

BAKER/NINEMILE CREEK WATERSHED BASED PLAN (WBP)

Name of Project:

Baker & Centenary Creek Restoration Initiative—Phase II

Lead Organization:

Blount County Soil Conservation District
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Watershed Identification:

Name= Baker Creek Watershed
Location= Blount and Loudon Counties
HUC12= 060102040501

Name= Ninemile Creek Watershed
Location= Blount, Loudon, and Monroe Counties
HUC12= 060102040405

Sub-watersheds of the above that are addressed in the grant proposal shall include the following:

Name= Little Baker Creek
Location= Blount County
8-digit HUC and Segment Number = 06010204, 043-0400

Name= Centenary Creek (Tributary to Ninemile Creek)
Location= Blount County
8-digit HUC and Segment Number = 06010204, 043-0100

The Watershed Based Plan addresses NPS pollutants within the above HUC12 areas.
The grant proposal focuses only on Baker Creek, Little Baker Creek, and
Centenary Creek (a tributary to Ninemile).

Although, Ninemile Creek is not included in the grant proposal, its parameters as a 303(d) listed stream are included in the WBP.

Watershed Identification—continued:

Baker Creek and Ninemile Creek are within the eight digit Hydrologic Unit Code (HUC) TN06010204, both of which drain to Tellico Reservoir. The Baker Creek Watershed and Ninemile Creek Watershed are both within the Lower Little Tennessee River Basin which drains 2627 square miles (USGS Water Resources Data Report) (Figure 1).

Location of Little Tennessee Basin

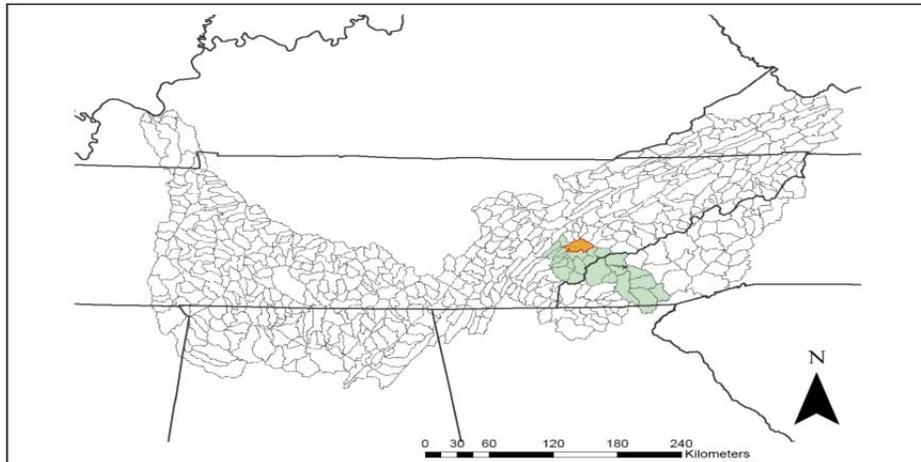


Figure 1. Location of Baker and Ninemile Creek Watersheds within the Little Tennessee River Watershed

Baker and Ninemile Creeks, tributaries of the Little Tennessee River and Tellico Reservoir in East Tennessee, drain approximately 103 square miles or 65,664 acres. The watersheds are located within the tri-county area of Blount, Loudon, and Monroe Counties (Figure 2).

