been an important source of income in the area for generations and continues to be as is evident by current land-use. Pastures and hayground represent 40%* of the land-use; woodlands represent 42%* of the land-use; and row crop production represent 9%* of the land-use of the targeted sub-basins (See enclosed current land cover map – page 13). Although woodlands represent the highest present land-use in the sub-basins, woodlands are predominately located on the side-slopes and in the uplands. Based on historical accounts, the Ozark highlands were described as prairie, oak savannah, oak woods with open under-story, and glade barrens. Present land-use in the valleys and river bottoms is dominated by fescue to help support the area's important cattle industry. Historical accounts described the valleys and bottoms as deciduous forests. In essence, land cover has "flip-flopped".

Most cattle producers in the targeted sub-basins manage beef cattle operations and use a "continuous" or seasonal pasture grazing system. An estimated 350* beef cattle farms each having an average of 40* head of cattle are in the targeted sub-basins. Based from the Department of Conservation's Human Dimensions survey data in this region of the state, three out of four landowners use their property for cattle production. Three out of four landowners with streams on their property use their streams for livestock watering because there is no other alternative source of water due to rocky ground. Consequently, wooded riparian corridors

are typically narrow or are missing. As riparian corridors are thinned or removed by land-use practices or by accelerated streambank erosion; both riparian habitats and filtration services for non-point source pollution provided by streamside vegetation is reduced or lost.

*By using the 2002 Census of Agriculture – County Data, and calculating the percentage of the targeted watershed in the counties, watershed land-use/cover can be inferred.

Ecological Context

The Niangua darter is federally listed as a threatened species and populations have been in decline for several decades. Niangua darters occur no where else in the world, only in eight small basins which drain to the Osage River in south central and southwest Missouri. Niangua darters have never been abundant or widespread in distribution but portions of its range have been further reduced by the construction of reservoirs used to conduct electricity and provide flood control. The habitat required by Niangua darters for continued survival includes clear upland streams that are small to medium in size with slight to moderate current (the Maries River is 59 miles long). Stream flow must be continuous with silt free gravel and rock bottoms. Current threats to Niangua darters in the Maries River sub-basins which are the focus of this proposal includes loss of riparian habitat; fertilizer and pesticide run-off; increased nutrification from livestock and human waste; and excessive stream sedimentation and bed loads of gravel. Conservation practices that address the above threats will not only benefit Niangua darters and their habitat, it will benefit numerous other declining aquatic species and declining riparian dependent species.

We worked with the Missouri Department of Conservation and the U.S. Fish and Wildlife Service to help us determine other species of concern. The following 13 species of concern are found in the Maries River Watershed. Niangua darter (listed as threatened under the Endangered Species Act (ESA)), plains topminnow (listed as S3 in Missouri or vulnerable because it is uncommon or found only in a restricted range), western silvery minnow (listed as S2 in Missouri or imperiled because of its rarity or factors which make it vulnerable to extirpation) ghost shiner (S2), grotto salamander (S2), Ozark clubtail (S3), Westfall's snaketail (S3), black sandshell (listed as S1 in Missouri or critically imperiled due to rarity or factors which make it vulnerable to extirpation from the state), pale avens, western wallflower (S3), and American bald eagle (listed as threatened under the ESA). Nine out of the 13 species of concern rely on aquatic habitats. Landowners are working to preserve this habitat for all of these species but knowing that the Niangua darter occurs no where else in the world and occurs predominantly on private lands, it is up to us to make a difference while continuing to preserve our heritage. There are also birds like red-headed woodpecker, prothonotary warblers and orioles that rely on stream side habitat.

Economic Context

The Missouri cattle industry provided nearly $2.4 billion worth of economic activity in 2002. Obviously, cattle production is an economically important industry to the state of Missouri. In 2002, nearly two-thirds of Missouri's 107,000 farms raised cattle. The Missouri cattle herd is estimated at 4.5 million head which ranks sixth in the nation. The Missouri beef cattle herd is estimated at 2.1 million head which ranks second in the nation. Cattle and calves sales produced $821 million, or 19% of the state's total farm cash receipts. An additional $1.5 billion worth of economic activity was created mostly in rural areas of the state. According to the 2005 *Missouri Beef Audit* produced by the University Extension, University of Missouri, "Beef cattle have been and likely will continue to be the most prevalent agricultural enterprise in Missouri's economy".

