HARPETH RIVER WATERSHED ASSOCIATION

HARPETH RIVER HEADWATERS
WATERSHED RESTORATION PLAN

Harpeth River Headwaters, Cheatham Branch

Harpeth River Watershed Association
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The Harpeth River Headwaters Watershed Restoration Plan was developed for the headwaters area, generally located in Rutherford County and Eagleville, Tennessee and encompassing Cheatham Branch, Kelly Creek, Concord Creek, and Puckett Branch including associated tributaries. The plan includes the identification of causes and sources (or groups of causes/sources), load reduction estimates, description of nonpoint source management measures (BMPs), cost estimates, information/education, schedule for implementation, milestones, measures of success and monitoring components to evaluate effectiveness.

1) Identification of Causes and Sources (or Groups of Causes/Sources)

The Tennessee Department of Environment and Conservation (TDEC) 303(d) List identifies the cause of degradation in the headwaters generally as alteration in stream-side or littoral vegetative cover, siltation and pollutant sources such as pasture grazing and removal of riparian habitat. The Harpeth River Watershed Association (HRWA) has for the past year been in the process of developing additional data on the headwaters area and generally agrees with the TDEC listed causes and sources.

1.1) Concord Creek (TN13204018-0200)

Specifically, fifteen and one tenths (15.1) miles of Concord Creek are identified as impaired as a result (cause) of "alteration in stream-side or littoral vegetative cover and siltation" with the specific source being identified as "pasture grazing and removal of riparian habitat."

1.2) Unnamed Tributary to Harpeth River (TN05130204018-0300)

One and three tenths (1.3) miles of an unnamed tributary to the Harpeth River are identified as impaired as a result (cause) of "alteration in stream-side or littoral vegetative cover and siltation" with the specific source being identified as "pasture grazing."

1.3) Kelly Creek (TN05130204018-0400)

Nine and three tenths (9.3) miles of Kelly Creek are identified as impaired as a result (cause) of "alteration in stream-side or littoral vegetative cover and siltation, *E. coli*" with the specific source being identified as "pasture grazing." However, there are additional sources that should be considered, including a large sod farm operation that, while the operator is very conscious of fertilizer loss, may in fact be a major contributor of sediment and thus nutrients to the Kelly Creek system. Based on conversations with many of the contacts HRWA has made over the past two years, it would appear that septic systems maybe an issue in Cheatham Branch, a tributary to Kelly Creek. We are

currently working with MTSU to conduct some preliminary fecal coliform work, including source tracking, to determine the validity of these statements.

1.4) Cheatham Branch (TN05130204018-0500)

Three and four tenths (3.4) miles of Cheatham Branch are identified as impaired as a result (cause) of "alteration in stream-side or littoral vegetative cover and siltation" with the specific source being identified as "pasture grazing."

2) Load Reduction Estimates

Load reduction estimates are based on the best available data for the best management practices chosen. The two core practices needed to address the cause and sources identified by TDEC are riparian restoration and streambank stabilization. Practices would generally include livestock exclusion, providing for alternative water supply via trough or tank, or limited stream access watering points, riparian revegetation and streambank stabilization through cedar revetment installation and/or bank revegetation. Estimates of pollutant reductions for each practice are as follows:

Load Reduction Estimates

Practice/Pollutant	Sediment (lbs/year)	Nutrients (lbs/year)	Fecal Coliform **	*E. coli* **
Riparian Restoration	92,174 *	1737 *	80%	80 %
Stream Bank Stabilization	9,217 **	173 **	1%	1%
Total Estimate – All Practices	**101,391**	**1,910**	**81%**	**81%**

* Estimate based on Watershed Treatment Model, Center for Watershed Protection on 35-foot buffers, both banks, along 29.1 miles of stream.

** Based on best professional judgment, personal communication with Dr. Frank Bailey (MTSU) & assuming source information is correct.

3) Description of Nonpoint Source Management Measures (BMPs)

HRWA has been working with the local community to begin developing relationships that foster a better understanding of why restoration of the headwaters are important, both from an economic and water quality perspective. For example, HRWA along with NRCS provided information to local cattlemen about increasing beef production and reducing vet bills by providing clean water for livestock. In addition, we helped implement BMPs on four sites as a part of our current 319 grant and are currently working with three additional landowners to develop site specific BMPs.

