

Lower Meramec River Source Water Protection Strategy Exchange Report



PREFACE

The Trust for Public Land (TPL) and the United States Forest Service (USFS) began work on a project in the fall of 2007 to demonstrate the value of protecting forest lands in source watersheds. They evaluated subwatersheds throughout the Upper Mississippi River Basin to select a midwest demonstration project. Given the capacity of the Open Space Council of St. Louis (OSC) as a strategic partner, as well as the high priority nature of the source water and its simultaneous susceptibility to development pressure, the Lower Meramec River Basin was selected as the next demonstration site. The primary purpose of this demonstration project was to show how land/forest protection and management strategies can be utilized in watersheds to protect and improve raw drinking water quality.

The Meramec River Tributary Alliance – a collaboration of about 30 agencies and organizations with an interest in the river – worked with USFS, TPL, and OSC to identify areas within the watershed most likely to benefit from conservation, restoration and stormwater best practices. MRTA determined that the study area would be: Fox Creek, Brush Creek, and Hamilton Creek subwatersheds of the Lower Meramec River Basin encompassing about 130 square miles. The downstream water intakes serve over 200,000 people in the St. Louis metropolitan area. The study area encompasses parts of three Missouri counties: St. Louis, Franklin, and Jefferson.

TPL, together with project partners, developed maps that identify target areas for conservation, restoration and stormwater objectives. USFS and TPL worked with the Tributary Alliance to identify additional questions that must be tackled in order to develop an integrated approach to on-the-ground implementation in the watershed.

These questions were examined by the Strategy Exchange Team (sometimes referred to in this report as “outside experts”) during a five-day visit to the study area between May 11 and May 15, 2009. The Strategy Exchange Team was an interdisciplinary team of 4 professionals who had developed successful programs in other watersheds and wanted to share their skills and experiences with colleagues facing similar challenges. The team followed a schedule of community gatherings with local experts to discuss watershed issues. Tributary Alliance members and others worked closely with the Exchange Team, and together came up with strategies contained in this report.

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**Lower Meramec Source Water Demonstration Project Report:
Strategy Exchange Team Recommendations**

I. PROBLEM STATEMENT

I.A. Ecological Concerns = Water Quality Concerns

The primary problem to be addressed by any actions taken with respect to the Lower Meramec River Tributary (LMRT) watersheds is the same problem that all watersheds face – the natural functions and benefits of a watershed become significantly degraded when combined with human influence and development, unless proactive efforts are made to protect the watershed's functions and benefits. While the LMRT watersheds are generally considered to be in good condition, especially considering their proximity to a large urban area, evidence of degradation, in the form of increased erosion, decreased biodiversity, changing flow dynamics, and other effects has already been clearly documented.

For the LMRT watersheds, the functions and benefits that face the threat of degradation are numerous, but can be summed up in two main elements. The first involves the Meramec River's use as a drinking water source for a large population (about 200,000 people) in the metropolitan St. Louis area. The surface water intakes for Missouri-American Water Company's drinking water treatment operation are located a short distance downstream of the LMRT watersheds. Therefore, the quality of the water that leaves the LMRT watersheds is a direct contributor to the quality of the drinking water produced, and to the viability of the Meramec River as a continued drinking water source. The second element is the overall ecological value of the LMRT watersheds themselves, particularly to the residents who live in them. Much of the appeal of this area lies in its rural character, its forests and open spaces, and its healthy streams. These qualities are both contributors to and results of the overall health of the LMRT watersheds.

These two elements of the functions and benefits provided by the LMRT watersheds are somewhat exclusive in the sense that each element is experienced by a different population. While there is some overlap, most of the people who use the drinking water produced from the Meramec River do not live in the LMRT watersheds – they live farther downstream. Likewise, much of the population residing in the LMRT watersheds utilizes private wells for drinking water, so do not utilize the Meramec River as a drinking water source. However, while they may be experienced by different groups of people, these two elements are by no means unrelated.

Preserving a watershed's functions as a drinking water source area requires the same efforts and practices necessary to preserve a watershed's ecological functions and benefits. This synergy has important implications for the strategies employed to protect these watersheds, and provides opportunities for partnerships between all the stakeholders in the quality of the LMRT watersheds.

I.B. Need for Leadership and Grassroots Involvement

During the Strategy Exchange, the "outside experts" heard from many local experts on their agency's or organization's experience with topics related to watershed protection. In the course of field visits and in the roundtable sessions people who live and work in the project area provided insights into the barriers they encounter in their efforts to protect and restore the natural resources of the Lower Meramec. Our analysis suggests that lack of cohesive, organized leadership is one of the fundamental sources of these barriers.

It was clear that there are many capable and committed individuals who are working hard within the state and local government departments connected to conservation and water quality and that area nonprofits have excellent, dedicated staff. In addition, we were impressed by the caliber of people and products associated with the LaBarque Creek Watershed Association. Nevertheless, the depth and breadth of leadership and engagement needs to be substantially increased in order to achieve meaningful shifts in public policy and accomplish large-scale conservation and restoration initiatives.

On the surface it might appear that change can occur through local government intervention and investment. And, ultimately conservation of the areas' land and water resources does depend on municipal actions. But those actions will require difficult political choices on the part of elected officials. Whenever and wherever there is a confluence of issues related to land, water, regulation and money elected officials tend to become very cautious. Citizens and community leaders will have to convince elected officials to think big and do formerly unthinkable things such as campaign for voter authorization for a bond to pay for acquiring conservation easements and funding septic upgrades. **Therefore, there is a strong need for grassroots organizing and leader mentoring in order to build the political momentum that will make implementation possible.**

The Tributary Alliance provides a good core of leadership and offers potential for expansion. It is not, however, likely to be very influential with local officials. The agencies represented are very important for their combined expertise, funding, relationships and possibly enforcement authority. The nonprofit participants bring a whole suite of skills and capabilities that nicely complement those of the agencies. **Yet none of the Alliance members is currently able (by mission, fiscal abilities, or staffing levels) to lead implementation of a multi-pronged strategy for protecting or improving water quality in the Lower Meramec. A cohesive vision is needed for the target watersheds – one that can unify the Alliance and help motivate its members.**

I.C. Importance of Cooperation

Cooperation among groups in the Lower Meramec Watershed, via the Meramec River Tributary Alliance, will help develop a common strategy for information collection and analysis as well as a common understanding of the roles, priorities, and responsibilities of all stakeholders, organizations and governmental entities and thereby avoid duplication of efforts and conflicts of interest. Water quality problems, like the accumulation of pollutants or nonpoint source pollution can be addressed collectively and at the watershed level to identify the most cost-effective pollution control strategies to meet these clean water goals.

Efforts done at the watershed level are appropriate because they are readily identifiable landscape units with readily identifiable boundaries that integrate terrestrial, aquatic, and geologic features. Focusing on the whole watershed helps reach the best balance among efforts to control point source pollution and polluted runoff as well as protect drinking water sources and sensitive natural resources.

The Meramec River Tributary Alliance through increased organization and cooperation can reach its full potential in 1) Aligning and assigning roles and responsibilities based on the different organizations capacities, 2) Identifying and prioritizing water quality problems in the watershed, 3) Developing increased public involvement including help in forming local watershed partnerships, 4) Coordinating activities with other agencies, 5) Defining problem

areas and measuring success through increased and more efficient monitoring and other data gathering, 6) Developing and implementing public education campaigns designed to give a consistent message throughout the watershed, and 6) Coordinating regulation and conservation efforts.

A fully organized Alliance will allow for the close cooperation among local citizen groups, local governments, other state agencies, and federal agencies and allow a focus on those controls necessary to produce measurable improvements in water quality. This also results in a more efficient process: It encourages agencies to focus staff and financial resources on prioritized geographic locations and specific goals and projects thereby avoiding duplication of resources and funding and allowing coordination between agencies and individuals with an interest in solving water quality problems.

I. D. Need for Education and Outreach

Many things are going right for the lower Meramec and most of the elements are in place to achieve the goal of sustaining and improving the quality of LMRT waters (e.g., technical expertise, organizational structure). ***There are examples of successful partnerships and cooperatively-generated action plans in place (e.g., LaBarque Creek Watershed Conservation Plan), but what appears to need reinforcement and invigoration is transferring these successful examples to other watersheds and communities, finding the resources to implement action plans, and getting the grass roots support and political will to make significant changes in ordinances, priorities, enforcement, and individual action.*** As was quoted in the Strategy Exchange background materials, “We have the expertise, but we are not reaching the people.” Barriers identified by people participating in the Strategy Exchange included:

- It is difficult to reach people, particularly in larger watersheds. This is particularly true in the areas where many residents are commuting to St. Louis to work. This is compounded by a lack of agency staff and funding for education and outreach.
- There are a number of overlapping organizations trying to get messages out to people. At the same time, in the case of overlapping jurisdictions (e.g., city/county), there is the potential for issues regarding whom is in control of regulations.
- There is a general lack of public understanding of the sensitivity of the resource and the potential costs of inaction. This is manifested in a reluctance to spend money for services that benefit the environment, such as stormwater fees or septic system maintenance.

With 33 subwatersheds draining directly to the river, 3 counties, and multiple municipalities, as well as unincorporated areas, coordination and cooperation take substantial, intentional effort. The major cross-cutting challenges identified in the Issues Report prepared by the Trust for Public Land and Open Space Council, namely policy implementation hurdles, a need for landowner and developer education and outreach, better agency and organization collaboration, and better funding, all require a strong, coordinated, proactive approach to public outreach in order to succeed.

Though successful coordination and shared goals at the organizational level are critical to implementing solutions, adequate funding and a knowledgeable, willing citizenry are also essential. At this point it appears that most of the new developments that are contributing to stormwater and habitat stresses to the river and its tributaries are being designed, built, and perhaps occupied by people who may not be aware of the ecological value and fragility of the

resource. It was not apparent based on the supporting documentation that the panel received that any research has been done to evaluate citizen attitudes or behaviors, so this statement is somewhat speculative at this point.

Although Missouri has an excellent volunteer stream monitoring program, the data collected through this program could be used more effectively for increasing citizen awareness and perhaps for tracking regional changes in stream water and habitat quality caused by land use change.

II. OVERARCHING SOLUTIONS SUGGESTED

II.A. Cooperation

The LMRT watershed comprises three counties and numerous small cities underlining the **need among all the agencies within the watershed to develop a method of cooperation and regular communication** to allow for 1) Sharing of information, 2) Coordination of efforts in the enforcement of the regulations designed to protect water quality, 3) Finding funding needed for enforcement of existing and new regulations, and 4) Working for passage of any needed legislation both in and beyond the watershed

II.B. Leadership

As noted above, the lack of a clear organization to champion implementation of LMRT watershed protection efforts is an important problem to solve. However, picking a group or creating one and saying, “Go,” is not a sufficient solution. There are several key steps involved for the stakeholders in the LMRT watersheds that must be undertaken in order to develop a strong and effective leader. **The first step is to create or affirm a watershed vision.** Clear goals need to be defined. This report may be a key part of that step, but it is not the only part. Stakeholders will need to reach some level of consensus on the desired outcome for the watersheds.

Once goals are defined, the stakeholders need to develop a structure for implementation. Who is best to lead this effort? It may make sense for an existing organization, such as the Meramec River Tributary Alliance to take on the leadership role. Having a single organization in a leadership role ensures that there is a responsible party that can focus very specifically on implementation efforts, but it can lead to a lack of participation or interest by other organizations. Alternatively, it may make more sense to use a model of shared and distributed responsibility. With this model, different organizations take on different aspects of the leadership responsibilities through a formal agreement, which allows the stakeholders to take advantage of each organization’s strengths. There are several different models of leadership. It’s important to choose the model that is most amenable to the stakeholders and appropriate for accomplishing the consensus goals. **It is recommended that this issue be carefully considered – securing the assistance of a professional facilitator to help identify the roles for individuals and organizations in the leadership structure may be worthwhile.**

II.C. Education and Outreach

Given the difficulty of finding sustainable funding and of reaching the public with conservation messages, it is important that the multiple jurisdictions concerned with the Meramec River watershed find ways to work together to reduce inefficiencies, develop shared messages, and

fine-tune their education and outreach efforts to target specific interest groups with messages and programs tailored to their attitudes and behaviors. This cooperative effort would also be the vehicle for applying for the grant funds that would be necessary to accomplish the goals outlined in this report.

An important tool for disseminating information to the public, as well as communicating among watershed partners is a “watershed community” Web site. Many groups of seemingly disparate and disjointed organizations and governmental entities have been able to coalesce around interactive Web sites.

