

**Clinch and Powell Rivers
Watershed Restoration Plan
(Hancock and Claiborne Counties, TN)
December 2015**

ABSTRACT

This document was jointly prepared by the Clinch-Powell Resource Conservation and Development Council and The Nature Conservancy as a plan for restoring the biological integrity of that portion of the Upper Clinch and Powell Rivers Watershed, located in Hancock and Claiborne Counties, Tennessee. This plan identifies those stressors, and sources of stress which threaten and degrade the Clinch and Powell Rivers and their tributaries. The information attained through this study has resulted in the establishment of goals and objectives designed to return this globally important section of the Clinch and Powell Rivers and tributaries, including 2014 303(d) listed streams, back to the classification of fully supporting their designated uses. This document was created following the EPA and Tennessee Department of Agriculture – Non Point Source program guidelines for a Watershed-Based Plan and includes each of its nine key components.

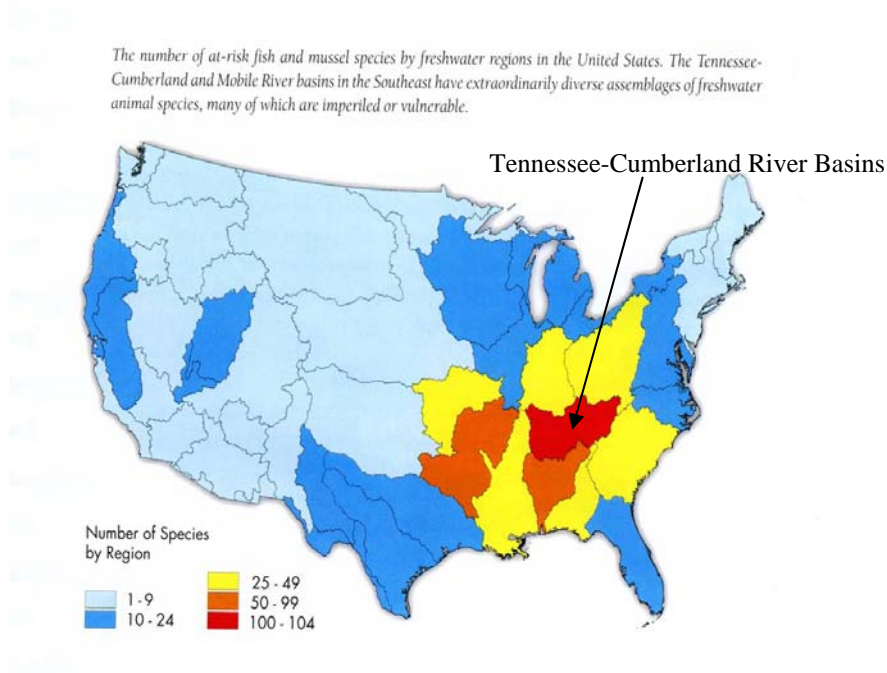
Portions of this document were provided by:

- PROPOSED TOTAL MAXIMUM DAILY LOAD (TMDL) For E.coli in the Upper Clinch River Watershed (HUC 06010205) Anderson, Campbell, Claiborne, Grainger, Hancock, Hawkins, and Union Counties, Tennessee (Submitted April 19, 2010, Approved by EPA Region 4 – May 13, 2010)
- PROPOSED TOTAL MAXIMUM DAILY LOAD (TMDL) for E. coli in the Powell River Watershed (HUC 06010206) Campbell, Claiborne, Hancock, and Union Counties, Tennessee (Submitted September 18, 2008, Approved by EPA Region 4 – October 15, 2008)
- PROPOSED FINAL VERSION YEAR 2014 303(D) LIST (October, 2014)
- 2014 305(B) REPORT, The Status of Water Quality in Tennessee (December 2014)

EXECUTIVE SUMMARY

The Clinch River and its main tributary the Powell River forms in southwestern Virginia and flows for approximately 400 km before entering Norris Lake, TN- a Tennessee Valley Authority (TVA) impoundment. The Clinch and Powell Rivers are among the most important freshwater bodies for rare species and biodiversity in North America (Figure 1). These rivers support 133 species of fish (Jenkins and Burkhead, 1994) and at least 46 extant species of freshwater mussels (Neves et al., 1997; Jones et al. 2014). Of these mussel species, 20 are federally listed as endangered, 2 are proposed endangered, and 31 are described as “at-risk” by state Natural Heritage programs (Tennessee Department of Environment and Conservation- Natural Heritage Inventory Program) (Table 1). Due to the river’s national importance, and the sensitive nature of its globally rare species, the EPA, the state of Tennessee, and the Commonwealth of Virginia have a specific Memorandum of Understanding (2008) in place to prioritize the river system for protection and coordinate their efforts at monitoring, TMDL development, river restoration, and water quality improvement. The result of this MOU was the creation of the Clinch Powell Clean Rivers Initiative (CPCRI). The CPCRI is an ambitious two-state river coalition that works to protect and restore water quality in North America’s most important river for rare and imperiled freshwater animals. They are a diverse group of agencies, research scientists, conservation organizations, and industry leaders, biologists, hydrogeologists, water quality specialists, stream restoration practitioners, education and outreach professionals, coal mining reclamation professionals and coal mining process professionals. Members of the CPCRI include: Tennessee Dept. of Environment and Conservation, Virginia Dept. of Environmental Quality, Virginia Dept. of Game and Inland Fisheries, Tennessee Wildlife Resources Agency, Virginia Dept. of Conservation and Recreation, Virginia Dept. of Mines, Minerals, and Energy, US Environmental Protection Agency Regions 3 & 4, US Office of Surface Mining Reclamation and Enforcement, US Fish and Wildlife Service, US Geological Survey, US Army Corps of Engineers, Tennessee Valley Authority, Alpha Natural Resources, Arch Coal, The Nature Conservancy, Upper Tennessee River Roundtable, Virginia Tech, Virginia Water Resources Research Center, North Carolina State University, Clinch-Powell RC&D and the Tennessee Healthy Watersheds Initiative.

FIGURE 1: Regional Concentration of At-Risk Fish and Mussel Species



I. Identification of causes of impairment and pollutant sources or groups of similar sources that need to be controlled to achieve needed load reductions, and any other goals identified in the watershed plan. Sources that need to be controlled should be identified at the significant subcategory level along with estimates of the extent to which they are present in the watershed (e.g., X number of dairy cattle feedlots needing upgrading, including a rough estimate of the number of cattle per facility; Y acres of row crops needing improved nutrient management or sediment control; or Z linear miles of eroded streambank needing remediation).

The globally important Clinch-Powell Watershed is located in the Appalachian Mountains of Virginia and 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 an amazing variety of wildlife and timber resources, coal mining areas that provide jobs and energy but stress the environment, sensitive caves which are critical to groundwater, working farms which support local communities, and small Appalachian towns struggling to remain economically viable.

The Upper Clinch River (USGS 8-digit Hydrologic Unit Code, 06010205) and Lower Powell River (USGS 8-digit Hydrologic Unit Code, 06010206) have a long history of watershed degradation from Nonpoint Source (NPS) pollution. Pollutants from abandoned mined lands (e.g. high levels of acidity, suspended heavy metals including iron, suspended solids, etc.), 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 these species rich waters. These stressors combine to impact water quality and human uses, as well as compromise the natural habitat of threatened and endangered species.

The Clinch-Powell Watershed is a generally rural area located in the Appalachian Ridge and Valley and Appalachian Plateaus geographic provinces. In the Ridge and Valley, which is the primary focus area for this project, 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. In the Appalachian Plateaus section of the watershed, coal and gas mining are the dominant land uses.

Hancock and Claiborne Counties are among the most isolated and impoverished areas of Tennessee. Containing both Clinch and Powell River systems and an array of mountainous terrain, this area is an example of natural beauty and rural isolation. The Clinch-Powell Primary Project Area has a median household income average of \$28,560 versus a US average of \$53,046. The project area has almost double the national average of people living below the poverty level (PPA -26.9%; US – 14.8%) and a lower than average per capita income (PPA - \$16,454; US - \$28,155) (US Census Bureau). This area has very few business opportunities, with agriculture being the major employer and land use. This has resulted in a significant amount of nonpoint source pollution.