Much of the restoration BMP implementation to date has been organized by HRWA staff. It takes considerable time to line up landowners, design site-specific BMPs, coordinate projects, purchase materials and coordinate volunteers and/or

contractors. There is significant staff time dedicated to BMP restoration implementation detailed in the budget so that a truer cost of BMP implementation is shown.

HRWA also leverages BMP restoration funds with significant in-kind contributions both by our expert advisors and the Volunteer River Restoration Corp. Almost every restoration project to date has involved volunteers. This proposal supports the River Restoration Program manager to coordinate all activities associated with BMP implementation. Youth groups, Eagle Scouts and faith groups are a core volunteer group and we are currently focusing on expanding this to include 4H, FFA, other youth organizations and civic groups. For the headwaters, a locally based part-time coordinator has been hired and is assisting in building locally based River Restoration Program volunteers and for outreach and education components as described below. It is critical to have volunteers in close proximity to restoration projects to develop community support and understanding as well as increased participation, especially in riparian restoration and stream bank stabilization projects.

The two primary nonpoint source management measures necessary to abate the pollutant sources and causes associated with the State's 303(d) listing of the headwaters streams in the Harpeth River are riparian restoration and streambank stabilization. Finally, HRWA will implement a septic maintenance and upgrade program for the Eagleville community should the data collected by MTSU warrant such a program.

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 NRCS guidelines call for a minimum of 35 foot wide buffer along rivers and streams, however other sources call for up to a 100 foot buffer (see Wenger, 1999). HRWA 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 would need to be a minimum of 35 feet wide. However, because TDEC biologist (per communication with 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., HRWA will advocate for as much width as possible, but in some cases work to reestablish minimal riparian zones (e.g. whatever we can get). 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 by grading and or creating berms within the riparian zone. In cases where aquatic systems are severely down cut or unnatural channels have formed through the riparian zone, it may be necessary to regrade or berm areas to detain riparian flows in order to increase contact time and thus pollutant load reductions and infiltration rates.

3.2) Streambank Stabilization will be carried out along roughly 10% of stream banks. Streambank erosion is a significant problem in the headwaters of the Harpeth River and thus treating all stream banks is not cost-effective or practical. Stabilization projects will be prioritized based on protecting specific ecologic assets and treating the most significant problem areas. For example, streams with one row of or scattered trees on a highly erosive stream bank would be treated in an effort to protect and save those trees providing shade and detrital material (habitat and food) to the system (ecological asset). In systems impacted by sediment, 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 streambanks will be placement of cedar revetments, possibly with reshaping of banks, back fill and revegetation. HRWA has utilized cedar revetments to treat banks as high as 12 feet and generally found them effective in reducing stream bank erosion. HRWA utilizes a technique 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 jute/coir matting helps capture more sediment by allowing cedar trees to be denser. In addition, the revetment can be backfilled and revegetated immediately following installation.

4) Cost Estimates

4.1) Technical and Financial Resources Estimates

HRWA, NRCS and HRWA's technical advisors will work with individual landowners to develop site-specific plans for stream restoration. Cost estimates are generally based on past experience and directly related to impaired stream miles and causes and sources associated with the TDEC 303(d) listing. Thus, the cost estimates are for the entire impaired subwatershed.

Financial Resources Estimates

Cause/Source/Program Component	Stream Miles in Need of Treatment	Practice	Cost ($) /Mile	Total Cost ($)
Pasture Grazing	29.1	Riparian Restoration (includes recruitment of landowners,	$33,891.00	$986,252.00

		livestock fencing [$1.00/foot for 153,648 feet], alternative water supply [77 @ $4,000.00/], re-vegetation [@35' wide, 300 seedlings/1000' length]		
	2.9	Stream bank Stabilization	$244,765.00	$709,818.00
Outreach & Education				$803,138.00
Totals			**$278,656.00**	**$2,499,208.00**

4.2) Sources of Technical and Financial Resources

HRWA will seek funds from multiple sources. Sources include State and EPA 319 grants, NRCS farm conservation programs such as Environmental Quality Incentives program (EQIP), city of Eagleville, private foundations such as the Fish and Wildlife Foundation, private business and individual donors and landowners. HRWA staff has been successful in incorporating NRCS farm programs into 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.