The Panel recommends that Community-Based Social Marketing be considered as a framework for designing a cooperative, unified educational program focused on improving land use behaviors and personal choices, ultimately leading to better stewardship of aquatic resources. **A better understanding of the barriers to behavior change is an important prerequisite to a successful outreach program. It is also important to develop some sort of evaluation program to document changes in attitudes and behavior as a result of education and outreach.**

Missouri is ahead of most states with its volunteer stewardship and monitoring programs. The Missouri Department of Natural Resources (MDNR) Volunteer Water Quality Monitoring Program and the Missouri Stream Teams are excellent ways to involve and educate citizens. **The Panel recommends promoting these excellent programs throughout the study area and encourages participation in a new program titled Cooperative Stream Investigations (CSI).** Experienced participants in these programs should be enlisted for peer-to-peer mentoring of new teams.

Demonstrations sites should be selected and developed with behavior change education in mind. Demonstration sites including innovative stormwater and wastewater management technologies, private woodlot management, environmentally sustainable lawn and garden care, and other sustainable practices could be used for educational workshops.

II.D. Demonstrations

There are a variety of interpretations of the word “demonstration” in the context of this project. In the broadest sense, the entire project demonstrates how recent advances in GIS technology can be combined with hydrological data to evaluate conservation and restoration priorities in a watershed. Bringing this cutting edge methodology to the Lower Meramec allows interested parties to quickly determine which lands contain resources that need to be retained or restored if residents want to maintain a clean, drinkable, fishable, swimmable Meramec.

The maps created in Phase I, using the “priority index” methodology, can be a powerful tool for building partnerships, support and funding for implementation. **A well-articulated and comprehensive acquisition plan for the Lower Meramec should be formulated – possibly based on the recommendations in the report – to guide additional prioritization among the parcels shown on the maps as being important for water quality protection.** Currently over 12,000 acres are considered high priority for either conservation or restoration. Completing a vision will provide additional criteria to use as finer screens for determining which tracts deserve/require immediate attention. The process of creating this project selection system will demonstrate to the public and municipalities where to focus their time and money for maximum benefit. **Implementation partners will need to investigate each of the priority parcels to determine which ones offer the best combination of natural features, funding leverage and landowner motivation.**

Although research from around the country has shown that protecting large forested areas provides the greatest returns on investment in terms of water quality and quantity, conservation alone will not assure the long-term water quality in the Meramec. Stormwater, sewage and other forms of pollution from existing and new developments, agriculture, roads, landfills and municipal treatment facilities can all cause significant degradation of surface and ground waters. Accordingly, the panel recommends that implementation include methods to control pollutants. Many of these methods can be demonstrated to important audiences ranging from **homeowners to developers to public lands managers to elected officials. Sites selected as conservation and restoration targets may offer opportunities for testing and teaching about technologies that minimize or mitigate or fix stormwater and septic problems. In fact, the selection criteria could favor sites that provide demonstration opportunities.**

Of particular interest in site selection should be locations that would be suitable for a “conservation development” that would utilize careful site preparation, cluster design for the homesites and state-of-the-art stormwater management and septic treatment. Combining restoration with a demonstration-oriented development would be especially appropriate on a degraded or other cleared property.

In addition, the panel recommends securing a publicly accessible site suitable for educational activities. Especially valuable features could include exposed karst formations, springs or other visible features that can help explain watershed function and fragility.

Some of the important demonstrations will take place in existing developments or even outside of the study area. Several of the education and outreach activities described below need to be undertaken in neighborhoods where residents can see the results of improved handling of stormwater or upgrades of old septic systems.

Watersheds and communities in other parts of Missouri (including Table Rock Lake) and around the country have been testing new regulations, education initiatives, methods of controlling and cleaning run off, and alternatives to conventional septic facilities. The results of these experiments offer lessons for the study area’s leaders.

III. SPECIFIC RECOMMENDATIONS

III.A. Specific Recommendations for Wastewater

1. Challenges & Opportunities

The use of septic tank absorption fields in the soils of the study area is generally considered to be very limited due to the shallow depth to bedrock, steep slopes, and poor soils usually requiring the use of alternative treatment systems, such as Class 1 aeration units followed by drip irrigation lateral fields. The consensus of the stakeholders of the study area (who participated in the Strategy Exchange) is that current regulations dealing with the permitting, design and installation of on-site wastewater treatment systems is sufficient and that new systems are being installed that do allow for protection of ground and surface waters from pollution.

One of the key characteristics of the use of alternative on-site treatment systems is that they require ongoing management and maintenance. The U. S. Environmental Protection Agency (EPA) in its “Voluntary National Guidelines for Management of Onsite and Clustered

(Decentralized) Wastewater Treatment Systems” (produced March 2003 and available at http://www.epa.gov/owm/septic/pubs/septic_guidelines.pdf) states:

Few systems receive proper maintenance because homeowners are either unaware of the need for maintenance or find it a distasteful task. In addition, most regulatory programs do not require homeowner accountability for system performance after installation. Although it is difficult to measure and document specific cause-and-effect relationships between onsite wastewater treatment systems and the quality of our water resources, it is widely accepted that improperly managed systems contribute to major water quality problems. The *National Water Quality Inventory 1996 Report to Congress* states that “improperly constructed and poorly maintained septic systems are believed to cause substantial and widespread nutrient and microbial contamination to ground water.” Ultimately it is the absence of a comprehensive management program addressing each of these issues that prevents onsite and clustered (decentralized) systems from being considered as an effective and reliable wastewater treatment strategy. Consequently, the potential for health and water quality problems from poorly managed systems is increasing.

It is generally agreed in the study area that there is no regulatory requirement for the ongoing management and maintenance of on-site systems after installation. Without proper maintenance, the best designed and installed system will someday fail and pollute the environment.

Another concern is the hundreds, if not thousands, of ineffective septic systems (now old and failing) were installed before current regulations were in effect. The identification and remediation of these systems is essential to any comprehensive water quality effort. Again, EPA states in the management guidelines referenced above:

Unfortunately, many of the systems in use do not provide the level of treatment necessary to adequately protect public health or surface and ground water quality. Many were initially sited and installed as temporary solutions as a result of the perception that centralized treatment and collection would soon replace them. Comprehensive, life-cycle management did not play a role in the approval or the ongoing operation of many systems. More than half the existing onsite systems are over 30 years old, and surveys indicate at least 10 percent of these systems back up onto the ground surface or into the home each year. Other data have shown that at least 20 percent of systems are malfunctioning to some degree. In most cases the homeowner is not aware of a system failure until sewage backs up into the home or breaks out on the ground surface. In many places, local authorities lack records of many of the systems in the service area.

2. Recommended Strategies

(a) Work with the various on-site regulatory agencies to require ongoing maintenance of on-site wastewater systems. One method of insuring maintenance is the adoption of EPA’s Management Model 3: Operating Permits as outlined their management guidelines referenced above:

Model 3 - The Operating Permit Model ...A principal objective of this management program is to ensure that the onsite wastewater treatment systems **continuously** meet their performance criteria. Limited-term operating permits are

issued to the property owner and are renewable for another term if the owner demonstrates that the system is in compliance with the terms and conditions of the permit. In subareas where it is appropriate to use conventional onsite system designs, the operating permit may contain only a requirement that routine maintenance be performed in a timely manner and the condition of the system be inspected periodically. With complex systems, the treatment process will require more frequent inspections and adjustments, so process monitoring may be required....The operating permit provides a mechanism for continuous oversight of system performance and negotiating timely corrective actions or levying penalties if compliance with the permit is not maintained. To comply with these performance standards, the property owner should be encouraged to hire a licensed maintenance provider or operator.

It is recommended that a committee comprised of all the regulatory agencies meet and develop a model ordinance for requiring ongoing maintenance of alternative on-site wastewater systems and then the committee develop a plan to educate the public and elected officials that will allow passage of the model ordinance.

(b) Develop and work to obtain passage of an ordinance that will require the inspection of on-site systems at the time of sale of the property and will require repair or replacement of failing systems that would bring them up to current standards. Suggested ordinance language is contained in Appendix A.

(c) Produce a “Septic Systems Owners Guide” that can be distributed to property owners in the study area. Information on obtaining a “Septic System Owners Guide” as developed by the Minnesota Extension Service can be found at: <http://septicprotector.com/Education.html>.

3. Demonstration Ideas

(a) Develop a demonstration site utilizing a working alternative wastewater treatment system, and showcase it during field days and public educational events. An on-site demonstration site can be developed to allow for education of the public, regulators and on-site professionals on new alternative systems and on the maintenance required. Many times, manufacturers, distributors and installers will donate systems, equipment and labor towards such a project. Distribute the “Septic Systems Owners Guide” mentioned above at these events.



The following is an example of a highly successful public on-site education campaign. In 1995, Ken Olson of the University of Minnesota Extension Service started a community education program for homeowners in the Twin Cities metro area. These 2-hour classes teach homeowners the health, environmental and financial damages failing septic systems have caused, what a proper system is, and how to use and maintain those systems. The objective of each class is to show homeowners that properly designed, installed and maintained septic systems are better for the environment

and less expensive than sewage treatment facilities, but they must be properly used and maintained. Here is a sample course outline:

- Explain the difference between disposal of waste water and treatment.
- Explain how soils naturally perform the treatment process.
- Give the history and evolution of septic systems.
- Explain how a septic system functions and what causes them to fail.
- Describe steps that can be taken to prevent a failure.
- Share environmentally safe methods that may rejuvenate a failed system.
- When applicable, focus on how small communities can map out a plan of action to deal with sewage treatment and show them how not to get “taken to the cleaners”...a very common occurrence with smaller communities.
- Answer questions and facilitate discussion.

Because of the number of questions from the audience these classes typically run 2½-3 hours. Follow-up studies have shown virtually 100% of the people that attend these classes make changes in their life-styles to protect their systems and a large percentage voluntarily replace/repair their failing systems. Requests from small communities outside the metro area and in other states proved the nation-wide need for this educational process.

Having worked with the Extension Service on various educational programs, Jim vonMeier volunteered to take this a step further by working with Health Departments and communities performing these classes in other parts of the country. These agencies/groups welcome the help and have said this [educational process] is long over-due. Many have also stated homeowners seem to listen to an outside source more readily than a local source.

A balance of new regulations and increased public education can allow on-site wastewater systems to be properly designed, installed and maintained to allow for protection of ground and surface waters in the study area.

4. Funding Sources

(a) Encourage the Missouri Department of Resources (DNR) to use a portion of the State Revolving Fund (SRF) they receive from EPA for repair and replacement of failing onsite systems. For years EPA has encouraged states to use a portion of the SRF funds for repair and replacement of onsite systems. While many states have a successful onsite SRF program in place that is not the case in Missouri. Even though a substantial amount of Missouri SRF money was set aside for onsite systems, to date none of it has been spent for this purpose. DNR should be strongly encouraged to develop an onsite SRF program patterned off the successful programs in other states.

(b) Utilize the Rural Development 504 Loan/Grant Repair & Improvement Program for very low income home owners. Rural Development, a division of the USDA, has a program that can provide low interest loans or even grants for very low income homeowners if they meet the program requirements. Contact the local USDA, Rural Development office for complete program details.

III.B. Specific Recommendations for Stormwater

1. Challenges

General background information on the nature of common stormwater problems and management solutions for addressing them is provided in Appendix B. During the panel's meeting on stormwater issues during the Strategy Exchange Week, several specific challenges became evident.

(a) Varying regulations of varying effectiveness. The LMRT watersheds include at least seven (7) jurisdictions (Franklin County, Jefferson County, St. Louis County, City of Ellisville, City of Eureka, City of Pacific, and City of Wildwood), all with different post-construction stormwater management requirements. Some jurisdictions have robust stormwater regulations, effectively addressing all four levels of stormwater management, some have no post-construction stormwater management regulations, and some fall in between, regulating some levels of stormwater management, but not fully integrating all levels.

(b) Improper installation and maintenance procedures. Regulations are important to ensure proper design of stormwater management practices, but proper design does not ensure proper function. Appropriate installation and maintenance procedures must also be utilized for practices to function as designed. Lack of knowledge of installation procedures on the part of construction personnel and lack of knowledge of maintenance requirements on the part of property owners were both noted as important challenges to overcome.

(c) Redevelopment not included in stormwater management regulations. When stormwater managers discuss the issue of redevelopment, the phrase, "death by a thousand cuts," is often mentioned. The reason is that redevelopment is often not covered under traditional stormwater management regulations because it is either not addressed in the same manner as new construction, or it falls under the area threshold (1 acre for many jurisdictions in LMRT watersheds) for application of the regulations. While it is often not regulated for stormwater, that does not mean redevelopment does not affect stormwater quality. Redevelopment projects usually result in increased impervious surface and increased stormwater runoff compared to the pre-existing condition. If redevelopment is common in a community, the combined effect of each small individual redevelopment project can lead to problems with both stormwater quality and quantity.

