Rutherford Creek

Watershed-Based Plan

Prepared by:

Tennessee Scenic River Association's

Duck River Opportunities Project

In cooperation with:

HARPETH RIVER WATERSHED ASSOCIATION

Funding provided by:

Tennessee Department of Agriculture
State Contract No. GR-06-17452-00
EPA Assistance Agreement No. C9994674-05-0

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Tennessee Scenic River Association's Duck River Opportunities Project

The Tennessee Scenic Rivers Association (TSRA) is a 501(c)(3), conservation organization with the purpose of protecting and restoring the free flowing rivers in Tennessee. The Rutherford Creek Watershed Based plan has been developed by TSRA's Duck River Opportunities Project (DROP) and is proposed to be implemented in coordination with the Tennessee Environmental Council (TEC). Rutherford Creek is located in southwestern Williamson and northern Maury counties and is a part of the Duck River Watershed.

This project is funded, in part, under an agreement with the Tennessee Department of Agriculture, Nonpoint Source Program and the U.S. Environmental Protection Agency, Assistance Agreement, C9994674-05-0. Grant contract # GR-06-17452-00.

1) Identification of Causes and Sources

The Tennessee Department of Environment and Conservation (TDEC) 2006 303(d) List identifies the cause of degradation in Rutherford, Crooked and McCutcheon Creeks and Grassy Branch (Rutherford Creek Watershed) generally as siltation, nutrients, loss of biological integrity and alteration of stream side or littoral vegetation. Pollutant sources include land development, discharges from municipal separate storm sewer system (MS4), minor municipal point sources and pasture grazing. The Duck River Opportunities Project (DROP) has been working in and around Rutherford Creek watershed collecting data as well as implementing best management practices on a limited scale for the past four years. One observation supporting TDEC findings are the presence of large areas of bank erosion along the main stem of Rutherford Creek and its tributaries including McCutcheon Creek and Grassy Branch.

2) Load Reduction Estimates

Load reduction estimates in Table 1 are based on the best available data for the management practice and its ability to reduce pollutant loads according to the Center for Watershed Protection's Watershed Treatment Model. The two core practices to address the cause (siltation) identified by TDEC are riparian restoration and stream bank stabilization. In a suburban - urban environment these practices would generally include riparian revegetation and stream bank stabilization through cedar revetment installation, jetties and/or bank revegetation. In some cases the practice may include the creation of recreational greenways. Livestock exclusion, providing for alternative water supply or limited stream access watering points is necessary to restore riparian zones in more rural parts of the subwatershed. Finally, in suburban – urban environments lawn care education and erosion control programs will be needed.

3) Description of Non-point Source Management Measures (BMPs)

The two primary non-point source management measures necessary to abate the pollutant sources and causes associated with the State's 303 (d) listing of Rutherford Creek in the Duck River Watershed are riparian restoration and stream bank stabilization.

Table 1 - Load Reduction Estimates

Practice/Pollutant	Sediment (lbs/year)	Nutrients (lbs/year)
Riparian Restoration	101,687 *	1330 *
Stream bank stabilization	10,168**	133 **
Erosion and Sediment Control Program	29,046***	4357***
Lawn Care Education Program	**N/A**	8992****
Total Estimated Reductions	**140,901**	**14,812**

* Estimate based on Watershed Treatment Model (WTM), 35-foot buffers, both banks, along 34.5 miles of stream.
** Based on Best Professional Judgment
*** Based on a 0.4 program discount, & 0.3 installation and maintenance discount (the lowest values possible) for WTM.
**** Based on WTM & assuming source information is correct.

3.1) Riparian restoration consists of two basic activities including; 1) removal of the cause of degradation and 2) restoration of the vegetative community. In addition, some hydrologic conditions may need to be restored. Removal of the cause of degradation includes livestock exclusion and provision for alternative water supply. Livestock exclusion will be accomplished by fencing riparian zones. Alternative water supply may be provided by one of two mechanisms, placement of trough or tank outside the livestock exclusion zone or a limited stable access point allowing livestock to enter the creek. Based on conversations with district conservationists, water supply should be provided every 2,000 feet. Once livestock are excluded from the riparian zone and alternative water supply provided riparian (buffer) restoration can occur.