With little money to feed their families these landowners do not have the resources to focus on environmental concerns. This project has a goal of addressing the needs of the landowners and environment while providing funding to the local economy. An effective cost-share program

goes far beyond assistance to the landowners and funding provided through this project will: (1) alleviate the financial burden of installing BMP practice in an already impoverished region, (2) support local business as the landowners purchase supplies needed to install BMPs and (3) support local contractors who will install the BMP practices. For this area of southern Appalachia, this funding will be greatly appreciated and needed for entire community.

Threats to the System:

- A. **Water Quality Degradation:** Given that imperiled freshwater mussels reach their highest North American density in these reaches of the Clinch and Powell rivers, improving/maintaining water quality is critical. Freshwater mussels are known to be more sensitive to some contaminants, such as ammonia and copper, than commonly used freshwater test organisms. Therefore, achieving water quality greater than minimum standards is valuable for the conservation of this fauna. Adequate riparian buffers can help prevent contaminants from reaching the river and causing acute or chronic stress on native mussels and fish. A recent study by the USDA-NRCS determined that hay and pasture land were significant contributors of nitrogen and phosphorous loading to streams in the upper Tennessee River System, including the Clinch and Powell rivers (USDA, 2011). The evidence that water quality is exerting stress on native freshwater mussels in certain reaches of these rivers is mounting and continues to be investigated by both Virginia and Tennessee state water quality agencies, NGO's, academic institutions, and federal agencies.
- B. **Inadequate Habitat for Fish and Wildlife:** Many studies identify excess sedimentation as a habitat degradation factor for stream systems in agricultural and urban settings. Limited indications of physical habitat impairment are documented in the mainstem Clinch River (Ostby et al., 2014). However, numerous tributary streams historically supporting diverse mussel and fish assemblages in the Clinch and Powell River systems exhibit sediment loads and altered instream habitats. Sedimentation was identified as a widespread problem in many tributaries of the Clinch River system by the USDA, potentially impacting benthic fish and mussel populations (1992). The EPA Risk Assessment for the Clinch and Powell rivers (2002) concluded that embeddedness and instream cover influenced biological conditions of both fish and macroinvertebrates and were correlated with riparian and overall land use. Collectively, these rivers specific and many other stream ecological integrity studies suggest that habitat alteration is problematic for instream fauna in watersheds with significant human uses such as agriculture, mining, and infrastructure development in close proximity to stream corridors.

Agriculture continues to be the leading land use in the Clinch-Powell Watershed. These agricultural activities are a significant source of coliform bacteria loading to surface waters and the activities of greatest concern are typically those associated with livestock operations:

- Agricultural livestock grazing in pastures deposit manure containing coliform bacteria onto land surfaces. This material accumulates during periods of dry weather and is available for washoff and transport to surface waters during storm events. The number of animals in pasture and the time spent grazing are important factors in determining the loading contribution.
- Processed agricultural manure from feeding operations is often applied to land surfaces and can provide a significant source of coliform bacteria loading. Guidance for issues relating to manure application is available through the University of Tennessee Agricultural Extension Service and the Natural Resources Conservation Service (NRCS).

- Agricultural livestock and other unconfined animals often have direct access to waterbodies and can provide a concentrated source of coliform bacteria loading directly to a stream and destroy the riparian vegetation holding the streambanks in place.

Table 1.2: Livestock Distributions in the Clinch River Watershed and Powell River Watershed.

County	Beef Cattle	Milk Cows	Poultry		Hogs	Sheep	Horses
			Layers	Broilers			
Hancock	7,571	19	474	D	82	62	354
Claiborne	14,777	570	338	92	102	86	809

* Claiborne County Data is based on the total number reported in the 2008 FINAL PROPOSED TOTAL MAXIMUM DAILY LOAD (TMDL) for E. Coli in the Powell River Watershed (HUC 06010206) Campbell, Claiborne, Hancock, and Union Counties, Tennessee with the numbers adjusted for the % of the county containing the Clinch and Powell Rivers Watershed (estimated 82.7%).

From the information provided and the experience of the Clinch-Powell RC&D staff we have set the following goals to make significant progress towards remediation of nonpoint source pollution in the Clinch and Powell Rivers of Hancock and Claiborne County, TN.

Within the Clinch-Powell Watershed Primary Project Area:

- Total Estimated working farms: 930
- Desired participation level: 93 producers (10% of the total working farms)
- Linear miles of streambank that needs remediation: 29 (153,000 feet or 25% of the 116 miles of impaired streams as defined by the Tennessee Department of Environment 303(d) lists of streams that violate water quality standards and/or don't meet their designated use.
- Watering Systems to be installed: 75
- Heavy Use Area Protection: 60,000 square feet (25 @ 2,400 square feet)
- Pipeline: 150,000 feet (75 watering systems x 2,000 feet per system)
- Fence: 153,000 feet (fencing will be part of the remediation)
- Water Control Basins: 4 or 1,600 cu. yds. (based on 400 cubic yards per)
- Critical Area Plantings: 10 acres
- Streambank/Shoreline Protection: 200 feet
- Livestock Exclusion: 153,000 feet or 105 acres (based on an average width of 30 feet)
- Access Road: 5,000 feet
- Riparian Forest Buffer: 153,000 feet or 105 acres (based on an average width of 30 feet)

II. An estimate of pollutant load reductions expected from management measures.

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

TABLE 1.1: Total estimated N reduction in pounds per year

BMP Name	NRCS Code	Amount	Unit	N Reduction Factor	Estimated Reduction in N per year	Unit
Watering System	614	75	each	70.23	5,267	lbs. N/unit/year
Heavy Use Area	561	60,000	sq. ft.	0.09	5,400	lbs. N/sq. ft/year
Pipeline	516	150,000	feet	0.13	19,500	lbs. N/foot/year
Fence	382	153,000	feet	0.25	38,250	lbs. N/foot/year
Water and Sediment Control Basin	638	4	each	199.41	798	lbs. N/basin/year
Critical Area Planting	342	10	acre	100.04	1,000	lbs. N/acre/year
Streambank/Shoreline Protection	580	200	feet	1.75	350	lbs. N/foot/year
Livestock Exclusion	472	153,000	feet	0.11	16,830	lbs. N/foot/year
Access Road	560	5,000	feet	0.37	1,850	lbs. N/foot/year
Riparian Forest Buffer	391	153,000	feet	0.28	42,840	lbs. N/foot/year

TABLE 1.2: Total estimated P reduction in pounds per year

BMP Name	NRCS Code	Amount	Unit	P Reduction Factor	Estimated Reduction in P per year	Unit
Watering System	614	75	each	5.88	441	lbs. P/unit/year
Heavy Use Area	561	60,000	sq. ft.	0.01	600	lbs. P/sq. ft/year
Pipeline	516	150,000	feet	0.02	3,000	lbs. P/foot/year
Fence	382	153,000	feet	0.02	3,060	lbs. P/foot/year
Water and Sediment Control Basin	638	4	each	33.92	136	lbs. P/basin/year
Critical Area Planting	342	10	acre	13.56	136	lbs. P/acre/year
Streambank/Shoreline Protection	580	200	feet	0.17	34	lbs. P/foot/year
Livestock Exclusion	472	153,000	feet	0.01	1,530	lbs. P/foot/year
Access Road	560	5,000	feet	0.03	150	lbs. P/foot/year
Riparian Forest Buffer	391	153,000	feet	0.02	3,060	lbs. P/foot/year

TABLE 1.3: Total estimated Sediment reduction in tons per year

BMP Name	NRCS Code	Amount	Unit	Sediment Reduction Factor	Estimated Reduction in Sediment per year	Unit
Watering System	614	75	each	0.004	0	tons/unit/year
Heavy Use Area	561	60,000	sq. ft.	0.002	120	tons/sq. ft/year
Pipeline	516	150,000	feet	0.006	900	tons/foot/year
Fence	382	153,000	feet	0.006	918	tons/foot/year
Water and Sediment Control Basin	638	4	each	6.109	24	tons/basin/year
Critical Area Planting	342	10	acre	0.055	1	tons/acre/year
Streambank/Shoreline Protection	580	200	feet	0.047	9	tons/foot/year
Livestock Exclusion	472	153,000	feet	0.001	153	tons/foot/year
Access Road	560	5,000	feet	0.004	20	tons/foot/year
Riparian Forest Buffer	391	153,000	feet	0.002	306	tons/foot/year

Based on our BMP goals in Table 4.1 and the outcomes in Tables 1.1, 1.2 & 1.3, we can eventually expect the following reductions, once all goals are met.

