Richland Creek
Water Restoration Plan
Grainger County, TN
August 2021

Name of Project: Richland Creek Water Restoration Plan

Lead Organization: Grainger County Soil Conservation District

Watershed Identification: Richland Creek, Grainger County, HUC12: TN06010104018_1000

Causes and Sources of Nonpoint Source Pollution in the Watershed

This document was jointly prepared by the Grainger County Soil and Water Conservation District and the Natural Resources Conservation Services as a plan to restore the biological integrity of Richland Creek, which is in Grainger County, Tennessee. This plan identifies the sources of stress that threaten Richland Creek and its varying tributaries. The information within this study has resulted in the establishment of objectives and goals designed to restore Richland Creek and all its tributaries, back to the classification of fully supporting their designated uses. Finally, this document was created following the EPA and Tennessee Department of Agriculture – Non-Point Source Program guidelines for a Watershed-Based Plan that includes each of its nine components.

Portions of this document were provided by:

- FINAL VERSION YEAR 2020 303(D) LIST OF IMPAIRED and THREATENED WATERS of TENNESSEE (April 2020)
- Natural Resources Conservation Service

Richland Creek has a Water Assessment Plan from the EQIP-NWQI program that has been approved for FY 2020. Richland Creek watershed is 42,391 acres and flows into the tailwaters of the Cherokee Dam, which is the Holston River. Tributaries include Rocky Branch, Buffalo Creek, Higgs, Highland Springs Branch, Leas Creek, Sprout Spring Branch and Frost Branch. The predominant land use in Richland Creek is deciduous forest, approximately 40% is pasture and hay. Very little cropland, less than 2 % is cultivated within the watershed. There are two small rural communities within the watershed: Blaine and Rutledge. The entire stretch is listed by TDEC as impaired by E.coli due to cattle grazing and lack of riparian vegetation. From observations on the ground over-grazing of pastures, grazing wet bottomland fields, and allowing cattle access to the tributaries and main creeks are contributing to the pollution of the area. The watershed streams host a diverse group of aquatic organisms including macroinvertebrates, freshwater mussels and snails. It is home to 47 species of fish including smallmouth bass, brown trout, rainbow trout, redline darter, and

bigeye chub. There are eight known rare fish species, eleven known rare mussel species, and one known rare snail species. Reduction of sediment and re-vegetating streambanks and riparian areas will provide improved habitat for a diverse fishery and aquatic habitat. More wildlife and wading birds will be attracted to the waters as additional riparian and terrestrial vegetation become available.

Education and outreach opportunities are available to work toward improving the septic tank systems function and quality, pasture/grazing situations, overstocking issues, streambank stabilization, aquatic organism passage, karst topography and sinkholes, promote wetland restoration, and provide education on appropriate grazing management.

Estimate of Load Reductions

The globally important Tennessee River Watershed, which includes Richland Creek is located in the Ridge and Valley province of Tennessee. Part of the Tennessee River headwaters, these free-flowing rivers are a leading national hotspot for biodiversity and imperiled species. Surrounding the rivers is a rural landscape that includes forests containing amazing wildlife and timber resources, livestock farms, sensitive caves which are critical to groundwater, family farms which support local communities, and small towns struggling to remain economically viable. Pollutants from agriculture runoff (suspended solids, high levels of nutrients and pathogens, and low levels of dissolved oxygen), and runoff from developed areas (dissolved solids, contaminants, illegal straight pipes, etc.) continue to threaten the species found in these rich waters. These stressors combine to impact water quality and human uses, as well as compromise the natural habitat of threatened and endangered species. Agricultural production comprises the dominant land use and is the largest contributor to nonpoint source pollution. Due to the loss of the vegetation and their vital root systems, the riverbanks are eroding actively, contributing many tons of sediment to the river annually, robbing landowners of valuable, productive soil and increasing treatment costs for local water utilities.

Due to the difficulties of precisely predicting the performance of management measures over time, the Tennessee NPS Program – Pollutant Load Reduction Estimation Tool to predict the effect of our BMP implementation program on the system.