Beef cattle are located in every county of the state; however, highest populations are located in the south central and southwest Missouri where Niangua darter and many other declining aquatic species occur. Consequently, the beef cattle industries impact to the local economy in the targeted sub-basins is critical. An estimated 73%** of the farms located in the targeted sub-basins are beef cattle farms which is approximately 10% more than the state average. During 2002, cattle and calves sales produced an estimated $6.4** million in economic activity in the targeted sub-basins.

**By using the 2002 Census of Agriculture – County Data, and calculating the percentage of the targeted watershed in the counties, agriculture economic impacts can be inferred.

Current Partnerships

The Maries River Watershed has been a priority watershed to conservationists for many years. During the past 2 ½ years, conservation agencies, non-governmental organizations (NGOs), and landowners have also expressed their support to improve the Maries River Watershed. Three Special Area Land Treatment (SALT) projects have been sponsored and recently awarded to the targeted sub-basins. Agencies providing letters of support for the SALT projects includes the following: Osage and Maries counties Soil and Water Conservation Districts (SWCD); U.S. Fish and Wildlife Service, Missouri Private Lands Office (Service); Farm Services Agency; Natural Resources Conservation Service (NRCS); Missouri Department of Natural Resources (DNR); Missouri Department of Conservation (MDC); University of Missouri Extension, and the Meramec Regional Planning Commission. Non-governmental-organizations providing letters of support includes the following: Maries/Osage Cattlemens' Association; Osage Independent Pork Produces; the local chapter of the National Wild Turkey Federation (NWTF); and the Conservation Federation of Missouri.

Local partnerships and support for the project is growing. In an attempt to secure targeted funds that benefit Niangua darter habitat and landowners, a landowner committee (Committee) was formed in January 2006. The goal of our Committee is to work collaboratively with partners including the local SWCDs; NRCS; DNR; MDC, and the U.S. Fish and Wildlife Service to address issues affecting our land, and consequently, our livelihood. Our 10 member committee is composed of five agricultural producers living within the targeted sub-basins; Maries and Osage counties SWCD board members that are landowners; SWCD staff; and a MDC employee. SWCD and MDC staff serves as technical advisors.

Intended Conservation Impact

Conservationists (i.e., the Missouri Department of Conservation, U.S. Fish and Wildlife Service and the Natural Resources Conservation Service) initially focused on The Maries River Watershed because of the presence of Niangua darters, historical and current land-uses impacting natural resources, and lack of remaining riparian corridors. These acute challenges, once met, could represent land management practices that could be applied to other neighboring watersheds facing similar challenges. In fact, two landowners from the neighboring Little Bourbeuse River and Brush Creek (LBB) Watershed Committee were requested by the Maries and Osage counties SWCDs to share their experiences of working with agencies and cost-sharing opportunities. **The meeting was very important to the U.S. Fish and Wildlife Service because the LBB Committee members described their positive experiences including the use of their PSG that was awarded in 2004.** With this proposal, Our Maries River Watershed Committee seeks to supplement existing efforts and capitalize on the current high landowner demand for implementation of Best Management Practices (BMP's) and riparian corridor restorations by acquiring financial assistance for landowners within the three targeted sub-basins.

These three sub-basins are each located within or upstream from important Niangua darter habitat. In these sub-basins, landowners are able to affect their own land and stream corridor and simultaneously improve habitat and water quality downstream. The scale lends itself not only to tangible ecological impacts, but also social impacts as the benefits of implemented BMP's are readily observable by adjacent landowners. Given the relative absence of publicly owned conservation land in the targeted sub-basins, it is only through cooperation with private landowners that conservation for all of these declining species is possible.

Current Funding Sources

The three targeted sub-basins have been awarded $2 million of SALT funds within the past 2 ½ years through the DNR. The local SWCDs use the SALT program to work with landowners to reduce soil erosion on crop, pasture, and woodland and to target special assistance in a priority watershed. Remaining funding is $1.1 million of SALT funds in the target sub-basins until 2010.

Additional incentive funding sources for the targeted sub-basins includes the following: U.S. Fish and Wildlife Service through the Partners for Fish and Wildlife Program; MDC – state cost-share; and NWTF. Providing a specific amount of money available for the targeted sub-basins would be speculation at best. In-kind contributions have been pledged from the following organizations: University of Missouri Extension, NWTF, County Commissions, Cattlemens' Association, Quail Unlimited, MFA, and MDC. Again, assigning a value to those contributions would be speculative. Additional funding sources for the three targeted sub-basins have not been identified or pursued.