2. Programmatic recommendations

(a) Regulation upgrades and coordination. It is important for each jurisdiction in the community to assess whether or not its stormwater management regulations are sufficient to do their part in achieving the goals set for the watershed. In order to meet those goals, each jurisdiction will likely have to develop stormwater management regulations that effectively address all four levels of stormwater management: flood control, channel protection, water quality, and natural resource protection as described in Appendix B. Redevelopment cannot be ignored either. Adjusting the regulations to address redevelopment, either directly, or by decreasing the minimum area threshold is another important step.

While each jurisdiction has different needs, goals, and enforcement capabilities, it is not necessary for each jurisdiction to individually develop its own stormwater regulations. Good examples of each level of stormwater management exist amongst the jurisdictions in the watershed, and much can be gained by coordinating efforts to develop sound stormwater management regulations. For example, the city of Wildwood has strong natural resource

protection and tree preservation regulations, the counties all require detention for varying degrees of flood protection, and the Metropolitan St. Louis Sewer District has adopted comprehensive water quality regulations. In addition to these local examples, CWP has developed a model stormwater management ordinance, which is included in the manual by Hirschman & Kosco (2008): *Managing Stormwater in Your Community: A Guide for Building an Effective Post-Construction Program*, available at: http://www.cwp.org/Resource_Library/Controlling_Runoff_and_Discharges/sm.htm.

(b) Improved inspection programs. While the panel does not have specific knowledge of the stormwater inspection programs of the jurisdictions within the LMRT watersheds, problems with installation and maintenance were noted as a considerable issue. Inspection is one method for addressing this issue. Inspection needs to happen during the installation process and after construction is complete. One effective inspection technique for construction is to require certification of stormwater management practices before they are approved and a certificate of occupancy is granted or the performance bond is released. After construction is complete, periodic inspections need to continue to ensure proper function of the practices. Since it is difficult for local governments to spend the time needed for this type of inspection, one solution would be to require periodic third party inspections as part of an approved maintenance plan. CWP's model ordinance provides further guidance on inspection and maintenance requirements for stormwater management practices.

(c) Education on the benefits and techniques of stormwater management to foster commitment. The programmatic stormwater management recommendations discussed above are relatively straightforward concepts, but that does not make them simple or easy to implement by any means. Ordinances do not get changed and inspection budgets do not get increased merely because a recommendation was made for improvement. For changes in stormwater management to occur, key stakeholders must be educated as to the benefits and techniques involved. The stakeholders include elected officials, local and county stormwater managers, construction personnel, and property owners. Each of these groups need to be made aware of the direct connection between stormwater management and watershed quality, as well as the techniques involved in successful stormwater management – elected officials, so they can change regulations to better address watershed goals; stormwater managers so they can implement the regulations; construction personnel, so they can improve installation techniques, and property owners, so proper maintenance of stormwater practices ensures continued function.

3. Demonstration

Demonstration projects can be an effective method for education of all the stormwater management stakeholders. They create the opportunity for people to see how a successful project can work. In the case of stormwater management, there are generally two types of demonstration projects, retrofits and new development.

(a) Retrofits. Stormwater retrofitting is a process used to implement stormwater management in locations where practices previously did not exist or were ineffective. Stormwater retrofit demonstration projects are typically installed on publicly owned properties, where property acquisition costs are not an issue and the visibility of the project will be high.

Watershed mapping, as has been undertaken for the LMRT watersheds is extremely useful in locating ideal sites for stormwater retrofit demonstration projects. The following table, excerpted from *Urban Stormwater Retrofit Practices*, Manual 3 in the CWP's Urban Subwatershed

Restoration Manual Series (available at <http://www.cwp.org/Store/usrm.htm#3>), provides a guide for using watershed mapping information to locate different types potential retrofits. The types of retrofits, as well as the process of retrofitting are further described in the Manual.

Table 4.11: Desktop Search Criteria for Different Retrofits	
Retrofit Location	What to Look For
SR-1: Existing Pond	Evaluate stormwater layer to find existing stormwater ponds with a contributing drainage area greater than 5 acres or Superimpose topography, drainage layers and aerial photos to identify low points in the drainage network where dry ponds may exist.
SR-2: Roadway Culvert	Superimpose topography and headwater stream layers (zero, first and second order) over the local and state road network to identify road crossings.
SR-3: Below Outfall	Superimpose publicly-owned stream corridor land parcels at least two acres in area with storm drain outfalls with a diameter greater than 12 inches and less than 60 inches.
SR-4: Conveyance System	Superimpose ditch lines, zero-order streams, conveyance easements or open channels with open land adjacent to the drainage network
SR-5: Transport Right-of-Way	Compare local, state or federal highway right-of-way layers against the stream or drainage network to identify open spaces one acre or greater or review highway agency GIS for existing stormwater infrastructure or treatment practices suitable for retrofitting.
SR-6: Large Parking Lot	Match large contiguous parking areas/rooftops greater than 5 acres in size with adjacent open land in public or institutional ownership, or owned by the same landowner.
OS-7: Hotspot Operation	Review land use maps to identify commercial, industrial, or municipal land uses or search permit databases to identify industrial operations that hold stormwater permits.
OS-8: Small Parking Lot	Search for parking lots less than five acres in size that are municipally or institutionally owned.
OS-9: Individual Street	Screen for streets that meet street retrofit feasibility criteria, such as slope, right-of-way width, open section drainage, presence/absence of sidewalks and parking lanes.
OS-10: Individual Rooftop	Superimpose property ownership layers with aerial photos or planimetric data to locate large municipal, institutional, commercial or industrial buildings that may be assessed for demonstration rooftop retrofits or look for clusters of building permit data that indicates areas experiencing active redevelopment
OS-11: Little Retrofit	A desktop search is not helpful in finding specific locations for little retrofits, although a GIS can help find tax reverted vacant lots and publicly owned parcels, such as parks, schools, recreation centers to investigate in the field.
OS-12: Landscape/Hardscapes	A desktop search is not helpful in finding specific locations for landscaping and hardscaping retrofits although it can find the general public spaces with high exposure and outdoor amenities, such as parks, schools, central business districts, spaces etc.
OS-13: Underground	A desktop search is not helpful in finding specific locations for underground retrofits, although storm sewer and utility maps are essential for field investigations.

(b) New development. A new development provides a greater opportunity to demonstrate to stakeholders many of the benefits and techniques of stormwater management and show how stormwater management can be included as an important attribute of a development. With this type of project, the entire process can be used for demonstration, from planning and permit review through construction and maintenance. Also, an entire property can be treated with proper stormwater management practices whereas with a retrofit, it would typically be just a small portion of the property that can be treated.

On the other hand, it may be much more difficult to locate a suitable new development project for demonstration. Unless a new school or government building is planned, cooperation with a private developer will likely be necessary. In addition, watershed mapping is less useful in this situation. Finding a suitable site will depend more on communication with local developers in order to find the right partnership and location. If a willing developer cannot be readily found, it

might be necessary to offer an incentive such as agreeing to take over maintenance responsibilities in order to get innovative stormwater management practices included in a development.

III.C. Specific recommendations for conservation and restoration

Research in watersheds around the country has shown that conserving and/or restoring forests can be the most efficient and cost effective way to prevent declines in water quality and quantity. Forests retain rain, allowing the water to slowly percolate down into the soil, eventually reaching the aquifer or surface water. In addition, preventing development -- particularly in highly sensitive locations such as those revealed by the priority index mapping done in the Lower Meramec -- keeps pollutants ranging from construction runoff to lawn fertilizers to pet waste out of the water. In keeping with findings from watershed research in other parts of the country, monitoring data from the study area reveals that water quality has decreased as subdivision and development increased. The research on the role of forests in maintaining water quality and quantity, shows that water quality begins to decline measurably when the percent of forested land decreases below 75%. In the LMRT watersheds today, 65% is still forested (Data from 2005, Missouri Resource Assessment Partnership). Accordingly, the project implementation in the Meramec must include strategic land conservation and restoration in order to achieve its water-related objectives and the natural resource/open space goals of the area's residents.

1. Opportunities and challenges

The study area is approximately 65% forested or forested wetlands. Almost 19% of the study area is grassland, 8% is developed, 6% is cleared for agriculture, about 2% is open water, and less than 1% is barren or sparsely vegetated ((Data from 2005, Missouri Resource Assessment Partnership). So there are still opportunities both to conserve relatively undisturbed lands and to restore tracts that have lost their native vegetation. Arguably, the national economic downturn increases the opportunities to acquire properties -- or property interests such as leases or conservation easements -- for these purposes because the study area is suffering more than other parts of the state according to Realty Trac (As of January 2009, St. Louis County (1 in every 604 housing units) and Jefferson County (1 in every 619) had two of the highest home foreclosure rates in the state. Franklin County was only slightly better. For more information, see <http://www.realtytrac.com/MapSearch/Missouri.html>). Parcels that were purchased for development in the past few years may become available as a result of the downturn. And landowners who were previously holding large tracts off the market in anticipation of increasing interest on the part of developers may now be amenable to other alternatives.

Prior to this quick market reversal, there had been substantial growth in the suburban and exurban communities surrounding the City of St. Louis. Local experts indicated that most new residents in the study area fit one of three profiles -- commuters, retirees or work-from-home professionals. In all cases, homebuyers are generally seeking a rural lifestyle, improved quality of life and relatively inexpensive property (compared to similar homes in the city).

The "outside experts" participating in the Strategy Exchange, and the local experts, believe it is only a matter of time before land sales and the conversion patterns resume, changing forests and farms into subdivisions and commercial sites to serve new residents. As one person interviewed for the Strategy Exchange commented, "Time is not on our side. We had better get

busy.” In order to ‘get busy’ and conserve the tracts that are most critical to the future health of the waters and ecosystems of the Lower Meramec, priorities must be established quickly.

Some parts of the study are better suited than others for providing water quality protection. The Conservation Priority Index map in Appendix C shows the areas that have forests and wetlands and key hydrologic features in the watersheds studied. The most suitable lands comprise about 8,700 acres (10% of the study area). When overlaid with property boundary locations, this includes 326 parcels. The map in Appendix D shows the areas that are most important for restoration or implementation of best practices for agriculture. The most suitable lands comprise 4,320 acres (5% of the study area). When overlaid with property boundary locations, this includes 117 parcels. Protecting large contiguous parcels of forest land, wetlands and farmland can play a critical role in preserving water quality and quantity and the quality of life that area residents value. Development of these parcels – particularly using standard development techniques that clear the land as a precursor to construction --would lead to substantial degradation of water quality and a loss of groundwater recharge.

Together, the conservation and restoration priority maps show over 12,000 acres of important land that could serve the project’s purposes if protected or restored (almost 25% of the study area). This represents an unmanageably large number that is likely to overwhelm anyone interested in helping pursue conservation. At this time, funding for conservation and restoration is very limited outside of the area covered by the Great River Greenway District. Even when additional funding is secured, as suggested in the section on funding that follows, it will be imperative that projects be selected in a highly strategic way as there will always be more need than money.

2. Programmatic recommendations

As previously recommended in earlier sections of this report, the next steps for this project will require new levels and types of cooperation among the agencies and organizations that are already working in the watersheds, plus engagement of a larger cross section of stakeholders. Previously, we mentioned the **need for both a strong leadership structure and a “vision” that describes what those leaders want to achieve.** The vision will be essential for expanding local political and financial support for conservation and restoration, and for determining what properties should be targeted for protection.

There are a handful of agencies and organizations whose missions and capabilities make them potential participants in future conservation and restoration activities. Specifically, the Open Space Council, Great Rivers Greenway District, The Nature Conservancy, The Trust for Public Land, the Ozark Regional Land Trust, Missouri Department of Natural Resources and Missouri Department of Conservation all have experience with land acquisition or other forms of conservation and restoration agreements with landowners. In order to maximize ecological and public benefits from future land protection investments **it is imperative that these entities (and possibly others) work in a coordinated manner using a collective vision.**

Once the overarching vision for future action has been established, the entities with an interest in the land conservation implementation (for example land or easement acquisition, or other types of negotiations with private landowners) should **establish additional guidelines for selecting the highest priority tracts from among the many possibilities identified during the mapping phase.** These guidelines should help participating entities focus their limited time and funding on parcels that will have the biggest conservation impact. The implementing

partners must also conduct on-the-ground assessments and evaluate the landowners' motivations to identify best short term and long term conservation priorities. Prioritizing should be a collaborative effort that involves all key participants so that partners are deployed effectively, funds are used efficiently, competition is minimized and public visibility is maximized.