The Natural Resources Conservation Service (NRCS) guidelines call for a minimum of a 35 foot wide buffer along rivers and streams, however other sources call for up to a 100 foot buffer (see Wenger, 1999). TEC will promote as wide a buffer as seemingly possible, based on land condition, landowner concerns and other factors that may apply. In an effort to leverage additional (NRCS) funds, buffers need to be a minimum of 35 feet wide. However, because TDEC biologist (personal communuication wtih James R. Smith) and others have observed improvements in water quality associated with one row of trees along creek banks, and because land owner objections often have to do with loss of land to graze, crop etc. TEC will advocate for as much width as possible, but in some cases will work to reestablish minimal riparian zones. Revegetation may occur by two methods including active planting and/or natural “volunteer” revegetation. While the latter is more cost-effective, it may not provide as desirable a mix of biodiversity.

Finally, in some cases it may be necessary to restore natural hydrology to the riparian zone in cases where aquatic systems are severely down cut or where channels have

formed through riparian zones. This would in effect bypass sheet flow and thus pollutant load reductions associated with the filtration/infiltration capacity of the riparian zone.

3.2) Stream bank stabilization will be carried out along roughly 25 % of stream banks. Stream bank erosion is a significant problem in the headwaters of Rutherford Creek and thus treating all stream banks is not cost-effective or practical.
Stabilization projects will be prioritized based on protecting specific ecological assets and treating the most significant problem areas. For example, streams with one row or scattered trees on a highly erosive stream bank would be treated in a effort to protect and save those trees (ecological asset) providing shade and detrital material (habitat and food) to the system. Secondly, long, highly erosive segments may be treated. This should provide for the greatest load reductions at the least cost.

The primary method utilized to treat eroding stream banks will be placement of cedar revetments, possibly with reshaping of banks, back fill and revegetation. HRWA has utilized cedar revetment to treat banks as high as 12 feet and generally found them effective in reducing stream bank erosion. The technique utilized was developed by Jen-Hill Construction for cedar revetments. The process is the same as that recommended by the NRCS, except cedar trees are bundled in jute or coir matting, prior to being attached to the stream bank. The matting helps capture more sediment by allowing cedar tree branches to be more compact/dense. In addition, the revetment can be backfilled and revegetated immediately following installation.

Restoring the riparian forest, Sycamore seedlings, winter 2003 along McCutcheon Creek in the Duck River Watershed, Spring Hill, Tennessee.

Sycamore seedlings, summer 2005, two years of growth along McCutcheon Creek in the Duck River Watershed, Spring Hill, Tennessee.

4) Cost Estimates

4.1) Technical and Financial Resource Estimates

DROP, NRCS and DROPs technical advisors will work with individual landowners to develop site-specific plans for stream restoration projects. Best management practice (BMP) cost estimates are generally based on past experience and directly relate to stream miles impaired and causes and sources associated with the TDEC 303(d) listing. Thus, BMP cost estimates are for the entire subwatershed and presented in Table 2.

DROP will work with local officials on the implementation of the erosion control and lawn care education program (LCEP). The LCEP will be carried out utilizing public service announcements in conjunction with the WaterWorks! program at MTSU. The erosion and sediment control program will be funded through participating municipalities. Spring Hill will soon be a part of the state MS4 program and as such will be required to establish an effective erosion and sediment control program.

4.2) Sources of Technical and Financial Resources

HRWA will seek funds from multiple sources. Sources include State/EPA 319 grants, NRCS farm conservation programs such as Environmental Quality Incentives program (EQIP), private foundations such as the Fish and Wildlife Foundation, private business and individual donors. HRWA staff has been successful in incorporating NRCS farm programs into agricultural BMP implementation costs and has seen as much as 75% of costs covered by those programs. However, limitations exist for these programs, mainly limited funding and NRCS ability to deliver the programs in a timely manner. Thus, while this is an excellent source of cost share dollars, its limitations must be considered. Most if not all site-specific BMP implementation will require a diverse source of funding. In the suburban – urban environments NRCS funds will not be available and thus other sources of financial resources must be sought. These include local governments, public and private foundations, private business and individual donors.