Baker Creek and Ninemile Creek Watersheds

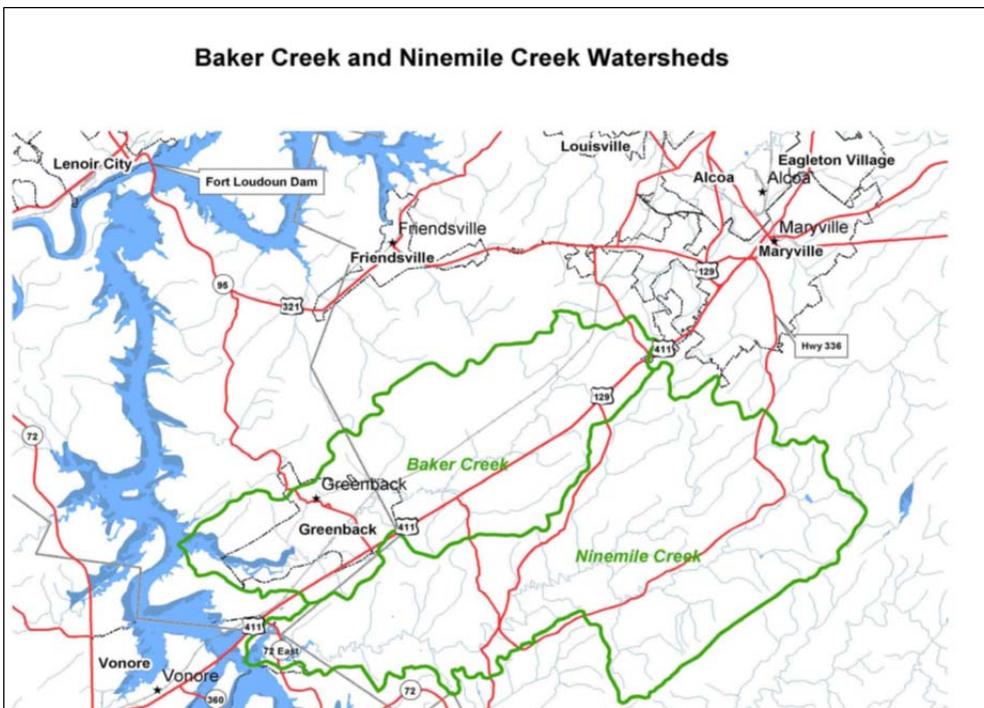


Figure 2. Location of Baker and Ninemile Creek Watersheds

Watershed Identification—continued:

Baker Creek Watershed drains 41.9 square mile area or 26,816 acres originating near Maryville and flows 18.2 miles through the City of Greenback. A large portion of the Baker Creek Watershed is located within Blount County, however, 25% of the watershed is located within Loudon County. Ninemile also originates near Maryville and flows 17.1 miles draining 60.7 square miles or 38,848 acres.

The Tennessee Wildlife Resources Agency has created 130 acres of wetland management area in the Kyker Bottoms Wildlife Refuge located within the Ninemile Creek watershed. This refuge is used by many citizen groups, including the Tennessee Ornithological Society and Ducks Unlimited. Additionally, the site provides nature tours as well as outings for recreation and hunting. Several university classes use this area for field work, including The University of Tennessee, Knoxville Wildlife Habitat Evaluation and Management class and The North Carolina Haywood Community College for Habitat Manipulation and Wildlife Maintenance Techniques courses. Studies involving amphibian population and community composition are also being conducted for the Tennessee Amphibian Monitoring Program through the University of Tennessee's Department of Ecology and Evolutionary Biology. TDEC has also documented 130 rare plant and animal species in the Little Tennessee Watershed.

Causes and Sources of NPS Pollutants within the Baker and Ninemile Watersheds:

According to the Tennessee Department of Environment and Conservation (TDEC) 2012 303(d) list, parts of both watersheds are classified as impaired due to pathogens, siltation, and habitat alteration.

A 1999 assessment of Tellico Reservoir embayments by the Tennessee Valley Authority (TVA) found deteriorating water quality conditions. Both Baker and Ninemile Creek watersheds are agricultural in nature but have emerging developmental pressures from the southern portion of the City of Maryville in Blount County, which is one of the most rapidly developing counties in Tennessee. Blount County's population is expected to grow by approximately 40,000 residents to reach 143,000 residents by 2025. Loudon County is estimated to grow by about 20,000 residents to reach 64,000 residents by 2025 (Tennessee Population Projections 2000-2010 Division of Health Statistics report). This growth and development of the area will certainly increase demands on regional water resources over time. Protecting and improving water quality and managing growth in Tellico Reservoir's tributary watersheds is vital to improving this important regional resource.

Causes and Sources of NPS Pollutants within the Baker and Ninemile Watersheds--continued:

A Partnership for Change:

In response to concerns about deteriorating water quality in Tellico Reservoir, local, state, and federal agencies as well as private organizations and a state university are working together to improve and protect water quality in the Baker and Ninemile Creeks which are both tributaries to Tellico Reservoir. The Baker/Ninemile Creek Partnership, formed in 2004, is dedicated to water quality improvement and protection initiatives within the Baker and Ninemile Watersheds.