The types of guidelines that the implementing entities may want to evaluate for screening potential conservation projects could include:

- Property size – The mapping work identified parcels over 20 acres. It might be desirable to seek out tracts of considerably greater acreage.
- Access by a public road- If the vision includes a site which would be available to the public for educational and recreational purposes, it will be important to prioritize tracts with a direct connection to a public road.
- Contiguity with existing protected lands or connectivity to greenways – There are many ecological benefits to expanding existing parks and preserves. Even small parcels can be important buffers to sensitive lands or links in a trail system.
- Presence of endangered species – If any of the mussel species have been designated as federally threatened and endangered, there may be possibilities to secure funds for habitat protection that also serves water quality.
- Frontage on a waterway – Fishing, swimming and boating are all important recreational activities that draw visitors to the area and improve residents' quality of life. If these are important considerations for involving the public, it may be wise to prioritize parcels that expand access to significant rivers and/or streams.
- Matching fund availability – It is important to be familiar with sources of matching monies and the purpose of each.

This list is not exhaustive. Rather it gives some ideas that can be used by the coalition of implementers as they define and refine the criteria for selecting the highest priority parcels.

There are few regulations available in the study area to help protect forests and/or wetlands, therefore acquisitions or voluntary land protection strategies (such as forest management plans or conservation easements) for private land will be essential for protecting the largest remaining forest tracts. The Panel recommends that the prioritization process consider all possible tools for retaining natural land cover on as many of the large, priority tracts as possible.

Well-managed farmland, particularly pastureland, also contributes greatly to water quality and quantity by allowing infiltration and filtering pollutants. Poorly managed farmland, on the other hand, can contribute to fecal coliform and nitrate problems. Although agriculture is not a major economic activity in the study area, local investigations have determined that livestock practices can have a significant impact on water quality, especially where cattle and/or horses are allowed to access streams and wetlands. The Panel recommends that implementation include conservation of priority agricultural parcels (through fee purchase or conservation easements), use of practices such as planting buffers and building fences around waterways and wetlands, and other voluntary measures and incentives to restore degraded lands. In places where degradation has been substantial there may be opportunities to create a partnership with a developer with an interest in low impact construction, combined with a restoration effort.

A conservation easement (sometimes referred to as a purchase of development rights) is a good tool when a landowner is interested in protecting his property, but not in selling. The landowner agrees not to develop the land, but retains ownership and rights to conduct forestry, agriculture, and other agreed-upon open space land uses that are compatible with the water

quality and other objectives of this project. A landowner may agree to allow public access, but access is not generally provided for without additional payment. The Forest Legacy Program administered by the USDA Forest Service provides funds for purchase of conservation easements in states with an approved plan (Assessment of Need or AON). Missouri completed its AON, and at least one easement (over the property owned by the Wild Canid Center) has already been purchased in the study area.

3. Demonstration projects

As discussed in Demonstration Section II.D of this report, there are several demonstration approaches associated with conservation and stewardship that would address the opportunities and challenges described above. Most exciting to many of the partners and funders is the possibility of acquiring (through purchase or donation) land or development rights to conserve significant resources. As described in the preceding sections, the conservation and restoration priority maps provide a starting point for identifying a few key parcels. (Funding for these transactions is discussed in the following section.) The sites themselves will help maintain water quality and quantity by virtue of their protection. In addition, these protected tracts could also provide a variety of other public benefits including water access for fishing and boating, seasonal hunting areas, trails and contributions to larger networks and locations for other types of education and demonstration activities related to watershed conservation. If the vision for future action requires multi-benefit sites (for example, parcels that provide opportunities for hunting and forest conservation and limited tree harvest) the project selection criteria need to be designed to favor this type of property.

The techniques that could be used to secure a site for demonstration purposes include:

- Acquiring (through purchase or donation or a combination) fee title to private land that either becomes public or is conserved by a private nonprofit which could offer certain limited types of public access for education or recreation.
- Acquiring (through purchase or donation or a combination) development rights on private land that stays in private ownership but an agency or nonprofit has the perpetual right and responsibility to ensure that the property is conserved. There would be value in simply demonstrating this conservation tool. In addition, some landowners are willing to allow specified public uses such as school visits or bird walks.
- Securing temporary conservation of private land using a lease or management agreement, often by paying for specific conservation practices or sharing the cost of improvements, such as fencing cattle out of wetlands or planting buffer zones along streams.
- Assisting public agencies with the stewardship or restoration of public land, which could involve volunteers and opportunities to demonstrate techniques that landowners could use such as preventing or correcting erosion.

4. Funding strategies

Implementing successful long-term conservation, restoration and remediation strategies requires substantial, reliable funding from a wide range of sources. Each of the roundtables and all the conversations with local experts during the Strategy Exchange revealed the serious constraints created by lack of sufficient funding. Almost all of the recommendations contained in this report will demand some amount of money. Accomplishing a meaningful series of land or development rights acquisitions will be virtually impossible without new or expanded sources of funding.

a. Local Funding

Local funding is the most reliable long-term way to fund land conservation since state and federal funding can be scarce (and variable) and the competition for those funds is often fierce. Hence, these sources are best viewed as supplements or complements to local land conservation. **Creating local funding with a larger revenue stream -- a dedicated, long-term funding source -- would enable the counties/communities within the study area to protect important natural areas and watershed lands and possibly fund infrastructure improvements.** The local funding purposes could be tailored to citizen interests and needs, potentially including monies for recreation, parks, trails, habitat and working landscapes.

A combination of other funding sources —state, federal and private— can be brought together to help achieve conservation objectives and leverage the local revenues. Local funds should be viewed as the cornerstone upon which the larger funding strategy is built, leveraged by other sources that may be available only for very specific types of projects.

According to research done by the Trust for Public Land for the Strategy Exchange, local governments in Missouri typically fund local land conservation with sales taxes and general obligation bonds.

Sales Taxes. A sales tax increase could be used to finance land acquisition in each of the counties or support maintenance and operational needs. Revenues from a sales tax could be used for parks, storm water and capital improvements.

- A 1/10 cent sales tax increase in Franklin, Jefferson or St. Louis Counties for land conservation would have an annual cost per capita of \$6, \$6, and \$8, respectively. Jefferson County could generate over \$1.7 million annually with this sales tax.
- Since 2000, there have been 13 municipal and county sales tax measures for parks, open space, and watershed protection. All 13 were successful as shown in the chart in Appendix E.

General Obligation Bonds. Each of the three counties could hold a general obligation bond referendum, which would provide the authority to issue long-term debt to finance land conservation. The bonds could be repaid through an increase in property taxes.

- A \$20 million bond in Franklin, Jefferson or St. Louis Counties for land conservation would cost the average household approximately \$24, \$16, and \$2 per year, respectively.

If the implementation partners decide to pursue local funding to provide the core funding to execute their shared vision, the following steps could guide the process:

- Conduct feasibility research to examine fiscal options, including spending tolerance; legal issues such as ballot language requirements; election timing, and other competing spending priorities.
- Conduct a public opinion survey to determine voter priorities, test potential ballot language, assess messages, determine willingness to pay and test arguments for and against the funding.

- Create a broad-based coalition of supporters who reflect the area. This should include political leaders, supporters of greenspace and conservation, the business community, owners of farm and forestland, heads of civic and religious groups and others.
- Develop a ballot measure, based on the survey results, that incorporates the messages found to be most compelling at a price voters are willing to pay.
- Conduct education and outreach to inspire support for the ballot measure. Garner the necessary public support by having appropriate, consistent messages. With the right coalition behind it, there is a range of education activities that can be successful.

b. State Funding

The State of Missouri does not have a funding source from which it makes grants for local government land acquisition. However, the Missouri Department of Conservation (MDC) does offer Community Assistance grants for Fisheries, Outdoor Classroom grants, Fire Department Matching grants, Trees Resource Improvement and Maintenance grants which might help in the course of a demonstration project.

The Department of Natural Resources (DNR) land acquisition budget is funded exclusively from state parks earnings. DNR receives approximately \$1 million from the state every two years for acquisition, which is limited to purchasing land adjacent to existing state parks and state historic sites. Missouri ranks 42nd in the country in state spending on parks on a per capita basis.

c. Federal Funding

A number of sources of federal funding could potentially leverage local dollars for conservation and water quality protection in the Lower Meramec study area, on a limited basis. (Research for this section was conducted by The Trust for Public Land). See Appendix F for details.

The counties might also want to consider creating tax classification programs that encourage conservation and the preservation of existing forest, farm, and recreational land. These are real estate tax classifications that reduce the landowner costs of retaining open space, forests or other natural vegetation by offering preferential tax rates. These classifications do not provide permanent protection, because land uses can be changed after payment of a roll-back tax. These programs can be used to encourage landowners who want to keep their land in open space, but are not able or willing to execute a conservation agreement. However, there could also be a “rollback” provision that would require that some portion of the property tax foregone by the local government through the preferential treatment to be repaid when a parcel is sold and/or the use changed. When the tax is repaid it could be directed to a fund for conservation, restoration and demonstration activities.

III.D. Specific Recommendations for Education and Outreach

1. Challenges

Put simply, improving environmental sustainability requires working from both the bottom up (grassroots level) and from the top down (organizational level). If everyone who lives or recreates in the Lower Meramec is part of the problem, then a key challenge is to find ways to influence average citizens to the point that they change to more sustainable behaviors, resulting in improved environmental stewardship, willingness to pay for environmental quality, and reduced impacts to the environment. Meeting this challenge requires coordination and consistency at the jurisdictional and organizational level and a means to influence policy maker understanding and behavior toward more environmentally sustainable approaches.

2. Programmatic recommendations

The Panel cannot overemphasize the need to **create a comprehensive coordinating body (or modify an existing structure) to lead this effort**. Representatives from nonprofits, business, industry, utilities, citizen watershed groups, local government, academia, and resource agencies should all be included to ensure buy-in and lasting change. This body has the ability to create a shared vision for the whole basin. Involving citizen groups brings the grassroots energy that leads to lasting policy change. Many examples of successful collaborative efforts can be found online (e.g., northern Minnesota's Regional Stormwater Protection Team (<http://www.lakesuperiorstreams.org/stormwater/rspt.html>)).

The first step for this group is to identify shared goals and an action plan to meet those goals (preferably led by a trained facilitator). Clearly there will never be enough funding, time, or ability to reach all the diverse stakeholder groups in the Lower Meramec, so an important early step is to **identify "critical control points."** In other words, influencing the behavior of which stakeholder groups could yield the biggest resource protection or improvement. Part of the planning effort should include creating a list, prioritized by potential for resource protection or improvement, of audiences to reach. The Panel encourages the coordinating body to look beyond the boundaries of their counties and consider who else might be allies in achieving their goals. For example, outdoor recreation interests from St. Louis might carry some weight and have resources to contribute to maintain the high quality environment of the Lower Meramec if they were made aware of the need. Similarly, in considering audiences to reach, groups beyond the counties may be critical, e.g., St. Louis-based developers might be a high priority group.

The Panel recommends Community-Based Social Marketing (CBSM) as a framework from which to work (Citation: Doug McKenzie Mohr and William Smith, 1999, *Fostering Sustainable Behavior: An Introduction to Community-Based Social Marketing*, New Society Publishers, Gabriola Island B.C., Canada, 160 pp. Web site: www.cbsm.com). This approach, based on extensive behavioral research, involves several steps:

1. *Identify barriers to desired behavior change and potential benefits of making the changes*
2. *Develop a strategy or action plan targeted toward your specific audience using proven "tools" to change behavior*
3. *Pilot the strategy with a small group before full implementation*
4. *Evaluate effectiveness and behavior change after implementation.*

Each of these steps is critical to overall success. The LaBarque Creek watershed protection efforts provide a good example for elaborating on each of these steps. As stated earlier, much has already been done in this watershed to retain the high quality of its water. A watershed conservation plan was developed by an organized group of watershed landowners (now the Friends of LaBarque Creek Watershed) along with agency and non-profit partners. The plan provides a vision, common understanding, goals, and action items, assigns responsibility, and recommends measurable indicators of success. The watershed is one of the Missouri Department of Conservation's Conservation Opportunity Areas. It has a volunteer stream monitoring group collecting data that are posted online. Yet even in this progressive watershed, small enough to have a sense of community, it is difficult to reach people with compelling information that leads to behavior change.