- A. Total estimated N reduction: 132,085 lbs. /year
- B. Total estimated P reduction: 12,146 lbs. /year
- C. Total estimated Sediment reduction: 2,452 tons /year

III. A description of the nonpoint source management measures that will need to be implemented to achieve load reductions in element 2, and a description of the critical areas in which those measures will be needed to implement this plan.

The Clinch-Powell RC&D involves a unique approach to watershed protection, through the use of resources available to strategically target the stresses and stressors of the Clinch-Powell system. Besides the BMP implementation goals we see the need to consider the following measures to achieve Clinch Powell Watershed Aquatic Habitat Protection:

- **Effective Partner Coordination:** The Clinch Powell RC&D along with NRCS, The Nature Conservancy and both the Claiborne and Hancock SCDs have committed their assistance in designing, implementing, and monitoring completion of BMP projects. Additionally, the RC&D will draw support from partners on other important activities in the project area such as ambient water quality monitoring, TMDL development, stream bank stabilization and land protection. Some of the expected partners include: Clinch Powell Clean Rivers Initiative (CPCRI), Tennessee Healthy Watersheds Initiative (THWI), US Geological Survey (USGS), US Environmental Protection Agency (EPA), US Fish and Wildlife Service (USFWS), Tennessee Department of Environment and Conservation (TDEC), Tennessee Department of Agriculture- Division of Forestry (TDF), Tennessee Wildlife Resource Agency (TWRA), Tennessee Stream Mitigation Program (TSMP), Tennessee Valley Authority

(TVA), Lincoln Memorial University (LMU), Clinch Powell Clean Rivers Initiative (CPCRI), Hancock County Soil Conservation District (HCSCD), Claiborne County Soil Conservation District (CCSCD), Hancock County Government, Claiborne County Government and the Sneedville City Government.

- **Innovative Science:** Using the best science and spatial analyses available, we propose to identify *Priority Agricultural Restoration Zones & Priority Agricultural Restoration Areas* in the Clinch & Powell watersheds. These zones/areas will be incorporated with other identified priority parameters into a *BMP Implementation Priority Ranking System*, to strategically direct project funding to those lands with greatest restoration needs and/or greatest potential ecological benefits. The RC&D will work with key partners to identify the best parameters and ranking system, but envision that these zones/areas will become the primary ranking parameter (where points are awarded based on proximity of each applicant's land to these zones), supplemented with field-based assessments, desktop GIS analyses, and/or expert knowledge of tract-level conditions and application logistics. This approach will allow us to rank the potential project on their contribution to the remediation of the resource concern and allow a more strategic approach to watershed protection through BMP implementation.
- **Local Economic Limitations:** Working in one of the poorest areas in the nation, poses a set of challenges for conservation. When a landowner is worried about feeding his/her families they have little time to be concerned about aquatic biodiversity or globally rare river species. This program will not only provide funding to assist the landowner, which would otherwise not have the means to complete these BMP practices, but also stimulate the local economies including; farm supply and construction material vendors, equipment operators, and construction companies.
- **Local and Regional Outreach Potentials:** Being one of the last great strongholds for freshwater mussels, the Clinch and Powell Rivers have long been a focal area for habitat protection and sediment reduction. Our focus area contains one of the greatest mussel assemblages in the temperate world. The Clinch and Powell Rivers are popular with locals, weekend visitors, canoeing enthusiasts, fishermen, and hunters and is within a two hour drive of both the Tri-Cities and Knoxville metropolitan areas. The project will have great exposure to both the scientific and public communities who spend time in the area and are very interested in the long term protection of the watershed. Local educational opportunities will also allow us to inform the Clinch-Powell landowners on the ways and whys of BMP implementation.

IV. Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement this plan.

Agriculture continues to be the main source of income for many of the residents in the Clinch-Powell 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.

Table 4.1: Agricultural BMP installation needs and cost based on project goals.

BMP	Amount	Unit	Cost per Unit *	Total Cost
Watering System	75	Each	\$5,000/each	\$375,000
Heavy Use Area	60,000	Sq. ft.	\$1.36/sq. ft.	\$81,600
Pipeline	150,000	Feet	\$4.67/ft.	\$700,500
Fence	153,000	Feet	\$2.73/ft.	\$417,690
Water and Sediment Control Basin	1,600	Cu. yds.	\$3.54/cu. yd.	\$5,664
Critical Area Planting	10	Acres	\$317.33/acre	\$3,173
Streambank/Shoreline Protection	200	Feet	\$56.82/ft.	\$11,364
Access Control Livestock Exclusion	105	Acres	\$14.72/acre	\$1,546
Access Road	5,000	Feet	\$14.21/ft.	\$71,050
Riparian Forest Buffer	105	acres	\$761/ft.	\$79,905

* Cost rates are based on 2015 NRCS EQIP Cost list for Historically Underserved Producers.

Table 4.2: Total estimated cost for remediation of nonpoint source pollution in the Clinch-Powell Watersheds of Hancock and Claiborne Counties, TN.

POLICY 03 Object Line-item Reference	EXPENSE OBJECT LINE-ITEM CATEGORY ¹	TOTAL PROJECT
3	Salaries Benefits & Taxes ² – of grantee employees	50,000
4, 15	Professional Fee, Grant & Award ² – for subcontracted work and BMP materials purchased by others	1,747,492
5, 6, 7, 8, 9, 10	Supplies (including BMP materials purchased by the grantee), Telephone, Postage & Shipping, Occupancy, Equipment Rental & Maintenance, Printing & Publications ²	10,000
11, 12	Travel, Conferences & Meetings	5,000
13	Interest ²	0.00
14	Insurance	0.00
16	Specific Assistance To Individuals	0.00
17	Depreciation	0.00
18	Other Non-Personnel	0.00
20	Capital Purchase	0.00
22	Indirect Cost	174,749
24	In-Kind Expense	0.00
25	GRAND TOTAL	1,987,241

Many of the organizations working in the Clinch and Powell watersheds do not have secured yearly budgets, so a full accounting of available funding for this project is difficult to attain. A continued dialog needs to be maintained with these additional supporting partners, to make sure the Clinch-Powell Watershed continues to be a priority for funding. Although some of the funding is secure, others are still uncertain, but each one is important for the protection of the Clinch-Powell Watershed.

Current Conservation Efforts in the Clinch-Powell Watershed:

- Tennessee Department of Agriculture, 319 Program, Mulberry/Little Mulberry Creek Watershed Restoration Project - currently the Clinch-Powell RC&D is in the final stages of this grant which is carrying a balance of \$48,787.00. These funds will be used to address the needs of this plan.
- Tennessee Department of Agriculture- Agriculture Resources Division (TDA-AR) – Ag Resources has been one of the most stable partners in watershed protection. Each year the Hancock and Claiborne County Soil Conservation Districts receive approx. \$100,000 in funding and a large portion of this is spent in the Clinch-Powell Watershed.
- Natural Resource Conservation Service, Environmental Quality Incentives Program (EQIP) – Over the past couple years, NRCS has provided over \$500,000 for BMP implementation in the Clinch-Powell Watershed. Given the uncertainty of government funding we are unsure what allocations will be available but we trust similar numbers in the years to come.
- Tennessee Wildlife Resources Agency (TWRA): TWRA has a history of investments into the protection of the Clinch-Powell Watershed. Through funding to the RC&D they have annually contributed \$9,000 per year in a per year agreement.
- The Nature Conservancy (TNC): TNC has a long history of working with partners in the Upper Clinch-Powell Watershed and beyond. They are involved in various endeavors to protect the Clinch and Powell Watershed and continue to invest resources into the protection of the Clinch-Powell aquatic biodiversity.
- US Fish and Wildlife Service (USFWS): They have made great investments in the Clinch-Powell Watersheds over the years. Currently they have a long term agreement with the RC&D which is amended yearly to provide additional funds. This is a non-matching federal agreement which could allow for non-federal matching funds to the 319 program through landowner cost-share investments in the projects. Currently the FWS have allocated \$100,000 for the reduction of sediment loading into the Clinch-Powell Watershed.
- Tennessee Healthy Watersheds Initiative (THWI): is a collaboration of federal, state and nonprofit organizations committed to maintaining and improving water resources in Tennessee watersheds. Currently The Nature Conservancy has secured a grant from the THWI for the purchase of 10 year easements in the Powell River Watershed of Hancock and Claiborne Counties. This \$100,000 grant ends in December 2016.