Partners collaborate across jurisdictional boundaries and capture a wide range of knowledge and skills.

The Baker/Ninemile Partnership represents 18 agencies including:

Blount County
City of Maryville
Blount County Soil Conservation District
Carpenters Elementary School
UT College of Landscape architecture
Great Smoky Mountain Resource Conservation and Development
Keep Blount Beautiful
Loudon County
Loudon County Soil Conservation District
Natural Resources Conservation Service
Tennessee Dept. of Agriculture
Tennessee Dept. of Environment and Conservation
Tennessee Valley Authority
Tennessee Wildlife Resources Agency
University of Tennessee
University of Tennessee Extension
US Fish and Wildlife Service
US Forest Service
TN Division of Forestry
Watershed Association of Tellico Reservoir

The partnership has acquired significant grant funding from a variety of sources which has resulted in cooperative water quality assessments, identification of causes and sources of water quality impairments, Integrated Pollutant Source Identification (IPSI) and Pollution Load Model (PLM), the development of a watershed restoration plan, trail development and maintenance, demonstration of agricultural and urban best management practices, secured funding from a wide range of sources, provided cost-share and technical assistance, assisted farmers to plan and implement conservation practices on their farms, and addressed urban pollution sources through the education of homeowners within Blount County including the cities of Maryville and Alcoa. The partnership has also provided overall water quality education and awareness through annual clean up events, environmental awards, volunteer monitoring, and canoe trips.

Partnership efforts in the area contributed to Ninemile Creek being delisted by the Tennessee Department of Environment and Conservation (TDEC) in 2006. However, this watershed was re-listed in 2012 for total suspended solids and pathogens. Partnership efforts continue working on identifying causes and sources of NPS pollutants, implementation of agricultural and urban best management practices, and conducting outreach and educational projects.

Past citizen involvement in the watersheds have included water quality improvement work completed by the Watershed Association of Tellico Reservoir (WATeR), a committed volunteer non-profit organization of primarily retired professionals to assist in working to improve the regional water quality. WATeR's accomplishments include conducting turf management workshops, native plant and water conservation workshops, construction of retention ponds and demonstration BMPs, trail development and construction shoreline clean-ups, and public meetings involving residents, farmers, and environmental planning graduate students from the University of Tennessee Knoxville about how to approach water quality improvement projects in the vicinity.

Baker Creek is primarily impacted by agricultural practices which has resulted in elevated *Escherichia coli* concentrations. However, removal of vegetation and failing septic systems also attributes to elevated *E. coli* concentrations.

Causes and Sources of NPS Pollutants within the Baker and Ninemile Watersheds—continued:

Streams listed on the 303(d) list (TDEC 2012) within the Baker/Ninemile watersheds include:

Waterbody ID & Segment #:	Impacted Waterbody:	County:	Miles/Acres Impaired:	Cause/TMDL Priority:	Pollutant Source:	Comments:
TN06010204 042-0100	Centenary Creek	Blount	3.25	Alteration in streamside or littoral vegetative cover. Loss of biological integrity due to siltation. <i>Escherichia coli.</i>	Pasture Grazing	Category 4A. EPA approved siltation/habitat alteration and pathogen TMDLs that address the known pollutants
TN06010204 042-1000	Ninemile Creek	Blount	17.1	Loss of biological integrity due to siltation. <i>Escherichia coli.</i>	Pasture Grazing Non-irrigated crop production	Category 4A. EPA approved siltation/habitat alteration and pathogen TMDLs that address the known pollutants
TN06010204 043-0400	Little Baker Creek	Blount	6.1	Alteration in streamside or littoral vegetative cover. <i>Escherichia coli.</i>	Pasture Grazing	Category 4A. EPA approved siltation/habitat alteration and pathogen TMDLs that address the known pollutants
TN06010204 043-1000	Baker Creek	Blount	18.22	Alteration in streamside or littoral vegetative cover. Loss of biological integrity due to siltation. <i>Escherichia coli.</i>	Pasture Grazing	Category 4A. EPA approved pathogen and habitat alteration TMDLs that address some of the known pollutants

TDEC has also developed Total Maximum Daily Load (TMDL) requirements for the Little Tennessee Watershed which includes Baker and Ninemile Creeks. The following two tables (Figures 3 and 4) specify the TMDLs for bacteria and sediment respectively.