EXAMPLE: Goal I.4.B. of the LaBarque Creek Watershed Action Plan aims to conserve riparian corridors by encouraging streamside landowners to establish or conserve 100 foot buffers, discourage clearing, and discourage grazing or agriculture in the buffer zone. It recommends a combination of technical assistance, outreach, conservation, and regulation. Using this goal as an example, the Panel would recommend the following:

- Do a "risk" analysis to target outreach where it will do the most good. Which of the land uses along the stream are causing the most damage and would most benefit the stream if buffers were installed? This step often requires research or analysis and has already been completed for many of the risks in the Lower Meramec. Prioritize efforts to achieve the greatest benefits.
- Elaborate upon the existing goal to make it specific and quantifiable. Develop measurable objectives, (e.g., 90% of private shoreline pasture will be fenced and have 100' buffers by 2015), using "SMAART objectives (Specific, measurable, audience-directed, ambitious but realistic, and time-bound).
- Once a critical target audience has been identified, determine what behaviors you need people to adopt to achieve your goal (e.g., keep horses out of LaBarque Creek; plant buffers between pasture and creek).
- Determine what barriers might keep people from adopting those behaviors.
- Once the behavior you seek has been identified, social marketing comes into play.

Social Marketing, Step 1: Identifying barriers and benefits.

Step 1 of CBSM, identifying barriers and benefits to achieving the behavior you are seeking, requires some background research to understand what is motivating the group you need to educate. Research should include literature reviews, focus groups, and surveys. What techniques are most effective in changing a particular behavior? What distinguishes the group of people who are "on board" with a sustainable behavior versus those who have not adopted the sustainable behavior? The goal of CBSM is to make it easier to do the "right" thing by removing perceived barriers and increasing the benefits of the new behavior. Focus groups with a small representative sample of the people you need to reach help you refine your questions which can then be asked of a larger population through a survey.

So, for example, if you seek to get horse owners to plant buffers and keep horses away from the creek, you must first do the research to understand their current attitudes, including the reasons they have not already adopted the behavior.

	Old Behavior: No buffer No fence	Behavior You Seek: Plant 100' native plant buffer and install fencing
Benefits (as perceived by target audience)	<ul style="list-style-type: none"> ▪ I decide what I do on my land ▪ Doesn't cost money ▪ Horses have access to water 	<ul style="list-style-type: none"> ▪ Protects the stream ▪ Keeps the government off my back ▪ More birds
Barriers (as perceived by target audience)	<ul style="list-style-type: none"> ▪ I've always done it this way – there is no reason to change 	<ul style="list-style-type: none"> ▪ Costs money and time ▪ Doesn't look "tidy" ▪ Reduces the size of my pasture

Next, the coordinating committee can develop targeted approaches to make it less attractive to do things the old way and more attractive to use sustainable practices, e.g., plant the buffers and build the fence.

Social Marketing, Step 2: Developing a strategy using proven “tools” to change behavior

Once the barriers to change have been identified and verified, a number of behavior change “tools” can be combined to create an action plan. Social marketing research has shown some tools to be particularly effective. These include:

Commitment – Asking people to commit to an initial small request makes them more likely to agree to a larger request in the future. Getting people to make a commitment to do things differently in a public setting helps ensure that they will live up to their commitment. Look for natural opportunities to reach people with requests for commitment. Using the horse farmer example, this might take the form of getting livestock owners to initially just allow a few trees to be planted along their stream frontage.

Prompts – We are all prone to forgetting, so prompts are essential reminders; strategically placed, self-explanatory, highly visible, and oriented toward positive behaviors. A well-known example is the storm drain stenciling program, in which storm drains are stenciled with the simple message, “Don't dump, drains to stream.”

Norms – Social research shows that if we observe others in our peer group or community following sustainable behaviors, we are more likely to do so. Norms need to be highly visible at the community level to work effectively. For example, a livestock owner who fences fields to keep animals out of the creek can be honored for his/her behavior and perhaps can be recruited to give talks to other livestock owners. Demonstrations of sustainable practices can help to change the norms.

Communication – Communication needs to be specific to the attitudes and beliefs of the primary audience you are trying to reach, needs to be from a credible source, should express the costs of inaction, be easy to remember, and be goal-oriented. Community activities and peer-to-peer communication are highly effective ways to share behavior change messages. One property owner proudly explaining their new rain garden to another can do much more than general fact sheets or workshops attended by only a few already committed shoreland property owners.

Incentives – Incentives can be very effective, particularly in cases when people are not highly motivated to change their behavior. Incentives should reward the desired behavior, should be publicly visible, and do not have to be monetary to work. An incentive could be as simple as

allowing realtors who have completed a workshop on environmentally sensitive shoreland property management to be included on a list of “green” realtors.

Looking again at the example above, the following approaches might be considered.

	Old Behavior: No buffer No fence	CBSM Approach: Decrease benefits and increase barriers	New Behavior You Seek: Plant 100' native plant buffer and install fencing	CBSM Approach: Increase benefits and decrease barriers
Perceived Benefits	<ul style="list-style-type: none"> ▪ No one tells me what to do on my land ▪ Doesn't cost money 	<ul style="list-style-type: none"> ▪ Work with “converted” pasture owners to reach their peers or others they trust (e.g., Extension Service) ▪ Fine them for noncompliance 	<ul style="list-style-type: none"> ▪ Protects the stream ▪ Keeps the government off my back 	<ul style="list-style-type: none"> ▪ Outreach campaign to link erosion and bacteria in creek from pastures to swimming or fish ▪ Increase threat of government fines for no buffer
Perceived Barriers	<ul style="list-style-type: none"> ▪ None – it has always been this way 	<ul style="list-style-type: none"> ▪ Honor those who plant buffers at event that horse owners all attend – change the norm – make them want to conform ▪ Incentives ONLY for those who plant buffers 	<ul style="list-style-type: none"> ▪ Costs money ▪ Takes too much time ▪ Doesn't look “tidy” ▪ Reduces the size of my pasture 	<ul style="list-style-type: none"> ▪ Financial incentives ▪ Volunteer or civic organizations to help plant ▪ Demonstration site – beautiful established buffer ▪ Reduced property tax for buffer area

The Panel is well aware that lack of funding for outreach and education, a general lack of public understanding, and a reluctance among the public to spend money for services that benefit the environment, such as stormwater fees might make the audience-specific, research-driven social marketing approach seem rather daunting. Nevertheless, if the Lower Meramec is able to develop a coordinating body with shared goals, the Panel believes it will be possible to develop and implement an effective social marketing plan for high priority audiences and watersheds.

3. Additional specific recommendations to consider

As part of the social marketing strategy the Panel has suggested, some of the following outreach, education, and communication approaches might be particularly appropriate for the Lower Meramec watershed.

▪ **Join the national organizations involved in outreach to increase environmentally sustainable behavior as a way to learn of resources** such as model ordinances, successful approaches to behavior change, new technical approaches, and demonstration projects.

Excellent examples include:

- The National NEMO (Nonpoint Education for Municipal Officials) Network. <http://nemonet.uconn.edu/>. A confederation of programs in 31 states that educate local land use decision makers about the links between land use and natural resource protection.

- The Center for Watershed Protection. <http://www.cwp.org/>. Provides practical and technical information for people and communities interested in protecting and restoring urban watersheds.
- Center for Landuse Education and Research (<http://clear.uconn.edu/>). In particular, there is a national Low Impact Development geo-referenced database (<http://clear.uconn.edu/tools/lidmap/>) as well as a variety of other tools.
- As part of developing a stronger and more diverse coordinating body for outreach, education, and demonstration sites, **consider developing a citizen friendly Web site.** This Web site can contain much more than educational information. It can also be a central data and report repository; place to feature demonstration sites, model ordinances, stormwater plans, and other technical information; and a place to document successful outreach programs. An example of such a site is www.lakesuperiorstreams.org. It can be a “home” for downloadable outreach materials, a place to house online courses for realtors, and a central home for all the jurisdictions in the Lower Meramec.
- **Take full advantage of peer-to-peer mentoring opportunities and “train-the-trainer” programs such as Master Naturalists** to improve interest and capacity of citizens as well as transfer successful approaches and examples to other watersheds and communities.
- As progress is made toward shared, consistent messages across jurisdictions, look for ways to “tell the whole story” of the Lower Meramec by linking research and environmental monitoring to better understanding of the resource to community action. **The Panel encourages continued efforts to develop more Stream Teams in additional subwatersheds.** Data from these teams would ideally be combined with other data sources (e.g., agency data) in a geo-referenced data visualization tool that would make the data more accessible and interpretable. See <http://lakesuperiorstreams.org/streams/data/Java/DVTexamples.html> for an example of a stream water quality data visualization tool.
- **Consider including representatives from K12 education on the coordinating body.** Most teachers are limited by time, money, and expertise from including a great deal of “place-based” environmental education in their curriculum. K12 representatives can help develop targeted materials of greatest use to teachers.
- **Consider including representatives of the academic water quality research community on the coordinating body.** They may be able to access new funding sources for research, demonstration, and restoration projects.

APPENDIX A: Excerpts from Stone County, Missouri Department of Health's on-site wastewater system management ordinance

"DRAFT" Property Transfer Regulation

Section 11 – PROPERTY TRANSFER CERTIFICATES

The purpose of a property transfer certificate is to, at the time of property transfer (i.e. sale of property), verify the adequacy of the existing onsite wastewater system (OWS) if it was previously approved and permitted, or assure that an unapproved OWS will be permitted and approved within one year of the property transfer. At the time of property transfer, properties with an approved OWS (i.e. septic system) will need to pass another inspection to ensure that the OWS continues to operate properly. If the OWS does not pass this inspection, the property owner will be required to obtain a repair permit to correct deficiencies or obtain an agreement signed by the new owners acknowledging they have accepted responsibility for repairing the deficiencies. In addition, all new construction that requests to connect to an existing OWS will be subject to these same requirements of Section 11 – PROPERTY TRANSFER CERTIFICATES.

11.0 Applicability

- A. Effective June 1, 2009, prior to the sale or transfer of ownership of a property served by an onsite wastewater system (OWS, or septic system), the owners of the dwelling or occupied building shall obtain, or have in their possession, a property transfer certificate and subsequent certificate of operation for that system unless exempted or waived as noted below.
- B. If the onsite wastewater system serving the dwelling or structure was installed and given final approval by Stone County Health Department (SCHD) ten (10) years or less prior to the date of closing on the property sale, a property transfer certificate shall not be required. But if an OWS Inspection is requested by the buyer or lending institution, a copy of the inspection is to be filed with SCHD for their records, but shall not be used for requiring action on the part of the seller.
- C. A property transfer certificate and certificate of operation will be issued to any owner of a property with an OWS upon completion of a property transfer application and submission of the required documents verifying compliance with these regulations.
- D. All properties must have an existing approved OWS permit from SCHD. Property owners without an existing permitted and approved OWS will need to go through a verification process and/or apply for a repair permit, and therefore would not need to obtain a property transfer certificate. Verification and repair of an unapproved OWS are both done by way of a major repair permit. In order to be exempt from these property transfer certificate requirements, owners of a property with an unapproved OWS must apply for a major repair permit to either verify that the OWS works adequately or have it replaced.
- E. Property owners that have a permit for their OWS but did not receive final approval from SCHD will need to contact SCHD to determine the necessary steps to obtain the OWS approval.
- F. The following additional situations will not require a property transfer certificate:
 - 1. The change in ownership is solely to include or exclude a spouse.

2. The transfer is creating or ending a joint ownership if at least one person is an original owner of the property and/or his/her spouse.
3. The transfer of property contains a building or buildings connected to an OWS that will be demolished (or already has been), and the building/buildings will not be occupied after the property transfer.
4. The transfer of property is to a trust.
5. The transfer of property is to effect foreclosure or forfeiture of real property.
6. The owner of the property or the person acquiring title has signed an enforceable agreement with SCHD to upgrade the system.
7. The owner of the property will connect the dwelling or occupied building to a sanitary sewer or a shared system within the next two years following the transfer of title, provided that such agreement has been disclosed to and is binding on the subsequent owner(s).
8. The property owner is part of a community plan or management district for his/her onsite wastewater system that has been approved in writing by SCHD, and the system has been inspected as required by the plan.

11.1 Application Requirements

A. Applications for a property transfer certificate shall be made on the appropriate form furnished by SCHD and shall include:

1. Name, address, and phone number of current owner.
2. Name, address, and phone number of current occupant, if different from owner.
3. Address of the property.
4. Legal description of the property.
5. Size of the property in acres, rounded to the nearest tenth acre (1/10).
6. Type of water supply.
7. Type of existing building or structure (if commercial, list all uses or tenants).
8. Number of bedrooms in the dwelling.
9. Statement from the current property owner regarding the present operational status of the onsite wastewater system.
10. A non-refundable certificate fee, as established by SCHD.