Table: Total estimated Nitrogen reduction in pounds per year

BPM Name	NRCS Code	Amount	Unit	N Reduction Factor	Estimated Reduction in N per year	Unit
Septic Improvements	006	5	No.	119.28	596	Lbs. N/unit/year
Watering System	614	5	No.	70.23	351	Lbs. N/unit/year
Pipeline	516	5,000	Feet	0.13	650	Lbs. N/foot/year
Heavy Use Area	561	3,380	Sq. Feet	0.09	304	Lbs. N/sq. foot/year
Fence	382	10,000	Feet	0.25	2,500	Lbs. N/foot/year
Critical Area	342	5	Acres	100.04	500	Lbs. N/acre/year
Streambank/Shoreline Protection	580	200	Feet	1.75	350	Lbs. N/foot/year
Livestock Exclusion	472	10	Acres	0.11	1.1	Lbs. N/acre/year
Access Road	560	1,000	Feet	0.37	370	Lbs. N/foot/year
Riparian Forest Buffer	391	5	Acres	0.28	1.4	Lbs. N/foot/year
Prescribed Grazing	528	500	Acres	0.408	204	Lbs. N/acre/year

Table: Total estimated Phosphorus reduction in pounds per year

BPM Name	NRCS Code	Amount	Unit	P Reduction Factor	Estimated Reduction in P per year	Unit
Septic Improvements	006	5	No.	12.58	62.9	Lbs. P/unit/year
Watering System	614	5	No.	5.88	29.4	Lbs. P/unit/year
Pipeline	516	5,000	Feet	0.02	100	Lbs. P/foot/year
Heavy Use Area	561	3,380	Sq. Feet	0.01	33.8	Lbs. P/sq. foot/year
Fence	382	10,000	Feet	0.02	200	Lbs. P/foot/year
Critical Area	342	5	Acres	13.56	67.8	Lbs. P/acre/year

Streambank/Shoreline Protection	580	200	Feet	0.17	34	Lbs. P/foot/year
Livestock Exclusion	472	10	Acres	0.01	0.1	Lbs. P/acre/year
Access Road	560	1,000	Feet	0.03	30	Lbs. P/foot/year
Riparian Forest Buffer	391	5	Acres	0.02	0.1	Lbs. P/foot/year
Prescribed Grazing	528	500	Acres	0.227	113.5	Lbs. P/acre/year

Table: Total estimated Sediment reduction in pounds per year

BPM Name	**NRCS Code**	**Amount**	**Unit**	**Sediment Reduction Factor**	**Estimated Reduction in Sediment per year**	**Unit**
Septic Improvements	006	5	No.	7,128	35,640	Lbs. N/unit/year
Watering System	614	5	No.	0.004	0.02	Lbs. N/unit/year
Pipeline	516	5,000	Feet	0.006	30	Lbs. N/foot/year
Heavy Use Area	561	3,380	Sq. Feet	0.002	6.76	Lbs. N/sq. foot/year
Fence	382	10,000	Feet	0.006	60	Lbs. N/foot/year
Critical Area	342	5	Acres	0.055	0.275	Lbs. N/acre/year
Streambank/Shoreline Protection	580	200	Feet	0.047	9.4	Lbs. N/foot/year
Livestock Exclusion	472	10	Acres	0.001	0.01	Lbs. N/acre/year
Access Road	560	1,000	Feet	0.004	4	Lbs. N/foot/year
Riparian Forest Buffer	391	5	Acres	0.002	0.01	Lbs. N/foot/year
Prescribed Grazing	528	500	Acres	0.333	166.5	Lbs. N/acre/year

Based on our BMP goals and the outcomes in Tables 4, 5 & 6 we can eventually expect the following reductions once all goals are met.