Figure 3. Summary of TMDLs, WLAs, & Las for Impaired Waterbodies
 (Table adapted from TDEC TMDL for *E. Coli*—2006)

HUC12 Subwatershed (06010204__) Or Drainage Area	Impaired Waterbody Name:	Impaired Waterbody ID:	TMDL	WLAs				LAs	
				WWTFs		CAFO's	MS4's	Precipitation Induced Nonpoint Sources	Other Direct Sources
				Monthly Average	Daily Max.				
0205	Ninemile Creek	TN06010204042-1000	40.7	8.107 x 10 ⁷	6.055 x 10 ⁸	0	46.8	46.8	0
0502	Baker Creek	TN06010204004-1000	86.1	8.58 x 10 ⁷	6.411 x 10 ⁸	NA	>92.6	>92.6	0

Figure 4. Summary of TMDL/Allocations (TMDL, WLAs for MS4s and Construction Stormwater Sites and LAs for NPS)
 Adapted from TDEC Siltation & Habitat Alteration in the Little TN. River Watershed---3/28/2007

HUC12 Subwatershed (06010204__)	Impaired Waterbody Name:	Waterbody ID:	Level IV Ecoregion:	TMDL (Required Overall Load Reduction)	Required Load Reduction	
					WLAs (Construction SW and MS4s)	Las (Nonpoint Sources)
					%	%
0205	Centenary Creek	06010204042-0100	66e	81.8	82.7	82.7
0501	Little Baker Creek	06010204043-0300	67f	16.9	21.0	21.0
	Baker Creek	06010204043-1000				

Estimate of Load Reductions:

Estimates of the total annual loads of bacteria, sediment, nutrients, and zinc were calculated in the original IPSI assessment of the Blount County Watersheds (TVA 2003) using the IPSI Pollutant Loading Model (PLM). Soil loss for selected land use classes and other high impact erosion features was calculated based on the Universal Soil Loss Equation (USLE).

Results from the IPSI study shows the Baker Creek watershed within Blount County boundaries general land use patterns by percent area is comprised of approximately 22% forest, 60% agriculture (pasture, cropland, livestock operations, dairy farms and horse farms), 14% residential, and 2% commercial/industrial (Figure 5). The Ninemile Creek watershed within Blount County boundaries general land use patterns by percent area is comprised of approximately 51% forest, 38% agriculture (pasture, cropland, livestock operations, dairy farms and horse farms), 9% residential, and 1% commercial/industrial.

The IPSI Pollutant Load Model indicates that the agricultural sector was the greatest source of TSS, generating 90% of the total load and 78% of the pathogen load. Residential and commercial areas were the last 10% of the TSS load.

The PLM indicates that pathogen loading is dominated by three sources: pasture, livestock, and failing septic systems. Results estimate that 19% of the pathogen load is generated by onsite wastewater systems that are failing. Some of these systems are failing because of age or inadequate maintenance, while others were constructed in unsuitable soils. In particular, Lower Baker Creek, Little Baker Creek, and Sixmile Creek, a tributary to Ninemile Creek watersheds appear to warrant particular attention.

These two creeks account for 82% of the Lower Little Tennessee River Basin TSS load (IPSI report). Additionally, Ninemile Creek and Baker Creek Watersheds combined also accounted for 81% of Total Phosphorus, 81% of Total Nitrogen, and 80% of zinc loads in the Little Tennessee River Basin (IPSI report).

PRIORITY AREAS

This project will seek to identify and remediate non-point source impairments in the Baker Creek Watershed and Centenary Creek Watershed, the Ninemile Creek tributary listed on the 303(d) list for water quality impairments, in order to restore it to the condition of fully supporting its designated uses. Baker Creek and Ninemile Creek are being addressed as one water quality initiative project because of their proximity to each other as well as their similar land use/land cover characteristics, soil composition, and impacts to increasing nutrient enrichment to Tellico Reservoir. Additionally, Baker Creek and Ninemile Creek key partnerships have similar approaches for both watersheds in protecting and improving water quality.