11. A septic tank pumping receipt from a licensed cleaner and a SCHED OWS inspection report form from a certified inspector (as identified in #13 below).

12. Where required, a copy of a maintenance contract and inspection report dated not more than thirty (30) days prior to the date of application if the system contains any mechanical components, such as an aeration or secondary treatment system, and an inspection report from the service provider.

13. A report on the appropriate form provided by the Missouri Department of Health and Senior Services from an inspector who has been certified and licensed by the Missouri Department of Health and Senior Services (MDHSS) or equivalent level of training and experience as established by SCHED. The form cannot be dated more than ninety (90) days prior to the date of the property transfer certificate application and must contain the information required for an inspection by MDHSS and include the following:

- a) A drawing showing the location of the dwelling or structure with two-point triangulated distance measurements to the septic tank lid(s) or global positioning system (GPS) coordinates. This requirement may be waived if such a drawing or data is already on file with SCHED.
- b) An inspection report for the onsite wastewater system which states whether each component is in good repair and proper working order, and that the inspection was conducted to meet all SCHED requirements, as outlined in guidance provided by SCHED.
- c) Any other information as required by SCHED.
- d) If vacant, a statement of when the vacancy occurred.

B. All reports shall be submitted on the MDHSS onsite wastewater system inspection report forms that have been provided by MDHSS.

C. Unless a property transfer permit is issued, applications shall become void ninety (90) days from the date of application or at the time of closing on the property.

11.2 Issuance of a Property Transfer Certificate

A. When the conditions in Section 11.1 have been met, SCHED shall approve the property transfer certificate and issue a certificate of operation, setting forth the terms and conditions of approval, including:

1. The existence of any permits in SCHED files.
2. Determination of size, type, and capacity of the system.
3. Evidence of past failures or malfunctions within the previous three years, as shown in SCHED records.
4. Any circumstances, such as lack of occupancy, snow coverage, or other factors, that may have affected the ability of the inspector to evaluate the system.
5. Any other information as deemed appropriate by SCHED.

B. The property transfer certificate shall remain valid for a period of four (4) years from the date of issuance.

11.3 Waiver of Property Transfer Certificates

If it is determined that an onsite wastewater system does not meet any of the requirements in Section 11.2, the requirement for a property transfer certificate may be waived, provided that: The buyer has executed a written agreement with SCHED agreeing to repair or re-place the onsite wastewater system within one (1) year of the closing date of the sale or transfer of the property.

11.4 Revocation of a Property Transfer Certificate

The health officer may revoke a property transfer certificate based upon a determination that the onsite wastewater system is no longer functioning in accordance with these regulations, or if any of the requirements noted in Section 11.2 are subsequently violated, or if false or misleading material statements were made on the application or inspection reports.

Appendix B: Common stormwater problems and approaches for addressing them

Communities across the country are increasingly viewing stormwater management as an opportunity to improve the environment, create attractive public and private spaces, engage the community in environmental stewardship, and remedy the ills of the past, when development took place with inadequate stormwater controls.

Many local programs already have a strong emphasis on the stormwater basics of providing flood control and adequate drainage. Recently, many stormwater programs have become more sophisticated and more effective by incorporating channel protection, water quality treatment, and natural resource protection into their stormwater management regulations.

Common Stormwater Problems

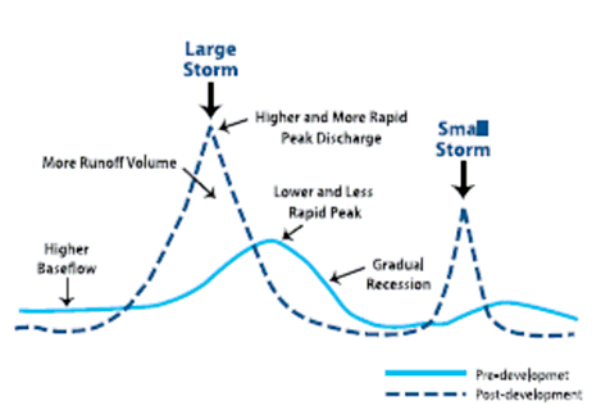
Water quality impacts from urban runoff can be significant. Many streams, lakes, and estuaries in urban areas are impaired due to urban runoff. Impervious surfaces, disturbed soils, and managed turf associated with urban development can have multiple impacts on water quality and aquatic life. These impacts are summarized in the table below, excerpted from the Center for Watershed Protection's (CWP) manual, *Managing Stormwater in Your Community: A Guide for Building an Effective Post-Construction Program*.

Summary of Development Impacts on Water Resources

Increases in:	Decreases in:
Impervious cover, compacted soils, managed turf, and other land covers that contribute pollutants	Health and safety of receiving waters
Stormwater volume	Groundwater recharge
Stormwater velocity	Stream channel stability
Pollutant loads	Health, safety, and integrity of water supplies, reservoirs, streams, and biological communities
Stream channel erosion	Stream habitat

Urban development can also impact the post-development hydrograph discharging to urban streams, as shown in the figure below. Compared to the pre-development condition, post-development stormwater discharges can increase the runoff volume, increase the peak discharge, and decrease the infiltration of stormwater, which thereby decreases baseflow in headwater streams. These changes to stream hydrology result in negative impacts on channel stability and the health of aquatic biological communities. Common problems

include bank scouring and erosion, increased downstream flooding, and loss of in-stream habitat for macroinvertebrates, fish, and other organisms. (Hirschman and Kosco, 2008)



Urban development increases runoff volume, peak discharge, and time to peak.

Stormwater Management Solutions

Four levels of stormwater management have been developed to attempt to address the degrading effects of stormwater on stream and watershed resources:

1. **Flood control.** Flood control requirements are design to mitigate the increase in the peak flow of runoff caused by development. Development leads to increased impervious surface coverage on a site. More impervious surface means more stormwater will run off the site more quickly, as there is opportunity for water to soak into the ground. The result is significantly higher peak flows in streams and waterways that can cause flooding downstream. Flood control practices, which mainly include ponds of various types mitigate the increase in peak flow by storing excess stormwater, then releasing it slowly. Flood control regulations often require that detention be provided so that peak flows from a given magnitude storm event (10-year, 25-year, or 100-year storms are typical standards), are kept at the level they were prior to development.
2. **Channel protection.** Flood control practices can effectively limit the potential for downstream flooding and property damage caused by development, but they do not address damage to stream channels in the form of erosion. The increased peak flows caused by development do not only cause flooding, they also cause stream channel erosion. In order to address this issue, a much smaller storm event must be planned for, as even the runoff from a development site produced by small storms can cause stream channel erosion. Channel protection practices are also based upon detention, but regulations typically require that 24-hour detention be provided for the 1-year storm.
3. **Water quality.** Both flood control and channel protection practices are designed to address the excess *quantity* of stormwater runoff produced by development. They do not address development's negative impact on stormwater *quality*. Development and increased impervious cover lead to significant increases in pollutant concentrations in stormwater runoff, including sediment, nutrients like phosphorous and nitrogen, bacteria, heavy metals, and other pollutants. For example, a typical developed site can easily discharge over ten times more phosphorous and nitrogen than the site would in a forested condition. Water quality practices employ techniques such as infiltration,

filtering, and biological treatment to remove pollutants from stormwater runoff before it is discharged. Typical water quality regulations require that these practices be designed to treat 90% of the annual stormwater runoff from a site. Some states and communities take water quality regulations a step farther by requiring the water quality practices to include runoff reduction or other low impact development principles. The runoff reduction principle, which requires that the quantity of stormwater runoff be reduced, rather than just captured and treated encourages a developed site to retain as much of its pre-development hydrologic characteristics as possible.

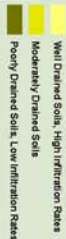
4. Natural resource protection and tree preservation. While the requirements described above are important, even the most effective stormwater management practices do not reach the level of stormwater management provided by natural systems. Therefore, natural resource protection and tree preservation are an important part of a stormwater management regulation system. Natural resource protection regulations require that the key natural features on a site be identified and preserved. A development must be planned around the important natural features, rather than eliminating them through clearing and grading. Tree preservation regulations require that a percentage of existing trees or tree canopy remain on the site through the development process.

APPENDIX C: Conservation Priority Index Maps (see next page)

Proximity to Streams and Watersheds



Soils Hydrologic Class



Soil Erodibility - K Factor

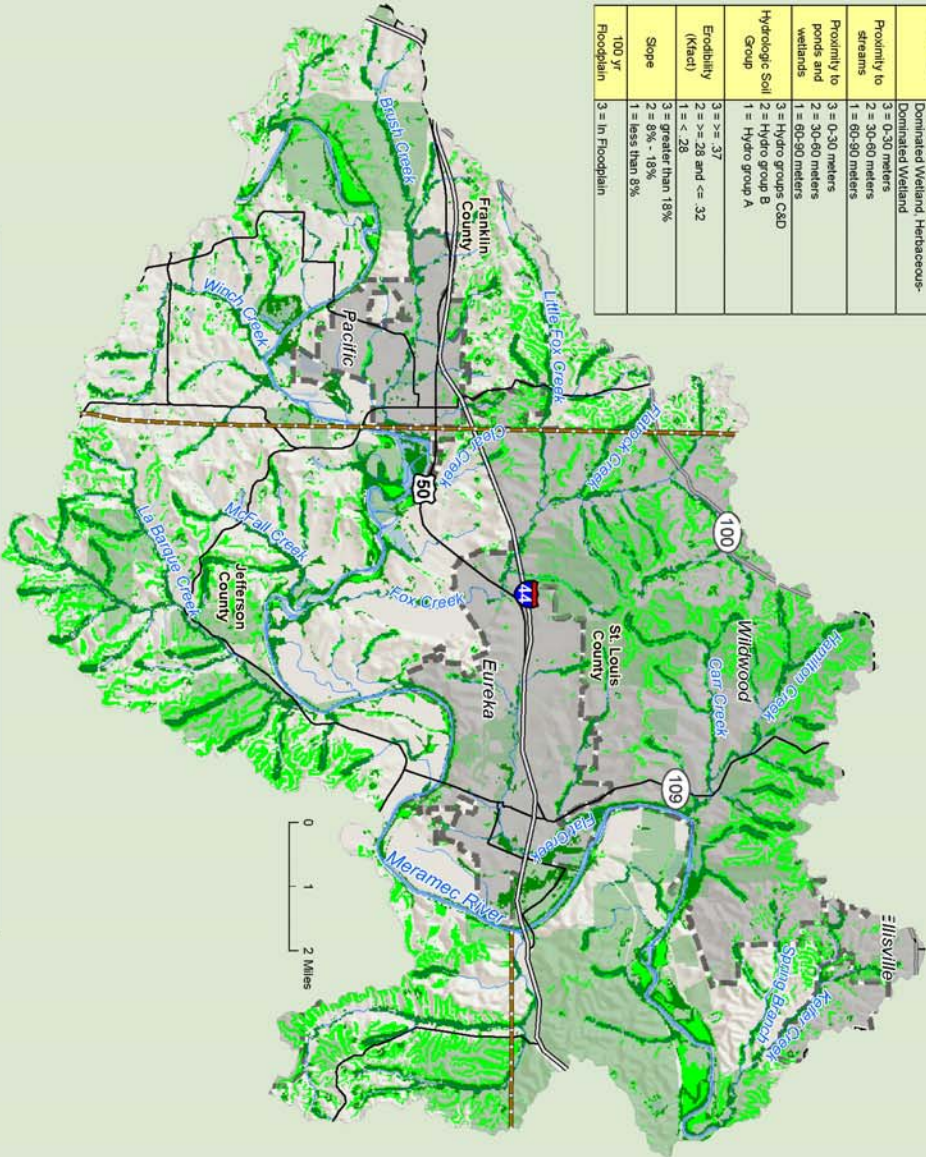


Lower Meramec Drinking Water Source Protection Project

Conservation Priority Index (CPI) Areas

May 5, 2009

Scored on 0-5 scale	CPI
Conservation Priority Index	
Land Use	3 = Deciduous Forest, Evergreen Forest, Deciduous Woody/Herbaceous, Wood-Dominated Wetland, Herbaceous-Dominated Wetland
Proximity to streams	3 = 0-30 meters 2 = 30-60 meters 1 = 60-90 meters
Proximity to ponds and wetlands	3 = 0-30 meters 2 = 30-60 meters 1 = 60-90 meters
Hydrologic Soil Group	3 = Hydro group CAD 2 = Hydro group B 1 = Hydro group A
Erodibility (Kfact)	3 = >= .37 2 = >= .28 and <= .32 1 = <= .28
Slope	3 = greater than 18% 2 = 8% - 18% 1 = less than 8%
100 yr Floodplain	3 = In Floodplain



