OPPORTUNITIES FOR STREAM FISHERY CONSERVATION IN THE SALT RIVER WATERSHED

The following perspectives on problems and opportunities for watershed management will guide MDC management priorities and activities for the foreseeable future. We realize we are only one of many partners whose joint efforts will be needed to protect and restore stream ecosystem integrity in the Salt River watershed.

MANAGING MDC RIPARIAN OWNERSHIPS

Stream Access Acquisition

MDC has purchased small tracts of land along streams in order to provide public access for recreation and to establish an ownership stake that may strengthen our position in resisting system-wide threats to riparian habitat integrity. In the past, statewide planners have assumed that a desirable spacing was approximately ten stream miles between access areas. Experience suggests that it takes much longer to float and/or fish a typical reach of prairie stream than an equivalent length of Ozark stream. Because of slower currents and more frequent channel obstructions in the prairie region, we should seek to shorten the distance between access areas to five to seven miles on floatable, unchannelized prairie streams with high public use potential.

In order to provide a stream access system with optimal one-day trip distances, MDC should acquire at least four additional access sites in the Salt River watershed–one located on the North Fork Salt River between Arrow-Wood and Mound View accesses (T57N R10W S14), one on the Middle Fork Salt River approximately five miles downstream from Woodlawn AC (T55N R11W S29), one on the Elk Fork Salt River near highway 15 (T54N R10W S26), and one on the South Fork Salt River upstream from Santa Fe AC (T53N R8W S28).

Stream Access Development

Because of fiscal restraints, planned developments have not been completed on all existing stream access areas in the Northeast Region. Developments must be completed so citizens can experience the quality recreational opportunities that will build their individual commitment to helping preserve and restore streams in this and other watersheds. As a matter of strategic priority, MDC will complete planned developments on existing areas before acquiring many additional areas.

Development is largely complete at several access areas including: Paris AC, Santa Fe AC, Ted Shanks CA (access to Salt River), Hunnewell AC, and Indian Camp AC. Mound View AC remains undeveloped, but an entrance road, 5-car parking lot, and boat ramp are planned. Improved parking and a boat ramp are planned for Cedar Bluff AC. Improved boat launching ramps also need to be developed at Woodlawn AC and Arrow-Wood AC.

Site-Specific Stream Restoration

Although stream ecosystem health is almost entirely dependent upon processes occurring upstream and downstream of any given ownership, Department of Conservation riparian areas should serve as model of good stream stewardship. In the Salt River watershed, streambank erosion and forested corridor deficiencies are minor at MDC owned access areas. In areas where the forested corridor is narrow, passive restoration is being used to establish increase corridor width.

Public Use Information

Public use of Salt River watershed streams is low to moderate, partially because most people are unaware of the high-quality fishing/floating opportunities that exist there. People who enjoy Ozark streams may have stereotyped northern Missouri streams as turbid, unattractive ditches that contain primarily non-game fish. While this may be true of some highly altered channels in the prairie region, several reaches of many streams in the watershed resemble Ozark streams. Many reaches support diverse aquatic communities that provide good fishing or an even greater variety of sport fish than exist in many Ozark streams.

MDC could increase public use and appreciation of the Salt River watershed streams by developing a brochure describing stream recreational opportunities. Such a brochure would include colored pictures, simple stream maps with mileages, access sites and camping areas clearly marked, descriptions of other local attractions, and fishing opportunities/regulations. Statewide news releases and an article n the *Conservationist* magazine might also help to inform potential users of the opportunities awaiting them in the Salt River watershed.

CONSERVATION OF AQUATIC COMMUNITIES

Statewide, the Department of Conservation has developed a long-term Resource Assessment and Monitoring program (RAM). The objective is to establish standardized sampling methods for several stream ecosystem attributes, especially biotic communities, that will allow scientists to provide an accurate, legally defensible portrayal of conditions and trends. Sampling is occurring at random and fixed sites to allow statewide or individual watershed assessments. Information gathered from this effort may be used to prioritize watersheds for conservation.

Long-Term Fish Community Monitoring

Long-term monitoring to assess stream fish community trends has not been conducted in the Salt River watershed. Although some sites within the basin may be included in the statewide RAM program, extensive sampling within that framework is not likely to occur for several years. In the meantime, in order to monitor trends in fish community composition and population levels, the Department of Conservation should conduct fish community surveys at sites randomly selected from among those surveyed during 1995-97 at least every ten years.