Potential Conservation Efforts in the Clinch-Powell Watershed:

- Tennessee Department of Agriculture, 319 Program:
 - a) Clinch-Powell Watershed Restoration Project – This proposal has been submitted to the TDA 319 program for review. If funded this will provide up to \$318,000 to address the needs of this plan.
 - b) Little Sycamore Watershed Restoration Initiative – This \$92,000 award was submitted by the Claiborne County SCD and has been approved by the TDA 319

and is awaiting final documentation. This will award will help address the needs of this plan.

- Natural Resource Conservation Service:
 - a) Regional Conservation Partnership Program (RCPP) - RCPP promotes coordination between NRCS and its partners to deliver conservation assistance to producers and landowners. NRCS provides assistance to producers through partnership agreements and through program contracts or easement agreements. Currently there is an RCPP application under review for the Clinch-Powell Watershed of Tennessee and Virginia. If approved it could provide for \$5.7 million over 5 years and a partner investment commitment of \$9 million. Although the majority of funds will be federal, there will be some non-federal investments that could potentially go to match this 319 project. If funded, the RCPP could bring over \$1,000,000 to the Tennessee portion of the watershed for NPS remediation.

Over the years the Clinch-Powell Watershed has benefited from the expertise and assistance of various organizations working in the watershed. In addition to the ones previously listed as possible funding opportunities, these are other agencies involved in some aspect of Clinch-Powell Watershed protection.

- US Geological Survey (USGS)
- US Environmental Protection Agency (EPA)
- Tennessee Department of Environment and Conservation- Division of Water Pollution Control (TDEC-WPC)
- Tennessee Department of Agriculture- Division of Forestry (TDF)
- Tennessee Wildlife Resource Agency Landowners Incentives Program (TNLIP)
- Tennessee Stream Mitigation Program (TSMP)
- Tennessee Valley Authority (TVA)
- Lincoln Memorial University (LMU)
- Virginia Tech (VT)
- Clinch Powell Clean Rivers Initiative (CPCRI)
- Hancock County Soil Conservation District (HCSCD)
- Claiborne County Soil Conservation District (CCSCD)
- Hancock County Government
- Claiborne County Government
- Sneedville City Government

V. An information and education component used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the nonpoint source management measures that will be implemented.

There is a great need to educate the public concerning the reasons for and ways of protecting the resources of the Clinch and Powell Rivers. Strategies for completing the educational goals of this Watershed Based Plan will include development and distribution of informative fliers, advertisement of the program through local avenues, and participation in educational events.

There are several existing educational opportunities at the local and regional level that include the Clinch-Powell Watershed protection. We anticipate the continued support of these events and plan to administer others as needed. Current educational endeavors include:

- The Hancock County Landowner Information Day - is a one-day event sponsored by the Hancock County Soil Conservation District and was established to allow landowners to have an informal meet and greet with experts in various farm-related fields, including the environment, farm production, financial assistance, equipment sales, and BMP installation.
- Public information fliers - are distributed as funds allow, and help to inform the public concerning watershed protection and pollution prevention.
- Adult Leadership Classes - The purpose of these events is to educate adults, in leadership roles in both Claiborne and Hancock Counties, concerning aspects of the community which are deemed vital for position as community leaders. Each one day session includes various topical discussions including law enforcement, healthcare, business development and environmental resources. Our role will be to demonstrate the benefits of BMP placement on water quality and their effects on the biological community. Approximately 30 community leaders take part in each of the events each year.
- Farm Tours – Both the Claiborne and Hancock County Soil Conservation Districts host farm field days throughout the year. This one day event allows local landowners to visit a farm where BMP practices have been previously implemented and see the final results along with the benefits to the environment and farming operations.
- There are various websites dedicated to informing the public about the Clinch-Powell Watershed. These could be used to report on the concerns and accomplishments of watershed protection. Some of the Web sites are:
 - Clinch-Powell RC&D: (<http://www.clinchpowell.net>)
 - The Nature Conservancy: (<http://Nature.org>)
 - The Clinch Powell Clean Rivers Initiative: (<http://cpcri.net/>)
 - Tennessee Healthy Watersheds Initiative: (<http://www.tn.gov/environment/article/wr-ws-tennessee-healthy-watershed-initiative>)

VI. Schedule for implementing the nonpoint source management measures identified in this plan that is reasonably expeditious.

Drawing on the experience of various organizations, working in the watershed, we plan to implement a series of BMP projects designed to reduce or eliminate sedimentation, pathogens, and/or other non-point source pollution loading into the Clinch-Powell Primary Project Area. All applications, for this program, must show direct water quality improvement and will be graded on a competitive base in accordance with their overall cost, complexity; and their benefits to water quality, in-stream habitat, and the aquatic biodiversity of the Clinch-Powell Primary Project Area.

The primary natural resource concerns to be addressed will be Water Quality Degradation and Inadequate Habitat for Fish and Wildlife. Within these broad categories, we will more specifically focus on reducing sedimentation and pathogen loading into the system. The partners involved in this project identified these concerns through a review of multiple watershed studies including but not limited to: (1) Clinch Powell Clean Rivers Initiative Science Plan results (CPCRI, 2008-2015), (2) Clinch-Powell Healthy Watersheds Assessment (EPA, 2015), (3) Clinch-Powell Ecological Risk Assessment (Diamond et. al, 2001), and multiple Total Maximum Daily Load plans published for sub-sections of the watershed.

Following is the sequence of events envisioned for successful administration of the Clinch-Powell Watershed Restoration Project:

1. Develop GIS Based Model – Using the best science and spatial analyses available, we will identify *Priority Aquatic Habitat Zones* and *Priority Agricultural Restoration Areas* in the Clinch & Powell watersheds. These zones/areas will be incorporated with other parameters into a BMP Implementation Priority Ranking System, to strategically direct project funding to those lands with greatest restoration needs potential ecological benefits. Supplemented with field-based assessments, desktop GIS analyses, and expert knowledge of tract-level conditions and application logistics, the RC&D will provide these results to the Project Partners, via a GIS database and hard copy maps. The results of the GIS model will drive selection of individual landowner projects funded by this 319 project.
2. Organize Project Partners – the RC&D will organize and facilitate this group which will review the GIS model, the *Priority Aquatic Habitat Zones* and *Priority Agricultural Restoration Areas* and develop priority BMPs which allow the RC&D to score landowner BMP projects on a competitive basis. This will also give the RC&D the opportunity to assess current conservation funding and potential efforts.
3. Develop Priority NRCS Conservation Practices – The RC&D and the project partners will identify those practices that contribute greatest to the alleviation of agriculturally related stressors to the aquatic ecology and water quality of the Clinch-Powell Watershed.
4. Priority Area Development – Using the results of the GIS model, current TMDL information, 303d lists for impaired waterways, guidance from the project partners, and other pertinent information, the RC&D will rank stream drainages within the Clinch-Powell Primary Project Area. A set of the highest ranking stream drainages will become our priority areas (i.e. “*Priority Aquatic Habitat Zones* and *Priority Agricultural Restoration Areas*”) for implementation of agriculture BMP projects funded by the 319 grant.
5. Priority Area Material Development – Once the priority areas are established, the RC&D will develop maps and other information to be distributed to the local NRCS and local soil conservation district offices. These maps and other resources will support landowner recruitment and outreach endeavors.
6. Landowner Recruitment – the RC&D will actively pursue landowner involvement throughout the Clinch-Powell Primary Project area with emphasis and focus on the *Priority Agricultural Restoration Areas*.
7. Whole Farm Plan Development – When a landowner becomes interested in the program, the RC&D, NRCS and the local SWCDs will assist in the development of a whole farm plan which will address our primary resource concerns of water quality degradation and inadequate habitat for fish and wildlife.
8. Contract and Approval Documentation– the RC&D will assist the landowner in applying for required permits and completing all paperwork associated with pre-project approval.
9. BMP Project Implementation – the RC&D will monitor the progress of the landowner’s BMP implementation making sure the landowner adheres to the plans and goals of the Whole Farm Plan.
10. Post-Project Documentation – the RC&D will assist the landowner with project closeout including BMP installation measurements, documentation, photographs, etc. This will lead to the landowner’s request for reimbursement and project completion.
11. BMP Monitoring – The Clinch-Powell RC&D will coordinate with NRCS, Soil and Water Conservation Districts, Division of Forestry, Farm Service Agency, TN Valley Authority, The Nature Conservancy, US Fish and Wildlife Service, and others implementing Agricultural BMPs in the Upper Clinch-Powell Primary Project Area. As information is available, the RC&D will record the placement of BMPs by all our partnering agencies and

update our Primary Project Area Maps. As possible, we will analyze available ambient water quality data collected by Tennessee water quality monitoring organizations to assess the collective level of positive impact Agricultural BMPs are having in our priority areas.