The listed stream impacts are primarily from sediment and bacteria, therefore, watershed based activities will focus on reducing those impacts. Phase I of the watershed plan is currently being closed out while Phase II will build upon the success of the original initiative while employing adaptive management strategies to ensure project success and evolution. Each phase of the WBP is expected to require 3 years for project completion with a minimum (to be determined) of 4 phases.

A summary per phase of the WBP and planned activities is as follows:

Activity:	Phase I:	Phase II:	Phase III:	Phase IV:
Agricultural BMP's	Nearing Completion	✓	✓	✓
Septic System Repair and Restoration for Low-income Households	Complete	✓	✓	✓
Retention Basin Assessment and Retrofit	Complete	-	-	-
Public Listening Sessions	Complete	-	-	-
Agricultural Conservation Tour	NA	✓	TBD	TBD
Homeowner Outreach and Education Campaign	NA	✓	✓	✓
Outdoor Environmental Learning Area	✓	✓	✓	✓
HWY 411 South Steep Bank Erosion Control	NA	TBD	TBD	TBD
Adaptive Management Strategies	✓	✓	✓	✓

Estimate of Load Reductions--continued

This plan documents the strategies that will be employed to restore the water quality of streams currently not meeting state standards and protect water quality in the streams that are at risk of degradation.

The Baker / Ninemile Partnership will be seeking additional funds from a variety of other sources including but not limited to TDA--Ag. Resources Conservation Fund, US Fish and Wildlife Service, US Forest Service, Tennessee Wildlife Resources Agency, and federal farm bill programming (Environmental Quality Incentive Program--EQIP) to implement the watershed plan, develop educational programming and implement on-the-ground conservation practices to achieve the desired goals.

BMP List, Education, Activities, and Budget:

The following table describes planned WBP activities and associated budgetary data for the 12—15 year term of the initiative. Tasks completed during Phase I of this initiative or those that will no longer be implemented (i.e. retention basin retrofits) have been removed from the following table.

WBP Activities	Quantity:	Cost/Unit:	Budget Estimate:
Agricultural Best Management Practices & Related Activities:			
Livestock Exclusion Fencing	100,000 feet	\$2.75/ft	\$275,000.00
Alternative Watering Systems	200	\$2400.00	\$480,000.00
Cross-fencing for prescribed grazing	100,000 feet	\$2.75/ft	\$275,000.00
Stream Crossings	35	\$3200.00	\$112,000.00
Heavy Use Area Feed Pads	50	\$2500.00	\$125,000.00
Critical Area Treatment	25	\$540.00	\$13,500.00
Pasture/Hayland Renovation Establishment	300 acres	\$150.00/acre	\$45,000.00
Animal Trail and Walkway	3000 feet	\$7.21/ft	\$21,630.00
Streambank Restoration	720 feet	\$60.00/ft	\$43,200.00
Septic System Repair and Restoration for Low-Income Households			
	120	\$4000.00	\$480,000.00
HWY 411 South Steep Bank Erosion Control			
	8900 feet	\$10.00/ft. est.	\$89,000.00
Educational Activities:			
Agricultural Conservation Tour	3	\$2800.00/tour	\$8400.00
Conduct Homeowner Outreach and Education workshops	60	\$625.00/workshop	\$37,500.00
Carpenters Elementary Outdoor Environmental Learning Area= 16-acre site (Pervious Pavement, Educational Signage, Site Access)	1	\$9375.00/acre	\$150,000.00
Development of campus wide landscaping plans designed from water quality or ecological parameters for schools within the watershed boundaries	4 campuses	\$15,000.00/campus	\$60,000.00
Total budget for WBP based on 12-15 year Initiative:			\$2,215,230.00

Project partners will engage private land users, civic groups, and governmental entities through multiple educational events such as the district’s annual awards banquet, forum sessions, direct mailings, news releases, and other multi-media venues.