Fishery Management and Research Needs

As in most northeastern Missouri streams, fish communities in the Salt River watershed seem to be imbalanced. Recognizing that our sampling methods may under represent large fishes, surveys in some basin streams still suggests the existence of relatively few fish-eating predators (flathead catfish, black bass or walleye), but large numbers of insect-eating bottom feeders (channel catfish, river carpsuckers, freshwater drum, common carp, and a variety of minnow species). Non-game fishes are represented mostly by species tolerant of the shallow depths and shifting substrates caused by excessive watershed erosion and subsequent stream channel sedimentation. Shifting substrates dramatically reduce biological productivity, so in channelized streams the large populations of insect-eating fish are almost entirely dependent upon terrestrial inputs or whatever invertebrate production occurs on in-channel woody debris. There are not enough predatory fish to control the abundant insect-eating fish. Degraded habitat may be the main factor limiting predator abundance and thereby preventing ecosystem balance.

We know very little about the abundance, migration patterns and minimum habitat requirements of the key-predator–flathead catfish. We need basic research, starting with studies of flathead catfish movement and exploitation rate, to begin developing a broad range of strategies for effectively managing sport fishes in streams (e.g., regulation, stocking, and information/education in addition to habitat protection/restoration).

Walleye represent another major predator in basin streams; however, surveys indicate that natural reproduction and density is low. A stream stocking evaluation was initiated in 1999 with the goal of determining if stream stockings of small or advanced size walleye will result in a quality walleye fishery in Mark Twain Lake and its Salt River tributaries.

Monitoring Contaminants in Fish

Fish contaminant monitoring has been conducted in Mark Twain Lake and some basin streams. The entire basin was included in a limited consumption advisory issued by the Missouri Department of Health for fish species with a high proportion of fat in their edible tissues (catfish, carp, buffalo, drum, suckers). Levels of concern for chlordane were reported in the early 1990s for catfish in this and neighboring watersheds and the Mississippi River. This advisory was lifted in 2001 due to declining chlordane levels. However, another consumption advisory was added in 2001. This new advisory, issued due to mercury contamination, recommends that pregnant or nursing women, women of childbearing age, and children 12 years of age or younger not eat largemouth bass 12 inches long or longer from anywhere in Missouri.

Long-Term Mussel Community Monitoring

Mussels are abundant in some reaches of basin streams. Extensive, basin-wide surveys have not been conducted. The Department of Conservation needs to assess species diversity and abundance by conducting a carefully designed, system-wide survey. Survey sites and sampling periodicities should be consistent with RAM and other fish survey protocols.

SUPPORTING OTHER AGENCIES AND ORGANIZATIONS

The Missouri Department of Conservation works with many other governmental agencies and private conservation organizations in the process of managing stream resources. The following formal or traditional interactions are among the most significant in frequency and scope, and they should be continued.

Missouri Department of Natural Resources (DNR)

MCD assists DNR by periodically nominating high quality or otherwise valuable stream reaches for "Outstanding State Resource Water" status; recommending water quality standard classifications for stream reaches of special concern; and assisting in water pollution investigations whenever an event results in the loss of aquatic life. In such cases, MDC's role is to document the number of dead fish and other aquatic organisms and report to DNR the estimated value of animals lost according to formulas established by th American Fisheries Society. MDC should continue its coordination efforts with DNR to ensure efficient use of state government resources in the conservation of streams in the Salt River watershed.

Missouri Department of Health (DOH)

MDC assists DOH by periodically collecting fish from select streams and preparing tissure samples for analysis of pesticide and heavy metal contaminants. We cooperate with DOH in advising anglers about precautions to take in the consumption of fish.

U.S. Army Corps of Engineers (COE)

MDC joins several other agencies in commenting to COE and DNR about activities in streams that require permit and certification under Sections 404 and 401, respectively, of the Federal Clean Water Act. COE requires a Section 404 permit for operators who propose to deposit or stockpile material in stream channels; and DNR requires a Section 401 certification for any activity that could significantly degrade water quality. MDC biologists help to disseminate information about stream-friendly sand and gravel removal practices to county commissions, contractors, and landowners.

MDC personnel are often the first agency representatives contacted by neighbors when individuals or public entities engage in what appears to be unpermitted and destructive practices in and along streams. MDC biologists should remain vigilant advocates for the interests on all riparian residents, upstream and downstream, who may be adversely affected by the activities of those few who knowingly violate Sections 404 or 401 of the Clean Water Act.

MDC recognizes that regulations are necessary to protect streams and their watersheds. Watershed management must be approached in a balanced, market-based manner that falls somewhere in the continuum between regulatory protection and voluntary conservation efforts.