Table 6.1 –Proposed timeline of successful administration of the Clinch Powell Watershed Based Plan.

Fiscal Year Quarter	FY16				FY17				FY18				FY19				FY20			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. Develop BMP Priority Ranking System																				
A) Develop GIS model																				
B) Identify Priority Aquatic Habitat Zones																				
C) Solicit partner review of GIS model																				
D) Export Results of GIS model to partners																				
E) Annually Review the GIS model and modify as needed																				
2. Organize Partners																				
A) Organize a diverse set of partners throughout watershed																				
B) Review final GIS model including priority areas																				
C) Identify Priority Agriculture Restoration Zones																				
D) Develop Priority BMP Implementation List																				
E) Identify Priority Land Parcels for protection/restoration																				
F) Identify additional conservation efforts																				
3. Agricultural BMP Installation																				
A) Develop outreach materials																				
B) Distribute outreach materials																				
C) Participate in 110 farm visits																				
D) Assist landowners with project (319 or other) enrollment																				
E) Enroll 93 farms into the 319 or other Farm Bill Program																				
4. Communicate Program Progress and Results																				
A) Submit Reports as specified by 319 program																				
B) Report progress through partner resources																				
C) Report to and update CPCRI partners through website and/or annual meeting																				

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

Milestone #1- Develop BMP Implementation Priority Ranking System: Using a variety of conservation, rare species, and land use data layers, we will develop a GIS Based Model to guide the prioritization and recruitment of the specific landowner projects.

- A. Develop GIS Model - Collect and analyze available, relevant biological, land use, aquatic species, and water quality data.
- B. Identify Priority Aquatic Habitat Zones – those areas with the primary project area with the greatest assemblage of aquatic biodiversity.
- C. Solicit partner review, feedback, and endorsement of the model results.

- D. Export results (GIS database, maps, and high priority tract information) to those conservation organizations working on freshwater conservation in the Primary Project Area.
- E. Update model annually with new information about completed BMP projects and relevant water quality and biological data.

Milestone #2- Organize Partner Resources: Organize a diverse set of partners (i.e. NRCS, local Soil Conservation Districts, etc.), which will review the GIS model, identify Priority Agriculture Restoration Zones, and develop a Priority BMP Implementation List.

- A. Organize a diverse set of partners which will assist in the planning and implementation of the BMP projects which meet the goals of this project.
- B. Review and finalize GIS model with partners including the areas of greatest interest to water quality improvement and biodiversity protection.
- C. Identify Priority Agriculture Restoration Zones – those areas of the primary project areas that are in greatest need of agriculture BMP implementation.
- D. Develop a Priority BMP Implementation List – Those BMPS which show the greatest potential for remediation of our NPS targets.
- E. Identify Priority Land Parcels - Using the BMP Priority Ranking System, and guidance from local partners, identify those land parcels which show the greatest need for the installation, enhancement and/or protection of riparian buffer areas and other BMPs.
- F. Identify other conservation efforts in the watershed to strategically work together with partners to achieve the goals of this watershed based plan.

Milestone #3- Agricultural BMP Installation: Drawing on the BMP experience of various organizations working in the watershed, we plan to implement a series of BMP projects designed to reduce or eliminate NPS loading into the Clinch-Powell watersheds and their tributaries located in the Priority Project Area.

- A. Develop landowner outreach materials and strategies including fliers, farm tours, and individual landowner visits.
- B. Distribute outreach materials throughout the watershed to solicit landowner involvement in the program.
- C. Conduct farm visits on 110 farms within the Clinch-Powell Priority Area.
- D. Assist landowners in the application for funding from the 319 or other farm bill program.
- E. Within the Clinch-Powell Watershed, enroll 93 farms into this or another Farm Bill program.

Milestone #4- Communication of Project Progress and Results: The RC&D will periodically reporting on BMP project implementation and results as defined by the final 319 contract. In addition, we will work alongside the Clinch Powell Clean Rivers Initiative - a collaborative effort which unites a broad array of groups and agencies working in both TN and VA to monitor, protect, and restore the biodiversity of the upper Clinch-Powell Watershed. We will use CPCRI as a platform for periodically reporting on BMP project implementation and results.

- A. Submit Progress Reports as specified by partnering agencies (EPA 319, NRCS RCPP, etc.).
- B. Annually Report (from October 1 of the previous year to September 30 of the present calendar year) to EPA 319, on the progress of the grant through the standard 319 “2x4” report.
- C. Report of the successes of the project through the CPCRI website (<http://cpcri.net>) and/or CPCRI annual meeting.

- D. Annually report the progress of the program through the local resources. (NRCS, SCD Boards, RC&D BOD, RC&D website, TNC website, THWI website)

VIII. 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

The Clinch Powell Watershed Restoration Project is a multi-year, multi-agency endeavor to improve the water quality and aquatic habitat throughout the watershed. Since this is a long term endeavor, and conditions change, we have developed the following criteria to be implemented on a per year basis so success can be effectively measured. Numbers also reflect the use of all resources available including EPA 319 funds, partner funds and other Farm Bill Program funding.

A. Agricultural BMP Cost-Share Program

Drawing on our BMP experience along with that of the Clinch-Powell RC&D, The Nature Conservancy, NRCS and local Soil Conservation Districts, we plan to implement a series of BMP projects designed to reduce pathogen loading into the Clinch and Powell Rivers and their tributaries. All applications will be graded on a competitive base in accordance with their overall cost, complexity and benefit to the objectives of this watershed based plan. Each project must show direct water quality improvement, with strategies to measure effectiveness and long term success.

Success Indicators - Per Year	Target
Contact landowners concerning the benefits of agricultural and residential BMP implementation.	25 landowners
Conduct landowner visits to complete needs assessments and negotiate BMP implementation to reduce NPS pollution.	25 landowners
Complete BMP projects to reduce NPS pollution in the Clinch and Powell watershed.	20 landowners
Watering System	15 systems
Heavy Use Area Protection	12,000 Sq. Ft.
Pipeline	30,000 Ft.
Fence	30,600 Ft.
Water and Sediment Control Basin	320 Cu. Yds.
Critical Area Planting	2 acres
Streambank/Shoreline Protection	40 Ft.
Access Road	1,000 Ft.
Riparian Forest Buffer	21 acres

B. Education and Outreach

There is a great need to educate the public concerning the reasons for and ways of protecting the resources of the MCR. Strategies for completing the educational goals of the MCRWRP will include development and distribution of informative fliers, advertisement of the program through local avenues, and participation in educational events.

Success Indicators - Per Year	Target
Develop and distribute educational fliers to target audiences throughout the watershed.	400 fliers
Educational programs for Adults about the importance and ways of watershed protection	400 adults

C. *Water Quality Improvements*

Water has many uses which are in the public interest are reasonable and necessary. Using the Tennessee NPS Program – Pollutant Load Reduction Estimation Tool to predict the effect of our BMP implementation program on the system, the following indicators will be used to determine success.

Success Indicators - Per Year	Target
Total estimated N reduction	132,085 lbs. /year
Total estimated P reduction	12,146 lbs. /year
Total estimated Sediment reduction	2,452 tons /year

D. *Habitat Improvement*

Much of the sediment loss throughout the watershed can be attributed to the poor health of the streamside riparian areas. As a goal of this Restoration Plan, we will attempt to restore or enhance riparian areas throughout the watershed, through the enhancement and/or protection of streamside riparian areas.

Success Indicators - Per Year	Target
Install Livestock Exclusion Fencing to prevent damage to streamside riparian areas.	30,600 Ft.
Install, protect and/or enhance Riparian Forest Buffers to stabilize streambanks and reduce sediment loading into the aquatic system.	21 acres
Enroll riparian areas into long term conservation programs (i.e. TN Healthy Watersheds easement program, wetland mitigation, streambank mitigation, CRP, etc.)	30 acres

IX. *A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under element 8 immediately above.*

The Clinch-Powell RC&D will coordinate with NRCS, Soil and Water Conservation Districts, TN Valley Authority, The Nature Conservancy, US Fish and Wildlife Service, and others implementing Agricultural BMPs in the Upper Clinch-Powell Primary Project Area. As information is available, the RC&D will record the placement of BMPs by all our partnering agencies and update our Primary Project Area Maps.