WBP activities that demonstrate success may be adapted for use in other watersheds including those that cross county or jurisdictional boundaries.

Timeline, Tasks, and Assessment of Progress:

Below is the implementation plan for the four, phases of the Baker/Ninemile Creek WBP. Phase I was for 5-years while Phases 2 thru 4 have been planned for 3-year terms.

Project Timeline:

Baker/Ninemile WBP—Milestones/Implementation Plan:	Phase I:					Phase II:			Phase III:			Phase IV:		
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Agricultural BMPs:														
Access Control Fence= 100,000 Feet	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Alternative Watering System—200 Units	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cross-fencing for Prescribed Grazing—100,000 Feet	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Stream Crossings—45 Units	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Heavy Use Area Feed Pads—60 Units	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Critical Area Treatments—25 Acres	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pasture/Hayland Renovation/Establishment—300 Acres	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Animal Trail and Walkway—3000 Feet	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Streambank Restoration—720 Feet	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Urban/Suburban BMPs:														
Septic System Repair and Restoration for Low-Income Households—120 Units	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Assess Condition of Stormwater Retention Basins	X	X												
Regulate construction site run-off and post-construction development	X	X	X	X	X	X	X	X	X	X	X	X	X	X
HWY 411 South Steep Bank Erosion Control									X	X	X	X	X	
Water Quality Monitoring:														
Five, <i>E. coli</i> . Samples within 30 days (TDEC 5-year monitoring cycle and Volunteer Monitoring via WATeR)				X					X					X
Benthic and Habitat Assessments (TDEC 5-year monitoring cycle)				X					X					X
Compile and analyze monitoring results				X		X			X		X			X
Educational Activities:														
Agricultural Conservation Tour—3 Tours			X			X					X			
Conduct Homeowner Outreach and Education workshops—60 Workshops	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Develop Carpenters Elementary Outdoor Environmental Learning Area= 16-acre site	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Development of campus wide landscaping plans designed from water quality or ecological parameters for schools within the watershed boundaries—4 Campuses						X	X	X	X	X	X	X	X	X
Reporting:														
Progress Reports(s) (to TDA)—Evaluate success in achieving pollutant reduction goals—Reporting period(s) = 1 to 3 months	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Baker/Ninemile Partnership Meetings—Quarterly report to grant partners. Coordinated via WATeR	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Update and adapt WBP	X				X			X			X			X

Projects Tasks:

Project Task 1: Implement Agricultural BMPs:

According to the IPSI model, agricultural sources account for about 90% of the TSS load and 78% of the pathogen load; therefore, the majority of grant funds requested will be to provide cost-share assistance and install agricultural conservation practices.

The Blount and Loudon County Soil Conservation Districts, Natural Resources Conservation Service, and other state and federal agencies (TN Division of Forestry, TN Wildlife Resources agency) would provide a variety of outreach and education activities including one-on-one discussions, display boards, conservation tours, and annual banquets in order to complete the goals of this task.

Timeline, Tasks, and Assessment of Progress—Project Tasks--continued:

Project Task 2: Implementation of Septic System Repair and Restoration Cost-share Program for Low-Income Households:

The IPSI Pollutant Load Model results estimates that 19% of the pathogen load is generated by onsite wastewater systems that are failing. Some of these systems are failing because of age or inadequate maintenance, while others were constructed in unsuitable soils.

Grant funding will be utilized to repair or replace failing systems in conjunction with educating septic system owners about maintenance of implemented systems.

Failing systems will be located by advertising the availability of funding for repairs. If there are not enough volunteers for this program, a risk-based system will guide field checks and recruitment. Design work, site location, and approval per system shall be overseen by the Blount County Environmental Health Department.

Project Task 3: Develop Implementation Plan to Address Eroded Steep Banks on HWY 411 South, Blount County, TN.:

Eroded steep banks that include bare earth and gullies have been identified along an 8900 linear foot section of Highway 411 South in Blount County, TN. Details of the eroded areas have been submitted to the TN Department of Transportation (TDOT) courtesy of TDA. Grant partners propose that a plan of action be developed in conjunction with TDOT to correct the eroded areas. Similarly, corrective actions could be expanded to critical drainage sites along the right-of-ways governed by TDOT as well as linking these projects to a current homeowner outreach and educational curricula.