Positive Impacts to Other Programs

If awarded the PSG, more riparian corridors will likely be established and/or protected. The establishment of 380 acres of wooded riparian corridors is the goal of the SALT projects. **To date, not a single landowner has planted or fenced out riparian corridors since the SALT projects started even though cost-share is available for those practices.** Asking landowners to convert some of their most fertile pasture and hayground into trees can negatively impact farm income even if "traditional" cost-share and incentive payments are provided. Even the USDA's Continuous Sign-up CRP has not met expectations in the three targeted sub-basins. However, PSG experience in the neighboring Little Bourbeuse River, Brush Creek and Lick Creek watersheds project has demonstrated that landowners are willing to convert some of their riparian pastures and hayground into trees if alternative watering sources and reinforced stream crossings are cost-shared at a true 90%. If awarded a PSG, the SALT projects riparian goals will have a chance to be met or exceeded; landowners will likely pay more consideration to enrolling into Continuous Sign-up CRP; and perhaps most important, landowners can reach their land-use goals while improving natural resources.

Project Statement of Work

The project's objectives are threefold

Improve water quality and aquatic habitat for Niangua darters through implementing technically and socially beneficial Best Management Practices in three sub-basins in the Maries River Watershed.

Protect and restore riparian and in-stream habitats by reducing streambank erosion rates; regulating water temperatures; providing in-stream cover and carbon; reducing stream sedimentation and bed load, and filtering nutrients.

Demonstrate how an ecosystem based approach to land management can benefit both private landowners and Niangua darters.

During the past 2 ½ years, 91 landowners have installed conservation practices on their property using SALT funds. (See enclosed completed Maries River Watershed projects map – page 14). Currently, 112 additional landowners have signed-up to implement new projects on their land within the three targeted sub-basins. Specific landowner names are not provided because there are so many. These landowners are cattle producers that are working with their local SWCDs and NRCS staff to develop and implement customized planned grazing systems. Project plans utilizing PSG funds will be agreed upon BMPs that have been developed with both the producer and the ecosystem in mind. The practices will be put in place by the landowners or a hired contractor with on-going technical oversight by local SWCD, NRCS, and MDC staff. Further coordination will occur between local MDC and U.S. Fish and Wildlife Service personnel throughout the project. A brief description of practices follows:

Riparian Corridor Reestablishment (RCR):

The first step in this process usually involves fencing out the corridor-to-be. This distance is arrived at based upon stream size. For the majority of the streams in these sub-basins, fifty feet on both sides of a stream (if both banks are owned by a cooperator) is the minimum acceptable corridor width. Once livestock have been excluded, conservation agencies have found the best success in tree plantings that took place at least a year following the exclusion. This being the case, the Committee will seek to find funding for subsequent tree plantings in riparian corridors through a funding source other than the PSG proposal.

Streambank Stabilization (SS)

Accelerated streambank erosion is occurring in much of the Ozarks including the Maries River Watershed. In many cases, 1st, 2nd, and 3rd order streams with excessive erosion rates can be repaired by planting riparian corridors and installing fence. Streams that are 4th order and larger with excessive erosion rates may require biotechnical and/or rock based streambank stabilization practices in conjunction with riparian corridors and fencing. All potential streambank stabilization sites will be evaluated by stream certified MDC employees and U.S. Fish and Wildlife personnel. The establishment and/or fencing of riparian corridors will be required to receive PSG streambank stabilization assistance.

Alternative Watering Systems (AWS)

When riparian areas are fenced, cattle lose access to their primary source of water. Providing an alternative watering system is critical. These systems can take a variety of designs. Generally, the new source of water would be either a pond or a well. Water would be made available to each established paddock through plumbing, including an electrical pump. To further control erosion, tanks are installed in conjunction concrete pads or

with GeoWebs. GeoWebs are synthetic matrixes that are then filled with gravel to create an erosion resistant foundation for watering tanks. In some cases, reconditioning pre-existing ponds is the preferred method of providing water. This type of work will most likely always require a contractor. The establishment and/or fencing of riparian corridors will be required to receive PSG alternative watering system assistance.