4.3) Authorities Who Will Implement the Plan

The Harpeth River Watershed Association, in partnership with the Natural Resources Conservation Service, will be the primary agency responsible for the implementation of the plan. In addition, HRWA will work with the City of Eagleville, TDOT and any other agency identified that has potential to impact the headwaters of the Harpeth River.

5) Outreach/Education

The core of the educational component will entail working with local landowners to gain their support and cooperation regarding the implementation of BMPs, as well as their involvement in the promotion of restoration projects to others in the local community. HRWA will continue working with the local watershed enhancement committee and conduct annual or semi-annual meetings to keep the community informed about project activities and opportunities. As a part of the educational process, HRWA will begin to introduce land protection tools through a partnership with Land Trust for Tennessee. HRWA, in conjunction with NRCS, may carry out field days for agricultural

operators and work to have participating farmers share with and recruit other farmers into the restoration program. Overall, the goal is to reach a broad a base of landowners and other community members in the subwatershed, impart understanding of restoration options and encourage active participation in the restoration process.

Where possible, HRWA's Education, Outreach and Volunteer Manager and other staff will educate and train landowners, teachers and youth on basic watershed and water quality conservation, RiverSmart tips, and land management options. We want to build a volunteer group that can give talks to master gardener programs on rain gardens and native landscaping, to civic groups to include water efficiency tips. HRWA also developed a River Smart festival kit under the current 319 grant that volunteers can readily do to build local interest and build a volunteer base for restoration projects and land management practices. Ideally, people who have implemented strategies, such as rain gardens, livestock exclusion fencing or conservation easements, will agree to hold demonstration gatherings to help others gain perspective about how to move from understanding of restoration principles and practices to implementation. These are just a few of key activities proposed under a 2007 319 grant to do watershed education throughout the Harpeth River Watershed (HUC 05130204) that we could put in place and leverage under this current plan.

6) Schedule for Implementation

Total implementation time is estimated to be 20 years.

Activity	Year(s)
1) Identify and meet with project partners, landowners	1-10
2) Identify willing landowners	1-18
3) Identify and train willing landowners, teachers, youth groups, etc. to assist with data collection	1-20
4) Conduct pre-BMP site assessments/ data collection	1, 3, 5, 7, 9, 11, 13, as needed.
5) Develop site-specific BMP implementation plans	2-18
6) Implement and maintain BMPs	2–20
7) Carry out post-BMP data collection/assessment	4, 6, 8, 10, 12, 14, 16, 18, 20
8) Submit final report and arrange final public meeting to present project details	19, 20

7) Watershed Restoration Milestones

Milestones	Year(s)
1) Complete site-specific BMP plan development	2-18
2) Train individuals and groups responsible for data collection in the watershed	1-20
3) Initiate education/outreach campaign (one community meeting per year, articles to local newspaper (6/year)	1-20
4) Complete pre-BMP	1, 3, 5, 7, 9, 11, 13,

implementation data collection	as needed.
5) Complete site-specific BMP implementation	2–20
6) Conduct BMP implementation assessment/ analysis/maintenance (survival, structure integrity, etc.)	4, 6, 8, 10, 12, 14, 16, 18, 20
7) Complete final report and hold final public meeting	19, 20

8) Measures of Success

The long-term success of the program will be measured based on the following:

- TDEC watershed data. TDEC is in the watershed every five years collecting data through their watershed cycle. Data include benthic macroinvertebrate, habitat and physical/chemical measures. Ecological health is defined/operationalized 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.
- Formation of a fully functioning steering committee to guide the restoration plan development process.
- Completion of community meetings aimed at increasing citizen awareness of water quality issues and involvement in watershed planning.
- Successful implementation of prioritized BMPs, including riparian habitat restoration, streambank stabilization, conservation easements, and other effective practices such as those related to site design, land use planning and stormwater management, on identified problem sites on 303(d) listed streams and in areas to protect healthy streams to prevent degradation .
- Execution of landowner agreements designed to preserve the long-term integrity of BMP projects.

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 site-specific data collected by HRWA staff and volunteers, 2) physical habitat data collected on specific sites, and 3) practice implementation data, such as stream miles fenced off from livestock, number of trees planted, and linear feet of stabilized streambanks.