No grant funding will be required to develop the plan of action.

Project Task 4: Conduct an Agricultural Conservation Tour within the Baker/Ninemile Watershed.

A conservation tour designed to showcase agricultural conservation practices will be facilitated by the Blount County Soil Conservation District in order to promote land use stewardship and cost-share opportunities.

Grant funding would be utilized to assist with marketing and logistics for the tour.

Project Task 5: Conduct a Homeowner Outreach and Education Program:

Educational curricula entitled “Sustainable Gardening” has been developed to teach suburban homeowners how their own landscaping practices can improve water quality in their own yards and communities.

The curriculum was developed as part of a homeowner outreach and education campaign funded via a 2005 EPA Targeted Watershed Grant, “Little River Watershed Restoration Initiative”, which was administered by the Blount County Soil Conservation District.

The sustainable gardening series is part of broader educational curriculum that includes riparian restoration sites, outdoor environmental learning areas, and environmental education literature.

The goal of this curriculum is to enhance homeowner understanding about how their land management practices can impact water quality, and encourage them to adopt management practices that minimize those impacts.

Grant funding would be utilized to sponsor a “Sustainable Gardening” workshop for the Baker Creek Watershed within Loudon County. The goal of this workshop shall be to teach ecologically-friendly landscaping practices and to promote environmental curriculums across political and watershed boundaries. No funding would be used within Blount County as the goal of grant partners including The University of Tennessee Extension Service is to make this program self-sustaining.

Timeline, Tasks, and Assessment of Progress—Project Tasks--continued:

Project Task 6: Implement Water Quality Environmental Features at Carpenters Elementary School—“Outdoor Environmental Learning Area”.

A 16-acre “Outdoor Environmental Learning Area” has been developed at Carpenters Elementary School in Blount County, TN. The site contains a perennial stream (Centenary Creek), a true wetland, a constructed wetland, cattail marsh, and other micro and macro habitats.

A loop trail system comprised of ½ inch crusher-run gravel and chat (very fine rock) connects the various habitats. The site is used on a weekly basis by the 1500 students who attend Carpenters Elementary and Middle Schools. Once fully implemented, the site will be made available to all Blount County Schools as well as surrounding school systems.

Grant funding would assist with the following site features:

- ✓ Implementation of Phase III of the loop trail system as identified on the existing concept plan that shall be comprised of chat, pervious concrete and pervious pavers, including a native plant shaded gazebo.
- ✓ Development of educational signage related to water quality (i.e. hydrologic/watershed cycle, soils, native plant identification markers). All signage shall be equipped with a quick-response (QR) code that will link to the schools website for additional learning content per sign topic.

This site has received numerous media headlines and is fully supported by school administrators, teachers, parents, and community volunteers. This site serves as one practice within the programming of the Blount County Green Infrastructure Network (BeGIN).

Project Task 7: Development of campus-wide landscaping plans designed from water quality and/or ecological parameters.

Four schools are located within the Baker/Ninemile Watershed serving grades K-12 and representing over 2600 students. Environmental education on the primary and secondary school level is critical for long-term environmental behavior and actions particularly when confronted with the challenge of decreasing non point source pollutants.

Grant funding would enable grant partners to develop landscape concept plans for each campus.

The concept plans would be developed by a landscape architect or specialist in ecological or green infrastructure design. The elements per plan could include site specific landscaping practices such as rain gardens, pocket woodlands, and meadows. Each plan would include connectivity between practices, plant palettes, and locations of educational signage.

The concept plans allow for community buy-in of the project and allow for detailed budgets to be developed per practice for long-term or phased implementation.

Assessment of Progress:

All WBP tasks shall be reviewed on a monthly basis by the board of supervisors of the Blount County Soil Conservation District as well as the TDA watershed coordinator (Sam Lemmons). Similarly, tasks shall be reviewed via quarterly meetings of the Baker/Ninemile Partnership coordinated by the Watershed Association of the Tellico Reservoir (WATeR). Tasks that fall outside of their WBP timeline shall be adjusted or revised as part of an adaptive management policy to ensure project success and completion.