Reinforced Stream Crossings (RSC)

Working in the headwaters of rivers means pastures are frequently bisected by streams of varying sizes. In order to maintain access to the entire property while minimizing the erosion that can result from stream crossings, RSCs are installed. These crossings are designated points that are selected based on landowner need and erodibility of the streambank. Crossing points are then made less erodible by the installing a RSC. On large streams, crossings are constructed using appropriate sized rock for the site. On small streams, Geo Webs filled with appropriate sized rock for the site is used. RSCs are labor intensive because the crossings are keyed into the stream bed and bank and will likely usually require hiring a contractor. The establishment and/or fencing of riparian corridors will be required to receive PSG reinforced stream crossing assistance and the installation will be sensitive to time of year (i.e., spawning) and will follow all state and federal regulations.

Warm Season Grass / Forb Reestablishment (WSG):

Establishing a diverse mix of native grasses and forbs is a time and labor intensive practice. Prior to seeding, the cool season pasture must be prepared. Best success has come from herbicide applications followed by a prescribed burn. In some cases, burning is not an option, when this is the case, a second herbicide application can serve the same purpose. Once prepared, the site is seeded with a diverse mix of local ecotype native prairie species. These seeds are expensive and require specialized equipment for seeding. Once seeded, the site must be left to grow for three years after which time, it is again burned. Additionally, for this proposal, the landowner will be responsible for seeding in most cases. Herbicide application will most likely be contracted.

Specifically, we seek to accomplish these objectives by achieving the following goals:

- Stabilize 3000 feet of eroding streambank
- Convert 50 acres of non-native cool season pasture to native warm season grass/forb pastures.
- Reestablish 30 acres of riparian corridor.

- Fence out 24,000 feet of stream/riparian corridor.
- Create 10 reinforced stream crossings.
- Develop or improve 10 Alternative Watering Systems.
- Generate word-of-mouth outreach regarding rare species conservation efforts on private lands in response to successful implementation of the projects above.

Many of these practices including streambank stabilization, reinforced stream crossings, and alternative watering systems represent permanent shifts in land management. Others practices such as the reestablishment of riparian corridors, fencing, and conversion of fescue pastures to native plantings are reversible, but only at great effort. To ensure the persistence of all installed practices, our Committee has agreed that a 10 or 15 year agreement will be made between the U.S. Fish and Wildlife Service (through the Partner's for Fish and Wildlife Program) and the landowners before any work is initiated. The 10 or 15 year agreement lifespan depends on the type(s) of practices installed; however, the practices installed are anticipated to far outlive the signed agreement. Once a customized landowner project plan/agreement is signed by the participating landowner, the project will be completed within six month depending on the practice, weather, and season. Our Committee has requested MDC staff to coordinate the installation of all projects. MDC has agreed to do so, and provided the two year estimate for project duration.

Considerable effort has been invested by the local SWCDs, Committee, local U.S. Fish and Wildlife Service, and MDC personnel towards the development of relationships with other landowners in the area as is evident by the large number of landowners already agreeing to cooperate. In order to capitalize on this effort, the Committees' overwhelming preference would be to receive full funding for this proposal. However, if this is not feasible due to funding shortages, the Committee would respectfully request 75% of the total requested funding believing this to be the minimum amount adequate for the maintenance for current landowner enthusiasm.

Project Budget:

BMP and PSG Cost	**In-Kind Match**
Streambank Stabilization Stabilize 3000 feet of eroding streambank @$25/ft.=**$75,000**	Stream channel survey and engineering design @$3.33/ft.=**$10,000**
Warm Season Grasses/Forbs 50 acres of cool season pasture conversion to native season grass/forbs@$400/acre (includes cost of local ecotype seed mixes and two herbicide applications)=**$20,000**	Fire break establishment by disking $35/hour for 2 hours for each of 7 wsg pastures=$490 Volunteer burn crew 7 burns (10 crew members/burn)(4 hours/burn)(17.19 per volunteer hour)=$4813 50 acres seed drilled $13.25/acre=$663 Subtotal=**$5966**
Alternative Watering System 15 tanks @$500/tank=**$7500** 20 GeoWebs@$120ea.=**$2400** Rock Materials@$100/GeoWeb (20GeoWebs)=**$2000** Installed $75/hour/GeoWeb =**$1500** 15,000 ft of trenching @$1.80/ft=**$27,000** 4 ponds @$9,000 ea=**$36,000** 4 wells @6,000ea=**$24,000** Subtotal=**$100,400**	
Riparian Corridor Reestablishment	Fencing 24,000 ft. @ $0.50/ft=**$12,000**
Reinforced Stream Crossing 10 @$3000ea.=**$30,000**	
Total BMP costs: **$225,400**	MDC and SWCD staff time=**$22,000** (technical assistance, project plan development, and oversight throughout project and beyond)
Total PSG Contribution: **$175,404 (78%)**	Total In-Kind Match: **$49,996 (22%)**