In partnership with the Clinch Powell Clean Rivers Initiative 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.

Table A: Rare Species of the Clinch and Powell Rivers Watershed.**Mollusks**

Species	Common Name	Global Rank	Tennessee State Rank
<i>Cyprogenia stegaria</i> ^C	fanshell	G1	S1
<i>Cumberlandia monodonta</i> ^C	spectaclecase	G2G3	S2S3
<i>Dromus dromas</i> ^E	dromedary pearlymussel	G1	S1
<i>Epioblasma brevidens</i> ^E	cumberlandian combshell	G1	S1
<i>Epioblasma capsaeformis</i> ^E	oyster mussel	G1	S1
<i>Epioblasma torulosa gubernaculum</i> ^E	green blossom	G2TX	SX
<i>Epioblasma triquetra</i>	snuffbox	G3	S3
<i>Fusconaia barnesiana</i>	Tennessee pigtoe	G2G3	S2S3
<i>Fusconaia cor</i> ^E	shiny pigtoe	G1	S1
<i>Fusconaia cuneolus</i> ^E	fine-rayed pigtoe	G1	S1
<i>Fusconaia subrotunda</i>	longsolid	G3	S3
<i>Hemistena lata</i> ^E	cracking pearlymussel	G1	S1
<i>Lampsilis abrupta</i> ^E	pink mucket	G2	S2
<i>Lemiox rimosus</i> ^E	birdwing pearlymussel	G1	S1
<i>Lexingtonia dolabelloides</i> ^C	slabside pearlymussel	G2	S2
<i>Plethobasus cyphus</i> ^C	sheepsnose	G3	S2S3
<i>Pleurobema oviforme</i>	Tennessee clubshell	G2G3	S2S3
<i>Pleurobema plenum</i> ^E	rough pigtoe	G1	S1
<i>Pleurobema rubrum</i>	pyramid pigtoe	G2	S1S2
<i>Ptychobranchus subtentum</i> ^C	fluted kidneyshell	G2	S2S3
<i>Quadrula cylindrica strigillata</i> ^E	rough rabbitsfoot	G3T2	S2
<i>Quadrula sparsa</i> ^E	Appalachian monkeyface	G1	S1
<i>Villosa perpurpurea</i> ^E	purple bean	G1	S1
<i>Io fluviialis</i>	spiny riversnail	G2	S2

Fishes

Species	Common Name	Global Rank	Tennessee State Rank
<i>Ammocrypta clara</i>	western sand darter	G3	S1
<i>Cycleptus elongatus</i>	blue sucker	G3G4	S2
<i>Erimystax cahni</i> ^T	slender chub	G1	S1
<i>Etheostoma cinereum</i>	ashy darter	G2G3	S2S3
<i>Etheostoma denoncourti</i>	golden darter	G2	S2
<i>Etheostoma tippecanoe</i>	Tippecanoe darter	G3G4	S1S2
<i>Etheostoma vulneratum</i>	wounded darter	G3	S2
<i>Notropis ariommus</i>	popeye shiner	G3	S3
<i>Noturus flavipinnis</i> ^T	yellowfin madtom	G1	S1
<i>Noturus stanauli</i> ^E	pygmy madtom	G1	S1
<i>Percina burtoni</i>	blotchside logperch	G2	S2
<i>Percina macrocephala</i>	longhead darter	G3	S2

Amphibians

Species	Common Name	Global Rank	Tennessee State Rank
<i>Aneides aeneus</i>	green salamander	G3G4	S3
<i>Cryptobranchus alleganiensis</i>	hellbender	G3G4	S3

Reptiles

Species	Common Name	Global Rank	Tennessee State Rank
<i>Trachemys scripta troostii</i>	Cumberland slider	G5T3T4	S3S4

Plants

Species	Common Name	Global Rank	Tennessee State Rank
<i>Berberis canadensis</i>	American barberry	G3	S2
<i>Cimifuga rubifolia</i>	Appalachian bugbane	G3	S3
<i>Parnasia grandifolia</i>	large-leaved grass-of-parnassus	G3	S2
<i>Paxistima canbyi</i>	Canby's mountain lover	G2	S1
<i>Silphium wasiotense</i>	Kentucky rosinweed	G3	S1
<i>Betula uber</i> ^T	Virginia round-leaf birch	G1	S1
<i>Spirea virginiana</i> ^T	Virginia spirea	G2	S1
<i>Isotria medioloides</i>	small whorled pogonia	G2	S2
<i>Agalinis auriculata</i>	earleaf foxglove	G3	S1S2
<i>Aureolaria patula</i>	spreading false-foxglove	G2G3	S2
<i>Buckleya distichophylla</i>	piratebush	G2	S2
<i>Collinsonia verticilata</i>	whorled horse-balm	G3	S2S3
<i>Delphinium exaltatum</i>	tall larkspur	G3	S2
<i>Diervilla rivularis</i>	mountain bush-honeysuckle	G4T3	S2
<i>Fothergilla major</i>	mountain witch-alder	G3	S2
<i>Gentiana austromontana</i>	Appalachian gentian	G3	S2S3
<i>Heuchera longiflora</i> var. <i>aceroid</i>	maple-leaf alumroot	G4T2Q	S2
<i>Hexastylis contracta</i>	southern heartleaf	G3	S3
<i>Juglans cinerea</i>	butternut	G3G4	S2S3
<i>Rubus whartoniae</i>	Wharton's dewberry	G2Q	S1
<i>Saxifraga careyana</i>	Carey saxifrage	G3	S3
<i>Scutellaria saxatilis</i>	rock skullcap	G3G4	S2
<i>Silene ovata</i>	ovate catchfly	G2G3	S2
<i>Viola tripartita</i> var. <i>tripartite</i>	three-part violet	G5T3	S2S3
<i>Carex oxylepis</i> var. <i>pubescens</i>	a sedge	G5T3	S1
<i>Botrychium jenmanii</i>	Alabama grapefern	G3G4	S1

Mammals

Species	Common Name	Global Rank	Tennessee State Rank
<i>Corynorhinus rafinesquii</i>	Rafinesque's big-eared bat	G3G4	S3
<i>Myotis grisescens</i> ^E	gray myotis	G3	S2
<i>Myotis sodalis</i> ^E	Indiana bat	G2	S2
<i>Neotoma magister</i>	Allegheny woodrat	G3G4	S3S4

Birds

Species	Common Name	Global Rank	Tennessee State Rank
<i>Aimophila aestivalis</i>	Bachman's sparrow	G3	S2

*Information in Table 1.1 is based on various sources and was accumulated by TNC. The global, state and federal status for each species was compiled from NatureServe.(2006). Information concerning Mollusks and Fish are known to be at specific locations within this proposals area of work, while the other organisms are known from the area but due to their range we are unsure of their exact locations, and have historical sightings in both the Clinch and Powell Watershed.

**Natural Heritage ranking system: G1 = 1 to 5 occurrences remaining, G2 = 6 to 20 occurrences remaining, G3 = 21 to 100 occurrences remaining, G4 = common and secure globally, TX = genus and species remain but subspecies is believed to be extinct, T2 = genus and species remain but the subspecies has 5-15 occurrences and could become extinct in 100 years.

^E Federally listed as endangered

^T Federally listed as threatened

^C Candidate species for listing

Table B: General Characteristics of the HUC 8 and 12 watersheds included in this plan.

Clinch River

HUC-10	HUC - 12	Contains a stream that is 303(d) listed	Threatened or Endangered Aquatic Species Element Occurrences	Contains TDEC High Quality Streams
0601020505	060102050502 (Clinch River)	Yes	?	Yes
	060102050503 (War Creek)		0	Yes
	060102050504 (Blackwater Creek)		0	
	060102050505 (Clinch River)	Yes	63	Yes
	060102050506 (Richardson Creek)		6	
	060102050507 (Panther Creek)	Yes	2	
0601020507	060102050702 (North Fork Clinch		1	
0601020508	060102050801 (Clinch River)	Yes	71	Yes
	060102050802 (Big War Creek)	Yes	2	Yes
	060102050804 (Clinch River)		38	Yes
0601020509	060102050901 (Big Sycamore Creek)		0	
	060102050903 (Sycamore Creek)	Yes	0	

Powell River

HUC - 10	HUC - 12	Contains a stream that is 303(d) listed	Threatened or Endangered Aquatic Species Element Occurrences	Contains TDEC High Quality Streams
0601020602	060102060202 (Wallen Creek)		0	Yes
	060102060203 (Powell River)	Yes	74	Yes
	060102060204 (Martin Creek)		0	Yes
	060102060205 (Mulberry Creek)	Yes	6	Yes
0601020603	060102060301 (Powell River)		24	Yes
	060102060302 (Russell Creek)	Yes	0	
	060102060303 (Indian Creek)		3	Yes
	060102060304 (Powell River)		27	Yes

* Element Occurrence = The Natural Heritage Program collects information on occurrences of rare plants, animals, natural communities, and animal assemblages. Collectively, these are referred to as "elements of natural diversity" or simply as "elements." Locations of these elements are referred to as "element occurrences."