Legend

- CPI 90th Percentile 13 - 21
- CPI 70th Percentile 12 - 21

- Protected Land
- Meramec River
- City Boundary
- County Boundary
- Rivers and Streams
- Interstate
- Highway
- Local Road



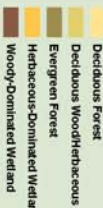
Slope



FEMA 100 Year Flood Plain



Landuse - Natural



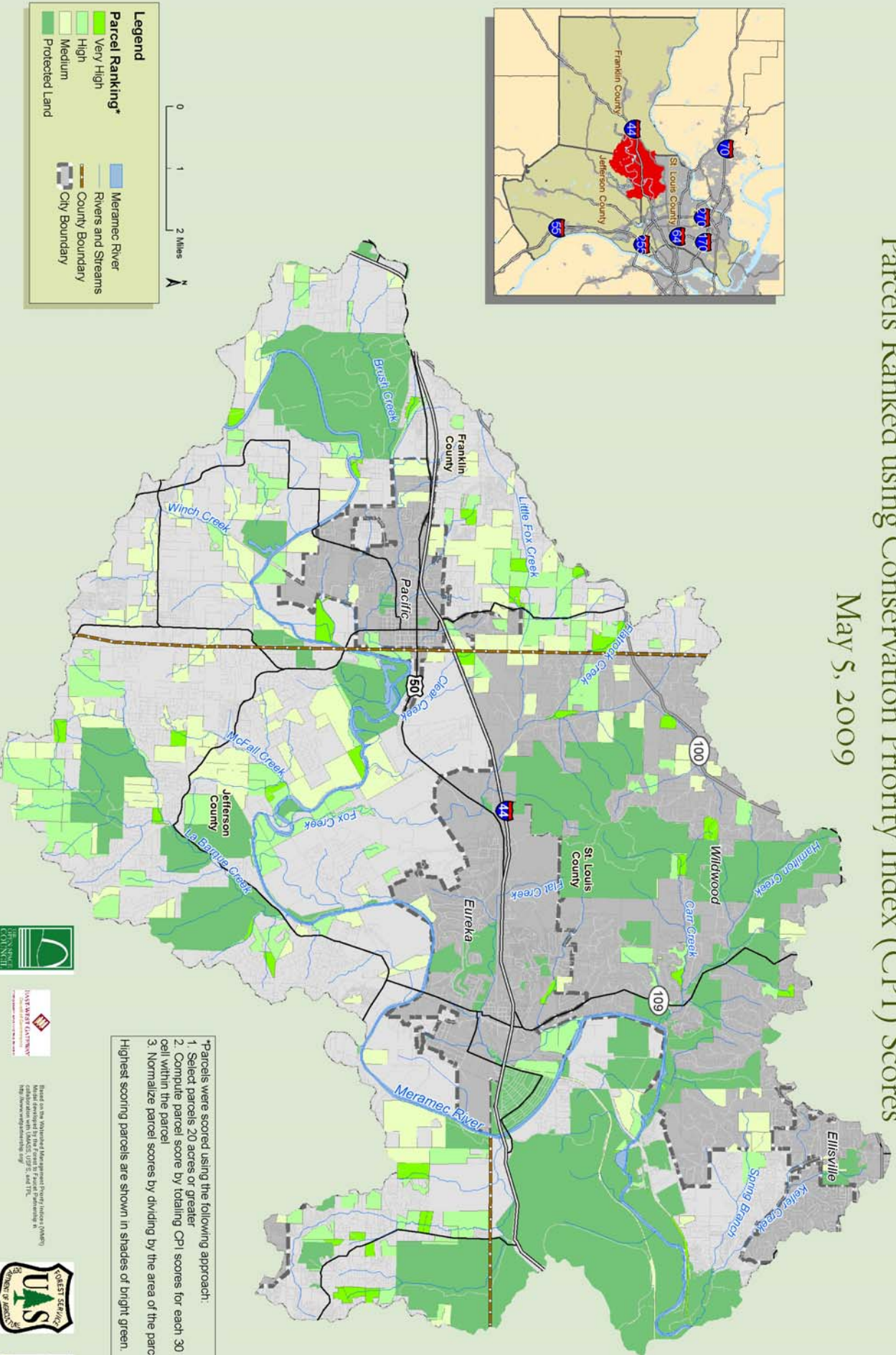
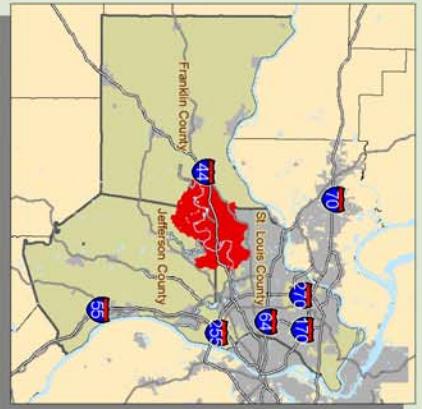
Map created by the Trust for Public Land and UAS, U.S. Department of Justice. Data provided by the U.S. Forest Service, U.S. Department of Justice. The Trust for Public Land is a 501(c)(3) nonprofit organization. For more information, visit www.trustforpublicland.org.



Lower Meramec Drinking Water Source Protection Project

Parcels Ranked using Conservation Priority Index (CPI) Scores

May 5, 2009



*Parcels were scored using the following approach:

1. Select parcels 20 acres or greater
2. Compute parcel score by totaling CPI scores for each 30 meter cell within the parcel
3. Normalize parcel scores by dividing by the area of the parcel

Highest scoring parcels are shown in shades of bright green.



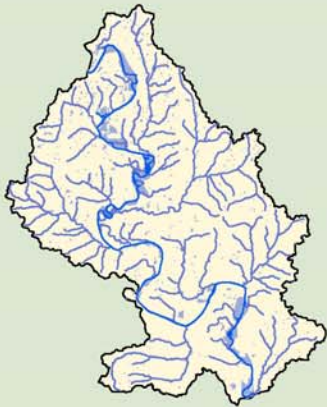
Based on the Watershed Management Program (WMP) calculation with MDC's VSPS and TRS.
<http://www.watershedcouncil.org>



Map created by the Trust for Public Land and UAS, 2009. Content in this map is derived from the Watershed Management Program (WMP) calculation with MDC's VSPS and TRS. The Trust for Public Land and UAS are not responsible for any errors or omissions in this map. All rights reserved. No part of this map may be reproduced without the prior written permission of the Trust for Public Land and UAS.

APPENDIX D: Restoration Priority Index Maps (see next page)

Proximity to Streams and Watersheds



Soils Hydrologic Class

- Well Drained Soils, High Infiltration Rates
- Moderately Drained Soils
- Poorly Drained Soils, Low Infiltration Rates



Soil Erodibility - K Factor

- <= .28
- > .28 and <= .32
- > .32

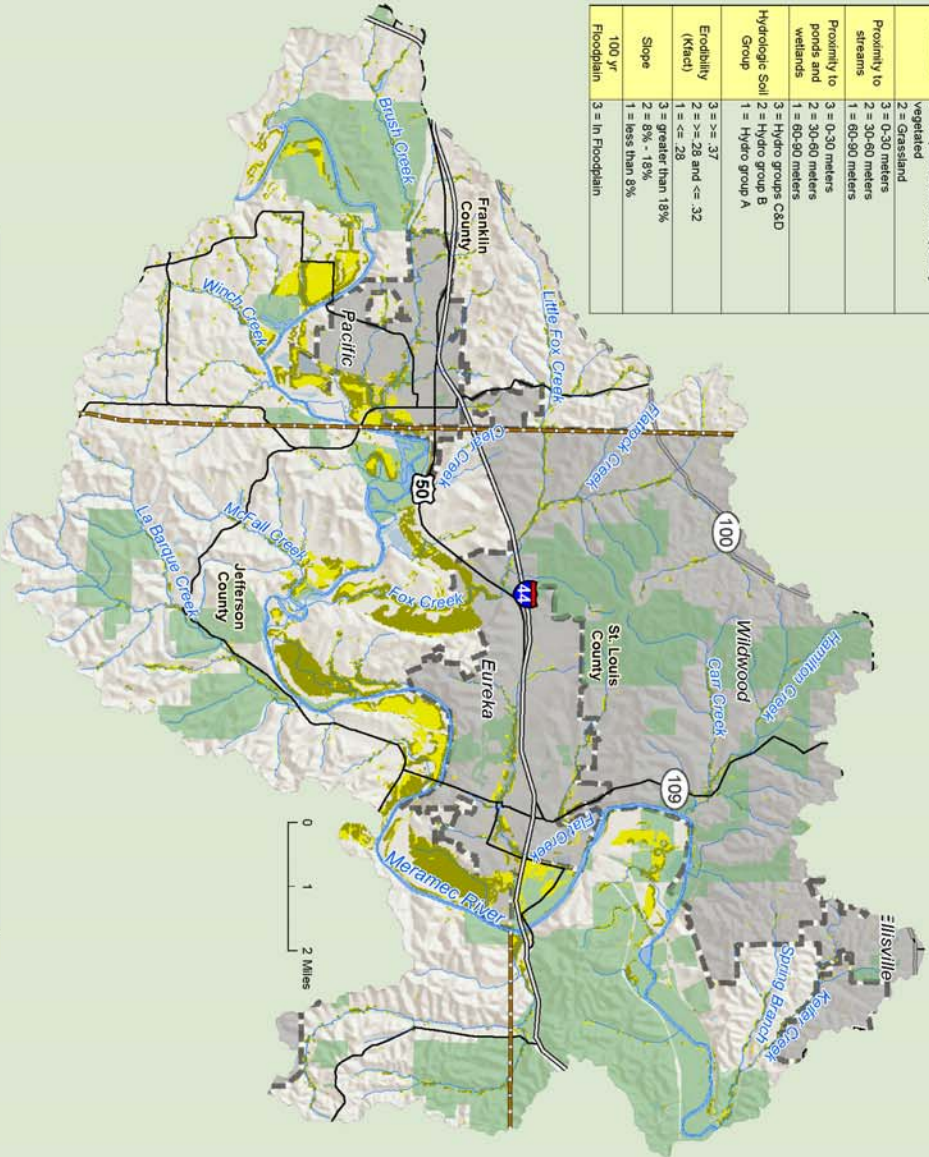


Lower Meramec Drinking Water Source Protection Project

Restoration Priority Index (CPI) Areas

May 5, 2009

Scored on 0-3 scale	RPI Restoration Priority Index
Land Use	3 = cropland, barren or sparsely vegetated 2 = Grassland 1 = 0-30 meters
Proximity to streams	3 = 0-30 meters 2 = 30-60 meters 1 = 60-90 meters
Proximity to ponds and wetlands	3 = 0-30 meters 2 = 30-60 meters 1 = 60-90 meters
Hydrologic Soil Group	3 = hydro groups C&D 2 = hydro group B 1 = Hydro group A
Erodibility (Kfact)	3 = >= .37 2 = >= .28 and <= .32 1 = <= .28
Slope	3 = greater than 18% 2 = 8% - 18% 1 = less than 8%
100 yr Floodplain	3 = In Floodplain



0 1 2 Miles

Legend

- RPI 90th percentile
- RPI 70th percentile

- Protected Land
- Meramec River
- City Boundary
- County Boundary
- Rivers and Streams
- Interstate
- Highway
- Local Road



Slope

- < 8
- 8-10
- > 10



FEMA 100 Year Flood Plain



Landuse - Agriculture, Barren, Grassland

- Barren or Sparsely Vegetated
- Cropland
- Grassland



Based on the Missouri Management Priority Index (MPI) calculation with LANDIS, USFS, and TPL. <http://www.mrcastles.com>