Total Estimated Project Cost: $225,400 (100%)

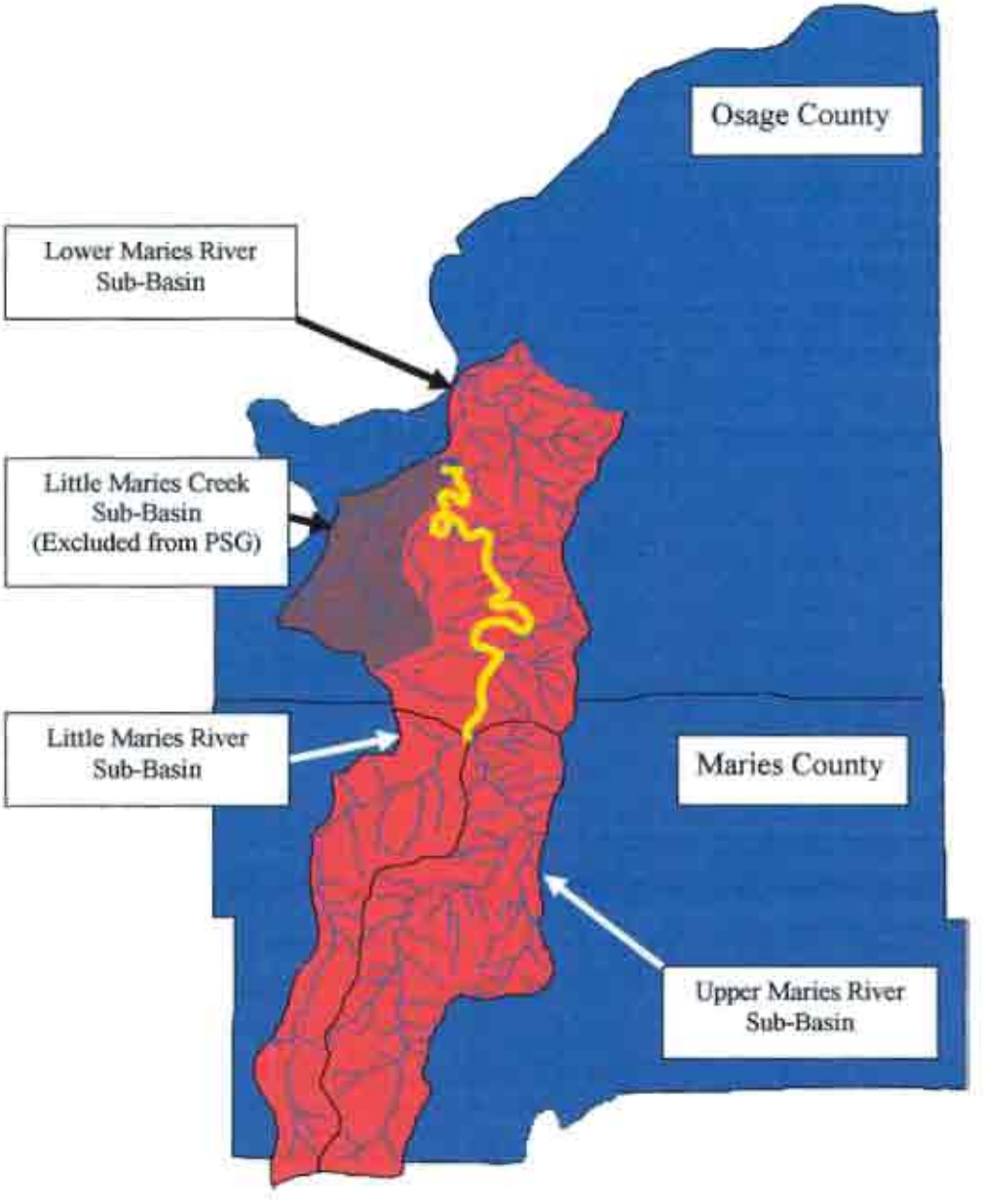
All farm practices cost estimates have been based on *2003 Custom Rates for Farm Services In Missouri*, published by M.U. Extension, University of Missouri-Columbia (available at http://muextension.missouri.edu) or previous MDC/FWS experience for cost of specific practices installed in the project area. The value of volunteer hours is based on the independent sector for 2003 (available at http://www.independentsector.org).