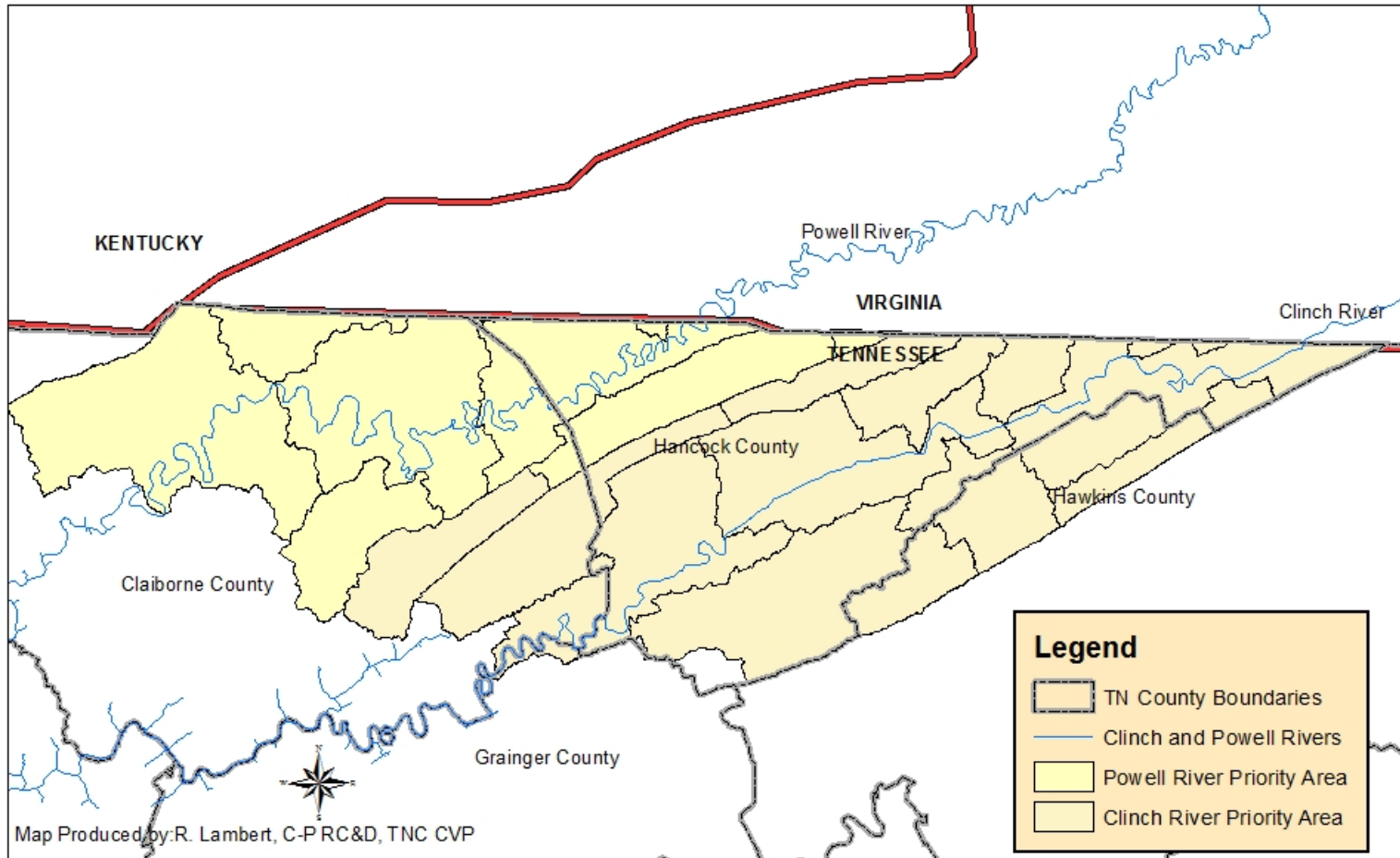
Table C: Upper Clinch River 2014 TDEC 303 (d) List: including that portion of the USGS Hydrologic Unit Code: 06010205 (Upper Clinch River), located within our Clinch-Powell Watershed Restoration Project Primary Project Area.

Waterbody ID	Impacted Waterbody	County	Miles Acres Impaired	CAUSE / TMDL Priority	Pollutant Source	COMMENTS
TN06010205013 - 0200	UNNAMED TRIB TO CLINCH RIVER	Hancock	1.22	Alteration in stream-side or littoral vegetative cover L	Pasture Grazing	Category 5.
TN06010205013 - 0600	RHEA BRANCH	Hancock	1.44	Alteration in stream-side or littoral vegetative cover L	Pasture Grazing	Category 5.
TN06010205013 - 0800	GREASY ROCK CREEK	Hancock	5.67	Alteration in stream-side or littoral vegetative cover L Escherichia coli NA	Pasture Grazing Land Development	Category 5. EPA approved a pathogen TMDL that addresses some of the known pollutants.
TN06010205013 - 1120	EAST FORK PANTHER CREEK	Hancock	5.22	Escherichia coli NA	Pasture Grazing	Category 4a. EPA approved a pathogen TMDL that addresses the known pollutant.
TN06010205013 - 1200	DAVIS BRANCH	Hancock	2.22	Alteration in stream-side or littoral vegetative cover L	Nonirrigated Crop Production	Category 5.
TN06010205014 - 0500	FLAT GAP CREEK	Hancock Hawkins	1.0	Zinc L	Mine Tailings	Stream is Category 5. (One or more uses impaired.)
TN06010205016 - 0100	UNNAMED TRIB TO CLINCH RIVER	Hancock	0.96	Escherichia coli NA	Pasture Grazing	Category 4a. EPA approved a pathogen TMDL that addresses the known pollutant.
TN06010205016 - 1000	CLINCH RIVER	Hancock	16.88	Threatened by loss of native mussel species. Threatened status. TMDL priority: High	Tennessee concerned about loss of mussel species from a stream that is one of the most important repositories for listed mussel species in the nation. EPA assistance needed to identify pollutants and control strategies.	
TN06010205061 - 1000	Little Sycamore Creek	Claiborne	18.7	Total Phosphorus M Alteration in stream-side or lateral vegetative cover M Escherichia coli H	Pasture Grazing	Category 5. EPA approved a pH TMDL that addresses the known pollutants.