Table 2 - Financial Resources Estimates

Cause/Source/Program component	Stream miles in need of treatment	Practice	Cost ($) per mile	Total Cost ($)
Siltation, loss of habitat, physical alteration, loss of littoral, stream side vegetation, nutrients land development / MS4, pasture grazing	34.5	Riparian Restoration (includes recruitment of landowners, livestock fencing [$1.00/foot for 90552'*], alternative water supply [46 @ $4000.00/], re vegetation [@35' wide, 300 seedlings/1000' length]	17,905.00	617,742.00

Siltation, loss of habitat, physical alteration, loss of littoral, stream side vegetation, nutrients land development / MS4, pasture grazing	8.6 **	Stream bank Stabilization	180,042.00	1,548,360.00
Education				541,525.00
Totals			**$197,947.00**	**$2,707,627.00**

*Assumes ½ of stream miles to be in pasture
** Assumes ¼ of stream miles to be treated

4.3) Plan Implementation Authorities

The Tennessee Scenic Rivers Association's Duck River Opportunities Project (DROP) and Tennessee Environmental Council in partnership with local governments (Williamson and Maury County, Spring Hill) and Natural Resources Conservation Service will be the primary agency's responsible for the implementation of the plan. In addition, DROP will work with any other agency or individuals identified with potential to impact the Rutherford Creek Watershed.

Established in 1999, DROP is a science and technically based watershed conservation project that has historically focused on protecting and restoring the ecological health of the respective river systems. Work has focused on river restoration, education and outreach that promote proactive, cooperative efforts to improve long-term conservation of Tennessee's vast water resources. Our work leverages scientific and technical experience of staff and advisors in additon to efforts of a diverse corps of volunteers who represent a crucial link in every aspect of DROP program work.

Some accomplishments include work funded by two 319 grants (and HRWA work) to focus on reduction in nonpoint source pollution. One project lead by McFadden for HRWA Visual Stream Assessment (VSA) in which 25 volunteers, logged over 550 hours, surveying 217 sites on 303(d) segments in the watershed. Data, including 800 photographs, included in an Access database and report produced, which is now used by staff to drive restoration program.

With a second 319 grant in 2002, DROP, in cooperation with HRWA, launched the Volunteer River Restoration Corps, an ongoing effort to engage citizens, schools, municipalities, farmers and others to improve long-term water quality of the Rutherford Creek and Duck River Watersheds by improving stream and riparian habitat on a site by site basis. DROP/HRWA completed over 20 stream and riparian restoration projects, planting over 25,000 seedlings, and stablizing close to 1700' (+/-) of stream bank. This could not have been accomplished without volunteers. The 2002 319 grant also included the gathering of field data, something DROP had been doing since 1999 to assess the effectiveness of restoration on water quality.

DROP is currently working with a group of citizens near Rutherford Creek to develop a stakeholder based restoration plan as a part of the current 319 project.

5) Education/Outreach

DROP, in conjunction with NRCS, may carry out field days for agricultural operators, and will work to have participating farmers present to and help recruit other farmers into the program for conservation. In addition, DROP will continue to work with Spring Hill High School and other youth groups utilizing the Protecting Our Watersheds curriculum in an effort to 1) add to information provided by TDEC and others and 2) get students involved in identifying and implementing restoration projects. The core of the educational programs will be related to gathering and training local citizens to speak on behalf of restoration.

Secondly, and perhaps most importantly, DROP will work with local officials and staff to help determine the best ways to meet water quality load reductions called for in the sediment TMDL on the Duck River. Our approach will be to utilize the basics of watershed science to help local officials and staff develop effective short and long-term programs that protect watershed quality. One example might be to utilize the watershed treatment model to help engineering staff understand the importance of maintaining less than 10 % imperviousness within a subwatershed or increasing the use practices that decrease sediment loss (siltation) at development sites.