In addition to the tasks outlined in the WBP, grant Partners are laying the foundation for long-term efforts to manage impacts to water quality. These efforts include reviewing and updating local codes and ordinances, development of a green infrastructure plan for Blount County, implementing Phase II Stormwater requirements in Loudon and Blount Counties, and developing riparian restoration demonstration sites throughout Blount County watersheds. These projects do not rely on 319 funding.

Criteria to Assess Achievement of Load Reduction Goals--Measure of Results:

Results will be compared with state standards to evaluate the success of this project, with success being defined as de-listing sections of Baker and Ninemile Creek and its tributaries currently on the 2012 Tennessee 303 (d) list. Grant partners will evaluate success in achieving pollutant reduction goals in Year 3 and 5 of each phase and will update and adapt the watershed plan accordingly.

Water quality data was collected by TDEC in 2012 as part of their 5-year monitoring cycle.

The final interpretation of this data is expected to be released in early 2015.

As compared with 2008 data, there did seem to be improvement for both nutrients and *E. coli*.

Monitoring and Documenting Success:

Physical, chemical, and biological monitoring by the Tennessee Department of Environment and Conservation was completed in 1998, 2003, and 2008 was collected to provide baseline data for the project.

Physical, chemical, bacteriological and biological conditions will be monitored to refine pollution source identification, track progress and evaluate the success of efforts to restore the streams of Baker and Ninemile Creek Watersheds and remove them from the 303(d) list.

This project coordinates with the TDEC 5-year watershed monitoring cycle and additional sites monitored will be collected by TDEC trained volunteers from the Watershed Association of Tellico Reservoir.

All monitoring activities will follow TDEC Standard Operating Procedures.

The monitoring plan is outlined below.

Pathogens

The TMDL for pathogens for the Little Tennessee Watershed (TDEC, 2006) calls for an 86.1 % reduction for Baker Creek and a 40.7 % reduction for Ninemile Creek in *E. coli* loads. In order to track progress towards achieving water quality goals, *E. coli* instream grab samples (5 in a 30 day period) will be collected at approximately ten sites monthly during year 2 and year 5 will be through TDEC's 5 year watershed monitoring cycle. Five of the ten sites are established TDEC monitoring locations. The additional five sites will be chosen to establish baseline conditions in subwatersheds that are targeted for restoration activities.

Siltation and Habitat Alteration

Numeric water quality criteria have not been established for siltation and habitat alteration impairments in Tennessee. The TMDL for Siltation and Habitat Alteration for Little Tennessee Watershed (TDEC, 2007) was based on a numeric interpretation of the narrative water quality standard for protection of fish and aquatic life. Average annual sediment loading was derived from biologically healthy watersheds, located within the same ecoregion. The geometric mean of average annual sediment loads of the reference watersheds serve as target values for the Siltation and Habitat Alteration for Little Tennessee Watershed TMDL. The TMDL calls for the following:

- 81.8% reduction in annual sediment load in Centenary Creek, a tributary to Ninemile Creek.
- 16.9% reduction in Little Baker and Baker Creek

Our strategy for evaluating the success on this initiative in reducing sediment load and removing Baker and Ninemile Creek and the impaired tributaries from the 303(d) list will be to document that benthic macroinvertebrate and physical habitat scores meet State standards. Benthic community (square kick protocol) and physical habitat will be assessed at five sample sites established by TDEC as part of their 5-year cycle. Following each monitoring component, partners will compile and analyze results and evaluate progress.

Chemical

Dissolved oxygen, pH, temperature, and conductivity will also be measured using a YSI Model 556 MPS or equivalent meter each time bacteria, sediment or biological samples are collected.

Summary of Monitoring and Documenting Success

Post-initiative bacteria and sediment monitoring results will be analyzed and used to evaluate the attainment of pollution reduction goals. The Baker/Ninemile Partnership will use adaptive management and reviewing if any changes are needed annually. A final report summarizing findings will be produced and distributed. Findings will also be used to update and adapt the watershed plan every 3 years to reevaluate conditions as well as for documenting measurable improvements.