A. Total estimated Nitrogen reduction: 5,623.5 lbs. per year
B. Total estimated Phosphorus reduction: 671.6 lbs. per year
C. Total estimated Sediment reduction: 35,917 lbs. per year

BMP List and Budget

Agriculture continues to be the main source of income for many of the residents in the Richland Creek Watershed. Historically, burley tobacco was the large source of farm revenue but recently less tobacco is being cultivated. The steep hilly topography is unsuited for large scale crop production resulting in a large portion of the land area being utilized for livestock operations. In attempts to subsidize the income from tobacco, many farmers are increasing their beef cattle herds and some even converting over to horses, sheep and goats. From a water quality standpoint, these agricultural trends have resulted in a reduction of tobacco related chemical loading and an increase in pathogen loading. An effective BMP implementation program can help alleviate many of these threats to this sensitive aquatic system.

BMP Name	Quantity per year	Cost/Unit	Budget Estimate
*ex. Riparian Buffer	40 Ac	$1,000/ac	$40,000
Watering facilities, 4-hole	30 no	$1,648/no	$49,440
Heavy Use Area	10,140 sq ft	$1.30/sq ft	$13,182
Livestock pipeline, rocky	15,000 ft	$4.24/ft	$63,600
Fence, 4-strand HT electric	20,000 ft	$2.79/ft	$55,800
Septic System Improvements	18 no	$8,000/no.	$144,000
Critical area planting	10 ac	$229/ac	$2,290
Mulching	10 ac	$339/ac	$3,390
Streambank/Shoreline Protection	40 ft, 110 tons	$41/ton	$4,510
Access Road	2,000 ft	$13/ft	$26,000
Riparian Forest Buffer	16 ac	$1,112/ac	$17,792

Prescribed grazing	400 ac	$11/ac	$4,400
Aquatic Organism Passage, CMP culvert	60 ft	$612/ft.	$36,720
Tree/Shrub Preparation, mow & spray	16 ac	$76/ac	$1,216
Stream Crossing, ford crossings	1,200	$7.80/sq. ft	$9,360
Roof Runoff, gutters, downspouts, fascia	1,500 ft	$7.84/ft	$11,764
Underground Outlet for Roof Runoff	400 ft	$4.11/ft	$1,646
		Total	$445,110

Criteria to Assess Achievement of Load Reduction Goals

A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards. Public Education.

BMP's installed per year

Success Indicators - Per Year	**Target**
Contact landowners concerning the benefits of agricultural and residential BMP implementation.	350 landowners
Conduct landowner visits to complete needs assessments and negotiate BMP implementation to reduce NPS pollution.	35 landowners
Complete BMP projects to reduce NPS pollution in the Richland Creek Watershed.	20 landowners
Watering System	15 systems
Heavy Use Area Protection	10,140 Sq. Ft.
Pipeline	15,000 Ft.
Fence	20,000
Septic Systems Improved	18 (5% of 3,527 total parcels, 180 in ten years)
Critical Area Planting	10 acres
Streambank/Shoreline Protection	40 Ft.
Access Road	2,000 Ft.
Riparian Forest Buffer	16.0 acres
Prescribed Grazing	400 acres

Aquatic Organism Passage	60 ft
Tree/Shrub Site Preparation	60 acres
Stream Crossing	3 no
Roof Runoff Systems	5 systems

Education and Outreach

Success Indicators - Per Year	**Target**
Develop and distribute educational fliers to target audiences throughout the watershed.	350 Fliers
Educational programs for Adults about the importance and ways of watershed protection.	50 Adults
Educational programs for Children about the importance and ways of watershed protection.	50 Children at Rutledge Middle School and Grainger High School

Monitoring and Documenting Success

1.) ***A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under immediately above.***

2.) ***A description of interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented.***

The Grainger County Soil and Water Conservation District will coordinate with NRCS, TN Valley Authority, TDEC, Grainger County Health Department, and other agencies and inform them of BMP's we are implementing in the Richland Creek Watershed.

In partnership with TDEC, and as possible, we will analyze available ambient water quality data. This information will assist us in assessing the collective level of positive impact Agricultural BMPs are having in our priority areas. The Knoxville Environmental Field Office covers Grainger County, see contact information below.

Knoxville Environmental Field Office

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