Supporting Documentation:

Much of the ecological and land use information was obtained from the Watershed Inventory and Assessments which can be found online by visiting:

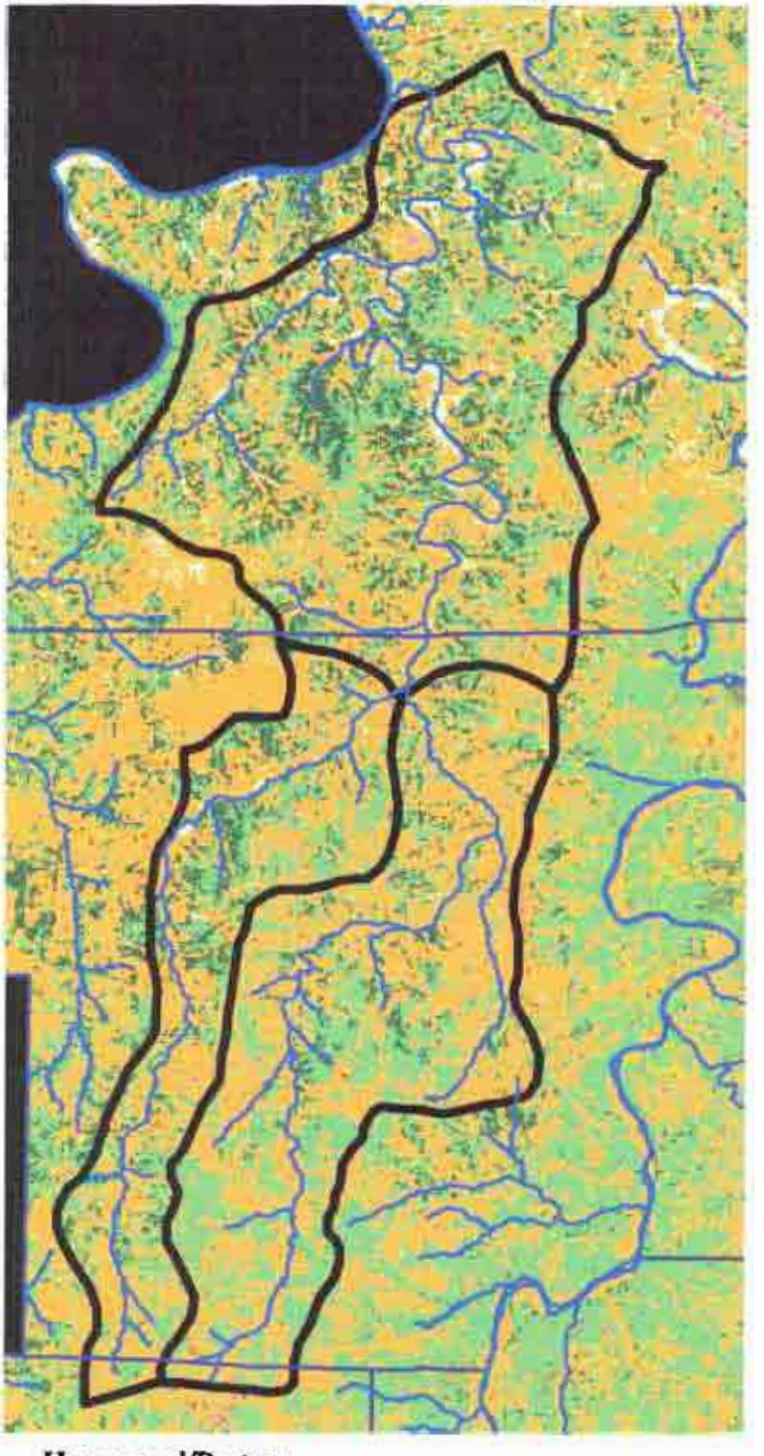
http://mdc.mo.gov/fish/watershed/eosage/contents/300cotxt.htm