MDC staff also work closely with COE regarding fishery management activities at Mark Twain Lake.

Conservation Federation of Missouri (CFM)

MDC facilitates and promotes Stream Team, a program initiated by CFM that seeks to enlist volunteers in the stream conservation effort. Many Teams have adopted streams in the Salt River watershed; however, most report little to no activity. Far more citizen interest and volunteer effort will be needed for any significant stream improvements to occur within the watershed.

Clarence Cannon Wholesale Water Commission (CCWWC) and University of Missouri Outreach and Extension (MUOE)

The CCWWC and MUOE coordinate the North Fork Project. This watershed project, supported by many governmental agencies, business owners, landowners, and municipal leaders, seeks to provide informational/educational materials and training that leads to better coordinated management activities in the North Fork Salt River watershed. MDC provides technical support to the North Fork Project and assists in major educational efforts.

ASSISTING CITIZEN-LED WATERSHED CONSERVATION EFFORTS

We are convinced that the watershed conservation approach will work only if there is widespread recognition that social, economic, and environmental values associated with streams are compatible. If that can be achieved, success will depend upon local initiatives to form diverse partnerships of committed groups and individuals under the leadership of landowners and other local interests.

Watershed restoration is essential to restoring the primary processes that create and maintain fish habitat in healthy stream ecosystems. The most critical and affordable first step in watershed restoration is *passive* restoration–the cessation of human activities that are causing degradation or preventing recovery (e.g., channelization, riparian corridor clearing, indiscriminate gravel dredging, and streamside livestock grazing). Active restoration (e.g., tree revetments and riparian corridor plantings) should be considered only if recovery fails to occur over a reasonable period of time while using *passive* techniques (e.g., livestock exclusion and natural regeneration of woody plants). Because restoring degraded stream ecosystems is more costly and risky than simply protecting fully functional sites, we suggest that protecting and preserving intact riparian ecosystems be the highest priority of watershed-scale restoration efforts.

Protecting Healthy Riparian Corridors–Stream Stewardship

A program aimed at conserving healthy forested stream corridors by placing them into permanent easements using Stream Stewardship Agreements (SSA) was piloted in Marion County between 1992 and 1995. That effort resulted in the permanent conservation of 88 acres of 100- to 200-foot-wide forested corridor on four ownerships along 2.4 miles of the South Fabius River. Although there are no SSA in the Salt River watershed, the infrastructure now exists for MDC to facilitate the permanent conservation of healthy stream corridors, but measurable impact will require funding from a variety of sources. Enrollment of streamside lands in continuous CRP (Conservation Reserve Program) will not substitute for enrollment in

SSA or other permanent easement programs because healthy forested corridors cannot be enrolled in CRP, and land enrolled in CRP buffers may be converted back to crop production at the end of the short-term contract periods (10 to 15 years). However, CRP may provide viable first step for landowners on the long path toward converting eroding floodplain crop fields or pastures into functional riparian corridors. MDC has identified the Elk Fork Salt River as the most likely watershed for SSA and other subsidized stream management practices in the Salt River watershed.

Passively Restoring Mildly Degraded Riparian Corridors–Livestock Exclusion

The activity of livestock can degrade physical aspects of water quality by causing streambank erosion, resulting in turbidity and stream channel sedimentation. Chemical aspects of water quality can be degraded by livestock waste. In some situations, streambank stabilization, corridor reforestation, and improved water quality can be achieved simply by excluding livestock from stream corridors. For fencing to be attractive to landowners, an alternative source of livestock water must be available (e.g., upland ponds, or shallow floodplain wells tapped by nose pumps or solar-powered pumps). Some landowners may have potential alternative water sources on their property, but may not have the money or the technical support to adopt new technology. Cost-share money for fencing and alternative watering may be available through a variety of federal and state programs. Department of Conservation biologists are available to assist landowners in selecting a practical alternative to instream watering of livestock.

Actively Restoring Moderately to Severely Degraded Corridors

A 75% cost-share program for stream restoration practices (e.g., tree revetments and riparian corridor tree plantings) was piloted by MDC in Sullivan County between 1990 and 1993. The program had no participants, despite the fact that 41% of county landowners were aware of monetary incentives. The problems and their solutions were often complex, and MDC assistance had stipulations (ten-year forested corridors 50 to 100 feet wide) which many landowners were unwilling to accept. The lesson learned? These landowners were not prepared to make the personal sacrifices in time, money, and values needed to restore moderately to severely degraded stream habitats on their property. Available funds might be better spent first on protecting healthy riparian corridors and passively restoring those that are only mildly degraded.