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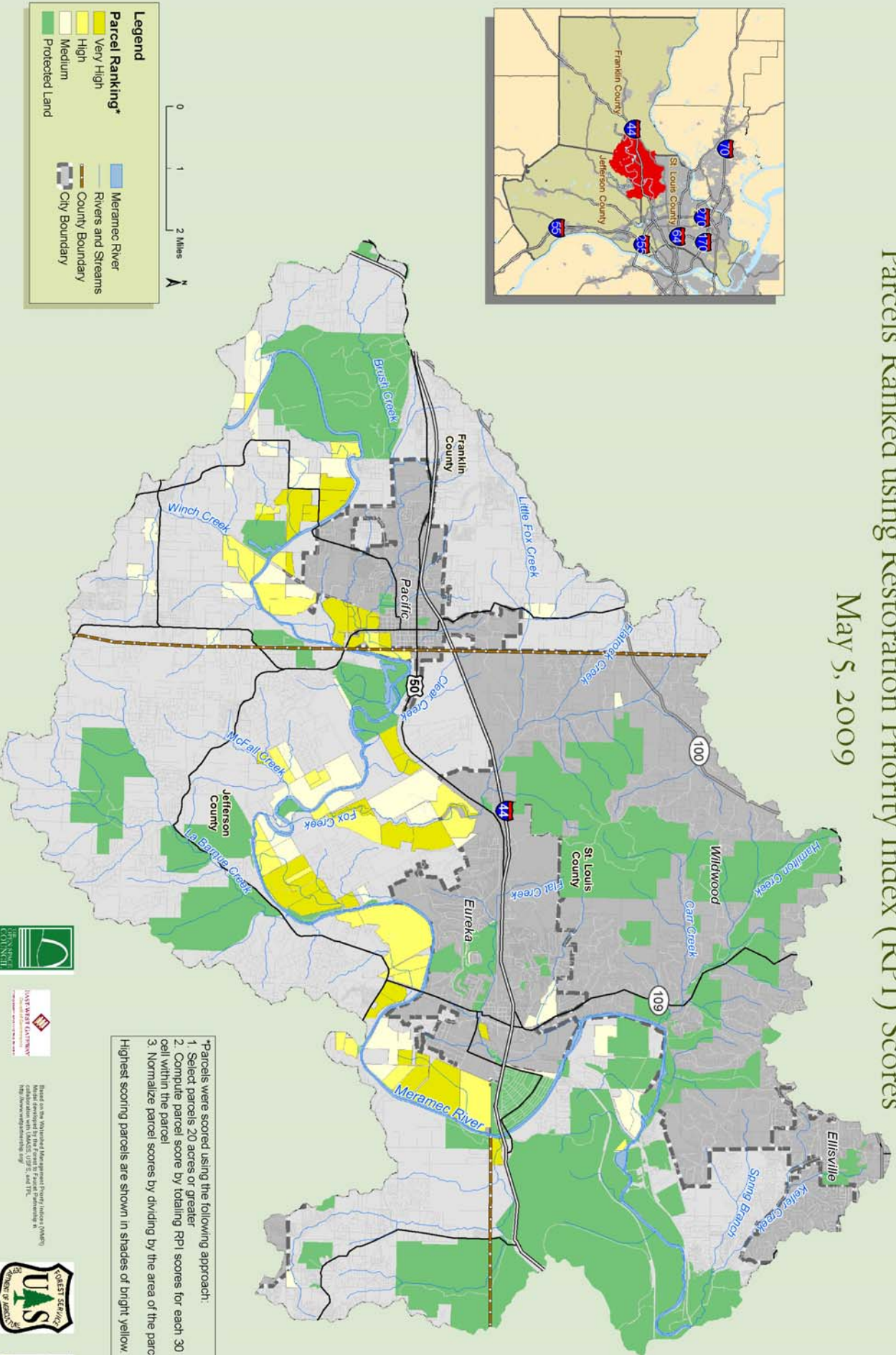
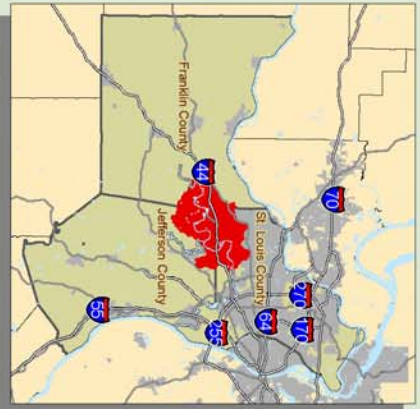


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Lower Meramec Drinking Water Source Protection Project

Parcels Ranked using Restoration Priority Index (RPI) Scores

May 5, 2009



*Parcels were scored using the following approach:

1. Select parcels 20 acres or greater
2. Compute parcel score by totaling RPI scores for each 30 meter cell within the parcel
3. Normalize parcel scores by dividing by the area of the parcel

Highest scoring parcels are shown in shades of bright yellow.

Legend

Parcel Ranking*

- Very High
- High
- Medium
- Protected Land

Other Features:

- Meramec River
- Rivers and Streams
- County Boundary
- City Boundary



Based on the Watershed Management Program (WMP) methodology developed with MDC, USFWS, and TRC.
<http://www.watershed.org>



Map created by the Trust for Public Land in St. Louis, MO. Content in this map is based on data provided by the Missouri State Council on Science and Technology, the Lower Meramec Watershed Council, and the United Agency for Science. The map is for informational purposes only and does not constitute a warranty of any kind. The map is provided as a service to the public and is not intended to be used for legal or financial purposes. All rights reserved. © 2009 Trust for Public Land. All other trademarks and registered trademarks are the property of their respective owners.

Appendix E: Successful Local Financing Referenda for Land Conservation

Since 1994, 100 percent of Missouri local conservation measures have passed generating almost \$600 million in new funds for land conservation.

Jurisdiction Name	Date	Finance Mechanism	Conservation Funds Approved	Status	% Yes
Arnold	8/5/1997	Sales tax	\$3,131,912	Pass	53%
Bel-Ridge	2/8/2005	Sales tax	\$120,000	Pass	82%
Belton	11/4/1997	Sales tax	\$11,000,000	Pass	63%
Beverly Hills	11/7/1995	Sales tax		Pass	55%
Chesterfield	11/8/1994	Bond	\$8,287,386	Pass	68%
Columbia	11/7/2000	Sales tax	\$17,000,000	Pass	54%
Columbia	11/8/2005	Sales tax	\$2,500,000	Pass	53%
Greene County	11/6/2001	Sales tax	\$7,480,000	Pass	60%
Greene County	8/8/2006	Sales tax	\$17,400,000	Pass	58%
Lee's Summit	11/4/1997	Sales tax	\$4,000,000	Pass	51%
Lee's Summit	4/5/2005	Sales tax	\$33,000,000	Pass	69%
Maryland Heights	11/7/1995	Sales tax	\$40,000,000	Pass	51%
O'Fallon	4/4/1995	Bond	\$2,000,000	Pass	76%
Overland	8/8/1995	Utility Tax	\$1,150,000	Pass	78%
Rolla	4/4/2004	Bond	\$800,000	Pass	66%
St. Charles County	11/7/2000	Sales tax	\$60,000,000	Pass	57%
St. Louis	11/7/2000	Sales tax	\$72,000,000	Pass	68%
St. Louis County	11/7/2000	Sales tax	\$280,000,000	Pass	70%
Town and Country	4/7/1998	Sales tax	\$186,000	Pass	55%
			\$560,055,298		

Appendix F: Potential Sources of Federal Funding for Land Acquisition in the Study Area

The Clean Water State Revolving Fund program provides low-cost financing for a wide range of water quality infrastructure projects. Federal funds must be matched by 20% non-federal funds. The funds water quality projects including nonpoint source, watershed protection or restoration, and estuary management projects, as well as more traditional municipal wastewater treatment projects. Land or easement acquisitions are permitted if they reduce nonpoint source pollution. Missouri's FY 2008 allotment of CWSRF funds was \$19,055,500.

The Drinking Water State Revolving Fund (DWSRF) program was established by the 1996 Safe Drinking Water Act Amendments. EPA provides grants to states for revolving loan funds for loans and other types of financial assistance to public water systems for eligible infrastructure improvements. There is growing recognition that protecting the source from contaminants is often more efficient and cost-effective than treating drinking water later. Missouri's FY 2008 DWSRF allotment was \$15,816,000.

Recovery Land Acquisition Grants from the US Fish and Wildlife Service provide funds to states and territories for the acquisition of habitat, through both fee and easement, in support of federally listed threatened and endangered species recovery. These funds must contribute to the implementation of a finalized and approved recovery plan for at least one species under the Endangered Species Act. If one of the mussel species is listed and has a recovery plan in place, this program may offer some opportunity to the study area.

Farm and Ranch Lands Protection Program grants are awarded by the Natural Resource Conservation Service (NRCS) to states, local governments and non-governmental entities on a competitive basis, according to national and state criteria and require up to a 50 per cent non-NRCS match to cover the cost of the easement. Up to 25 per cent of donated land value can be counted as the match. In FY 2007 Missouri received an allocation of \$639,621 from this program.

The Forest Legacy Program provides federal funding to states to assist in securing conservation easements on forestlands threatened with conversion to nonforest uses. The state can submit up to three grant applications each year for projects within previously designated areas. The federal government may fund up to 75 percent of project costs, with at least 25 percent coming from private, state, or local sources. In FY 2009, the Forest Legacy Program was funded at \$57.5 million. Since it joined the program in 2007, Missouri has received an allocation of \$2 million for the LaBarque Creek project in Jefferson County.

The stateside Land and Water Conservation Fund program provides a 50 percent match to states for planning, developing and acquiring land and water areas for natural resource protection and recreation enhancement. Funds are distributed to states based on population and need. Once the funds are distributed to the states, it is up to each state to choose the projects, though the National Park Service has final approval. Eligible grant recipients include municipal subdivisions, state agencies and tribal governments, each of whom must provide at least 50 percent matching funds in either cash or in-kind contributions and a detailed plan for the proposed project. Grant applications are evaluated based on the technical merits of the project, the public/private partnerships, and how the project addresses the identified needs and priorities of a statewide comprehensive plan. In FY 2008, Missouri received \$433,651 from LWCF.

Administered through the Department of Agriculture's Natural Resources Conservation Service, **Wetlands Reserve Program** is a voluntary program to restore wetlands. Participating

landowners can establish conservation easements of either permanent or 30-year duration or can enter restoration cost-share agreements of a minimum 10-year duration. In order for a property to be eligible for a WRP grant, the landowner must have owned the land for at least seven years, and the land must be restorable and suitable for wildlife benefits. The landowner continues to control access to the land and may lease the land for recreational activities. In FY 2007, Missouri received \$10,639,172 in WRP funds.

In 1984, Congress created the **National Fish and Wildlife Foundation** to benefit the conservation of fish, wildlife, plants, and the habitat on which they depend by attracting diverse investments to conservation and encouraging locally supported stewardship on private and public lands. Eligible grantees include federal, tribal, state, and local governments, educational institutions, and non-profit conservation organizations. Grants can range from \$50,000 to \$300,000 and typically require a 2:1 nonfederal match.

The **North American Wetlands Conservation Act** (NAWCA) provides matching grants for the acquisition, restoration, and enhancement of wetland ecosystems for the benefit of wetland dependent migratory species. Administered by the U.S. Fish and Wildlife Service, grants are available to nonprofit organizations, state and local agencies, tribes, and private individuals in the U.S., Canada, and Mexico. Two types of grants are awarded; small grants for up to \$75,000 and standard grants for up to \$1 million. There is a 1:1 non-federal match requirement for each grant although the average match of successful proposals is over 2:1. The Congressional appropriation to fund the grant program in FY 2009 was approximately \$42.64 million.

The **State Wildlife Grants Program** is a matching grant program that supports conservation efforts aimed at restoring or maintaining populations of native species to avoid listing under the Endangered Species Act. States' comprehensive wildlife conservation action plan determines what projects would be eligible. The State Wildlife Grants Program provides matching funds that are to be used to implement the conservation recommendations outlined in these plans. Since its inception in 2001, Missouri has received slightly over \$8.8 million in matching funds from this program.

The **Army Corps of Engineers has a Civil Works Program**. Two programs, Section 1135 and Section 206 are of special interest. Section 1135 provides authority for the Corps of Engineers to investigate study, modify, and construct projects for the restoration of fish and wildlife habitats where degradation is attributable to water resource projects previously constructed by the Corps of Engineers. Aquatic Ecosystem Restoration (WRDA Section 206) provides authority for the Corps of Engineers to carry out aquatic ecosystem restoration and protection projects. Each project is limited to a Federal cost of \$5,000,000. The total program limit is \$25 million.

Other federal programs can be used to get funding that could encourage conservation and active management of forested land, and increase the likelihood of permanent forestland protection by increasing the number of forest landowners enrolled in management programs. Forest Stewardship Programs (which are supported by funds from the USDA Forest Service, State and Private Forestry), and in Natural Resources and Conservation Service (or NRCS) programs under the Farm Bill (e.g., Wildlife Habitat Incentives Program or Environmental Quality Incentives Program).