Maries River Watershed Site Map
By Sub-Basins/Niangua Darter Range



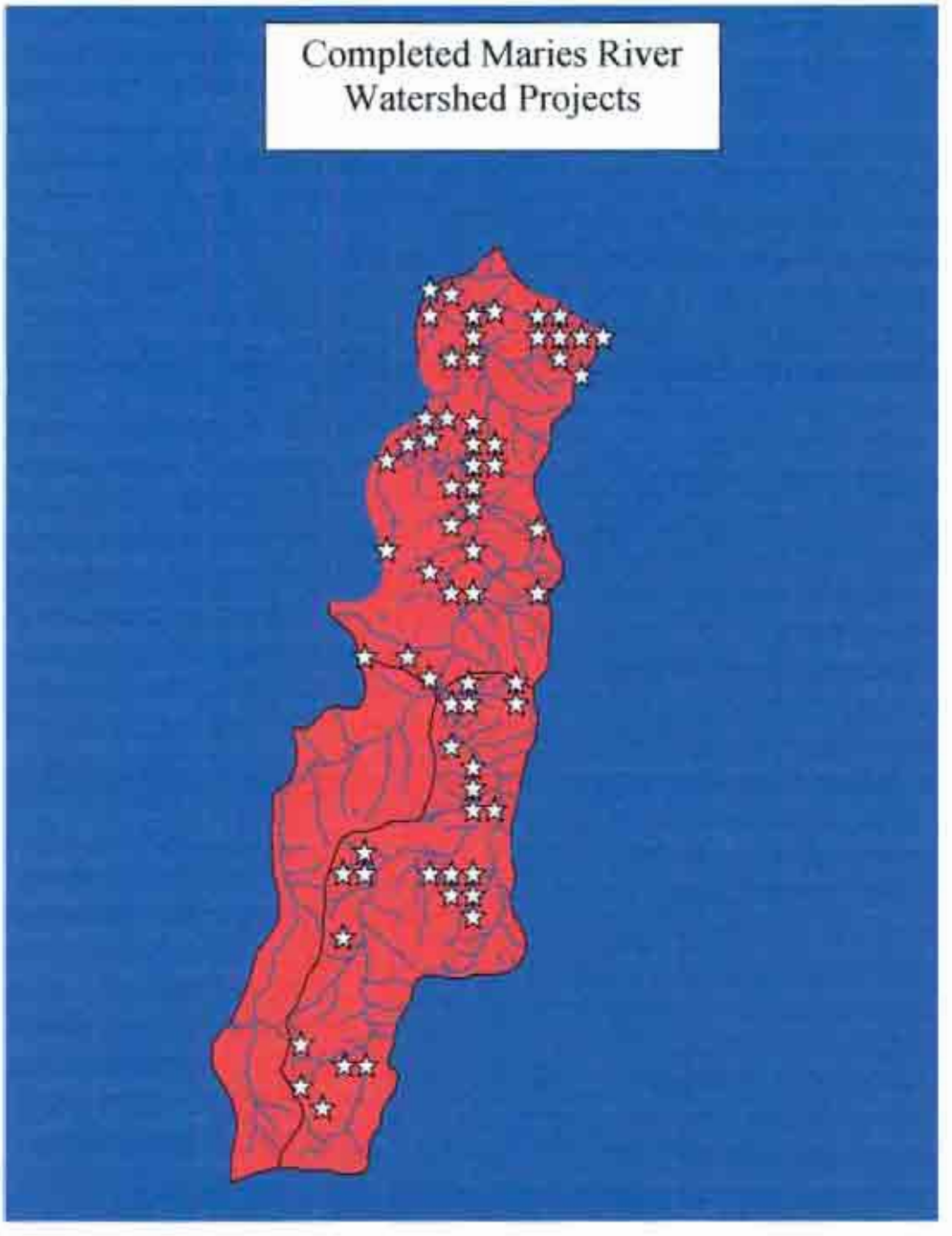
- Niangua darter range

Maries River Watershed
Current Land Use Cover



- Hayground/Pasture

- Forest/Woodland



The above map was produced by MDC Fisheries Management Biologist, Rob Pulliam with assistance from the SWCDs. All of the projects indicated on this map have been completed within the past 2 ½ years and are not a part of this grant proposal. The map is provided in order to visually represent recent landowner interest in three targeted sub-basins, and to reinforce the fact that current landowner demand is in response to previously satisfied cooperating landowners. Though not depicted, there are also 3