Educating Future Watershed Stewards

Educating our youth about the complexities of watershed processes and problems will be critically important in advancing the science and art of watershed conservation. Today's youth are more technologically oriented and therefore likely to embrace complex information systems. And because of changes in classroom teaching strategy, they are likely to work effectively in problem-solving teams once they become adults.

MDC has found that students in and around the 6th grade are particularly receptive to messages about stream conservation because they can understand most concepts and evaluate new ideas with relatively little social or cultural bias. Classroom teachers may find helpful lesson-planning materials in Missouri's *Stream Team Curriculum*, a watershed-based curriculum developed by

teachers, for teachers, that will help students to meet environmental education goals in the Missouri Performance Standards.

Junior high and high school students in vocational agricultural programs may also be prime candidates for watershed conservation education because they are more likely than others to become landowners and other important members of rural communities. Involving these students in hand-on stream conservation activities may contribute to the creation of a new generation of landowners committed to stream ecosystem integrity.

CITIZEN PRIMER TO LEADERSHIP IN WATERSHED CONSERVATION

This section is included as a starting point for citizens who wish to lead or contribute significantly to watershed-based stream conservation efforts. The proliferation of information about watershed planning can be intimidating to individuals or groups who have decided that they have a problem they wish to fix. To facilitate that process, we recommend that potential leaders and contributors to watershed conservation efforts first familiarize themselves with a summary of lessons learned over the past decade about what works and what does not. The list in Table 11 combines the *Top 10 Watershed Lessons Learned* published by the United States Environmental Protection Agency (1997) with the ten principles for effectively coordinating watershed-based programs listed by Turner (1997). These documents are highly recommended reading.

Citizens determined to develop and implement watershed conservation plans can also obtain critically important information about organizing and funding such projects by visiting the Internet websites listed in Table 12. These sites contain convenient links to many other sites that, in the aggregate, provide enough information about the watershed conservation process to help any individual or group get started in an informed and effective manner.

Table 11. Ten useful watershed conservation principles.*

1) For watershed conservation approach to work, there must be widespread recognition that social, economic, and environmental values are compatible.

2) Successful watershed conservation requires the formation and support of diverse partnerships under the authority of landowners and other local interest.

3) Leadership is critical in the watershed approach to conservation.

4) A good coordinator is key to successful watershed conservation projects.

5) The best plans have clear visions, goals, and action items.

6) Good tools (planning guides, technical assistance, and funding sources) are available to help watershed groups achieve their goals.

7) It is important to start small and demonstrate success before working on larger scales, celebrating even minor success as it occurs.

8) Plans are most likely to succeed in implemented on a manageable scale.

9) Public awareness, education and involvement are keys to building and maintaining support for watershed conservation efforts.

10) Measuring and communicating progress is essential to the success of watershed conservation efforts.

* For EPA Publication 840-F-97-001, call the National Center for Environmental Publications and Information at 1-800-490-9198.

Table 12. Internet websites containing important information for Missouri watershed planners.

Conservation Technology Information Center
www.ctic.purdue.edu
CTIC is a non-profit, public-private partnership equipping agriculture with realistic, affordable, and intergrated solutions to environmental concerns.

EPA Watershed and Wetlands
www.epa.gov/OWOW
This site, created and maintained by the federal Environmental Protection Agency, is a good starting point for information about watersheds and water quality.

Funding Sources for Watershed Conservation
www.epa.gov/OWOW/watersheds/wacademy/fund.html#forward
This site contains a comprehensive listing of private and public sources of watershed project funding, with links to many individual sites and references to many useful publications.

Know Your Watershed
www.ctic.purdue.edu.KYW/KYW.html
This initiative works to encourage the formation of local, voluntary partnerships among all watershed stakeholders for the purpose of developing and implementing watershed plans based upon shared visions of the future.

Missouri Stream Team
www.rollanet.org./~streams/
This site provides specific information on activities, programs, and funding sources for volunteers who have adopted Missouri streams or otherwise committed themselves to conserving stream resources in Missouri.

Missouri Watershed Information Network
http://outreach.missouri.edu/mowin/
This site serves as a clearinghouse for information about Missouri watersheds.

River Network
www.rivernetwork.org/wag.htm
This organization supports development of local watershed partnerships through its Watershed Assistance Grants Program. They seek to fund projects in diverse geographies that have demonstration value on a national scale.