5.1) Erosion and Sediment Control Program

The Erosion and Sediment Control program is primarily a function of local municipalities. However, given a lack of MS4 status in the Rutherford Creek subwatershed DROP will focus attention on the town of Spring Hill (McCutcheon Creek) in a effort to educate local leaders, developers and contractors about the need for an effective erosion and sediment control program. In addition, DROP will continue working with Achiever Development Corporation and other developers on implementation of short term practices to control sediment.

5.2) Lawn Care Education Program

DROP will work with the Middle Tennessee State University's Center for Environmental Education's WaterWorks! program on lawn care education (LCEP). The majority of public education outreach will be accomplished via radio and secondly through public speaking engagements with rotary, church groups, etc. The message will be targeted toward homeowners and their lawn fertilization practices.

6) Schedule for implementation - Total implementation time is estimated to be 20 years.

Activity	Year(s)
1) Identify and meet with project partners, landowners, homeowners associations	1 - 10
2) Identify willing landowners, homeowners associations., developers, etc.	1 - 18
3) Develop LCEP outreach information in conjunction w/ MTSU	1 - 3
4) Work with city and county to develop protocol to educate	1 - 3

developers and disseminate LCEP information	
5) Identify and train willing youth groups, scouts, schools, etc.	1 - 20
6) Carry out pre BMP information collection	1, 3, 5, 7, 9, 11, 13, as needed.
7) Develop site specific BMP implementation plans	2 - 18
8) Implementation of BMPs	2 – 20
9) Carry out post BMP information collection / assessment	4, 6, 8, 10, 12, 14, 16, 18, 20
10) Final report	19, 20

7) Watershed Restoration Milestones

Milestones	Year(s)
1) Site specific BMP plan development	2-18
2) Youth groups collecting information in the watershed	1 - 20
3) One community meeting per year, articles to local newspaper (4/year)	1-20
4) Develop LCEP outreach information in conjunction w/ MTSU	1 - 3
5) Work with city and county to develop protocol to educate developers	1 - 3
6) Collect information prior to BMP implementation	1, 3, 5, 7, 9, 11, 13, as needed.
7) Site specific BMP implementation	2 – 20
8) BMP implementation assessment / analysis (survival, structure integrity)	4, 6, 8, 10, 12, 14, 16, 18, 20
9) Final report and public meeting	19, 20

8) Measures of Success

The long-term success of the program will be measured utilizing TDEC watershed data. TDEC is in the watershed every five years collecting data through their watershed cycle. Data include benthic macroinvertebrate inventories (BMI) and habitat and physical/chemical measures. Ecological health is defined as the inclusion of benthic macroinvertebrate communities that are deemed by TDEC as fully supporting the fish and aquatic life use of waters of the state as compared to the appropriate ecoregional reference site. DROP/TEC staff will utilize TDEC data in addition to other data collected by professional and volunteers to determine if the plan (orTMDL) needs revising. The main criteria will be BMI collections as many organizations, including TDEC and U.S. EPA consider this the primary characteristic of healthy aquatic systems. However, based on individual sampling plan data (e.g. TSS) associated with localized site work, it maybe determined that a specific practice, in a specific application situation is not functioning as predicted. The practice may then be modified and or excluded from the suite of practices being recommended. DROP will utilize the Watershed Treatment Model to make basic watershed load reduction predictions and the Georgia tool, developed by AMEC environmental (currently being adapted for Middle Tennessee) to make site level predictions as allowed. This may be followed up with actual data collection to verify

predictions. If predictions are not verified, then the plan (or TMDL) will be revised to increase the effectiveness of load reductions.

9) Monitoring Component to Evaluate Effectiveness

Three basic monitoring components will be utilized including; 1) benthic macroinvertebrate (BMI) data collected on the five year cycle by TDEC (sentinel data) and possibly collected by DROP (staff and volunteers) (site-specific), 2) physical habitat data collected on specific sites and 3) practice implementation data, such as stream miles fenced off from livestock, trees planted/survival rates and stream bank stabilized.

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