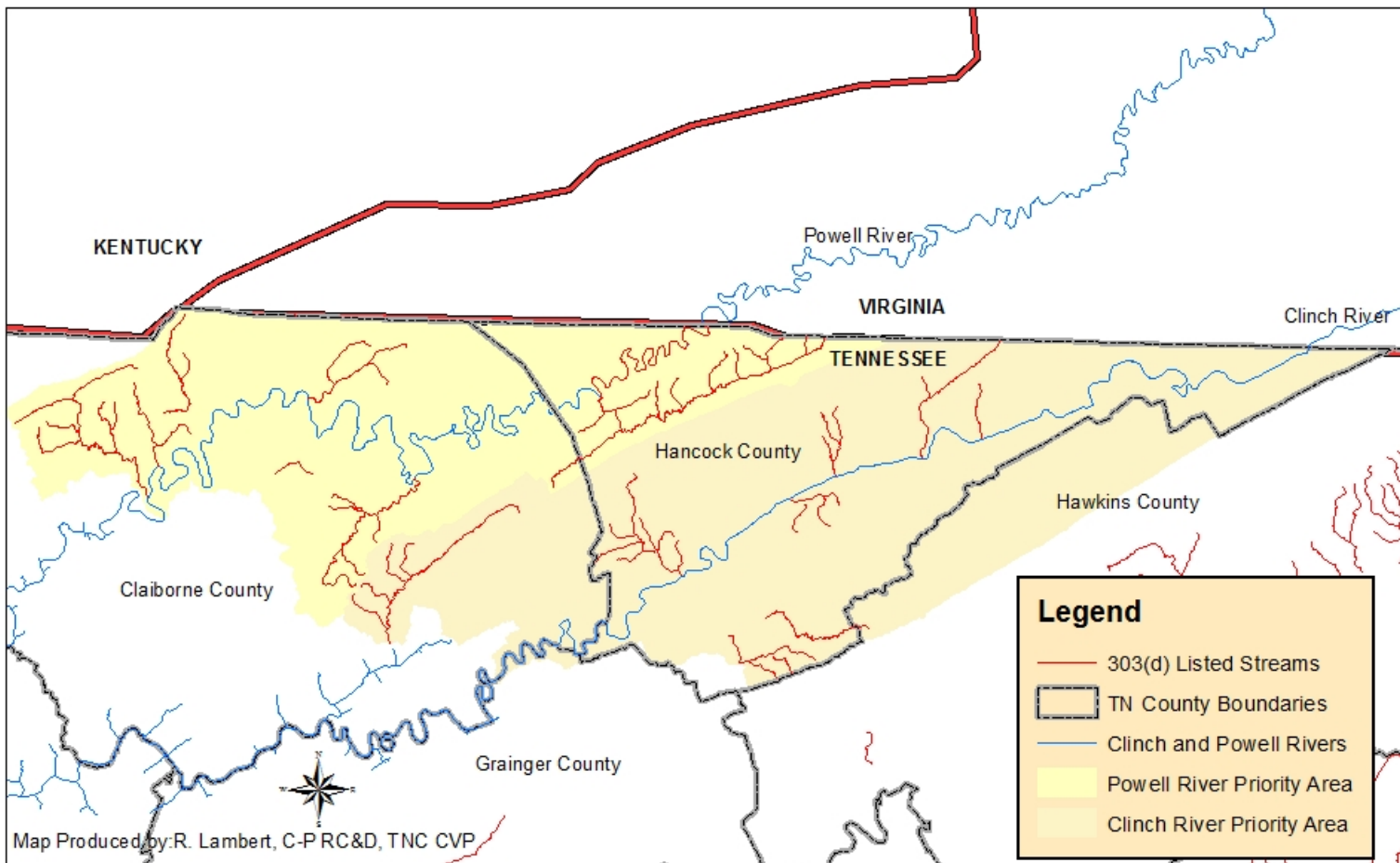
Table D: Powell River 2014 TDEC 303 (d) List: including that portion of the USGS Hydrologic Unit Codes: 06010206 (Powell River), located within our Clinch-Powell Watershed Restoration Project Primary Project Area.

Waterbody ID	Impacted Waterbody	County	Miles/Acres Impaired	CAUSE / TMDL Priority	Pollutant Source	COMMENTS
TN06010206006 – 0100	OLD TOWN CREEK	Claiborne	14.49	Escherichia coli H	Pasture Grazing	Stream is Category 5. (One or more uses impaired.)
TN06010206006 – 0150	OLD TOWN CREEK	Claiborne	6.27	Loss of biological integrity due to siltation L Alteration in stream-side or littoral vegetative cover L	Pasture Grazing	Stream is Category 5. (One or more uses impaired.)
TN06010206006 – 0250	GAP CREEK	Claiborne	6.76	Total Phosphorus M Escherichia coli NA	Municipal Point Source Collection System Failure	Category 5. Approved pathogen TMDL addresses some of the known pollutants.
TN06010206006 – 0310	UNNAMED TRIB TO BLAIRS CREEK	Claiborne	1.69	Loss of biological integrity due to siltation L	Hwy/Road/Bridge Construction	Stream is Category 5. (One or more uses impaired.)
TN06010206007 – 0100	LITTLE CREEK	Claiborne	9.4	Escherichia coli NA	Septic Tanks	Category 4a. EPA approved a pathogen TMDL that addresses the known pollutant.
TN06010206007 – 0800	MULBERRY CREEK	Hancock	26.6	Escherichia coli NA	Pasture Grazing	Category 4a. EPA approved a pathogen TMDL that addresses the known pollutant.
TN06010206007 – 0810	LITTLE MULBERRY CREEK	Claiborne Hancock	4.0	Escherichia coli NA	Pasture Grazing	Category 4a. EPA approved a pathogen TMDL that addresses the known pollutant.
TN06010206007 – 2000	POWELL RIVER	Hancock	12.88	Loss of Native Mussel Species H Unknown Toxicity L	Source in Other State	EPA should do the TMDL on this interstate stream. Category 5. (One or more uses impaired.)

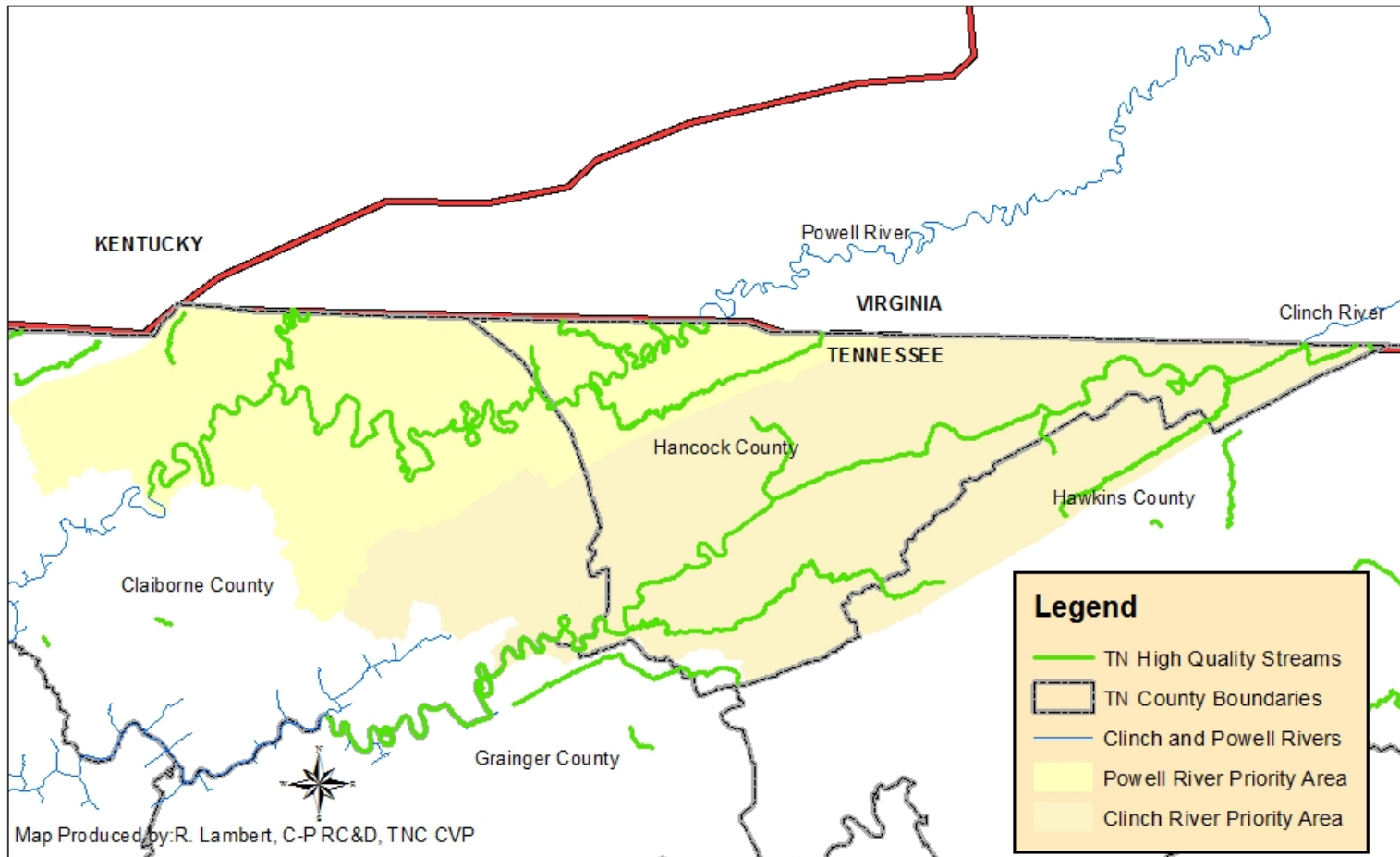
Map 1: Clinch Powell Priority Area including HUC 12 boundaries.



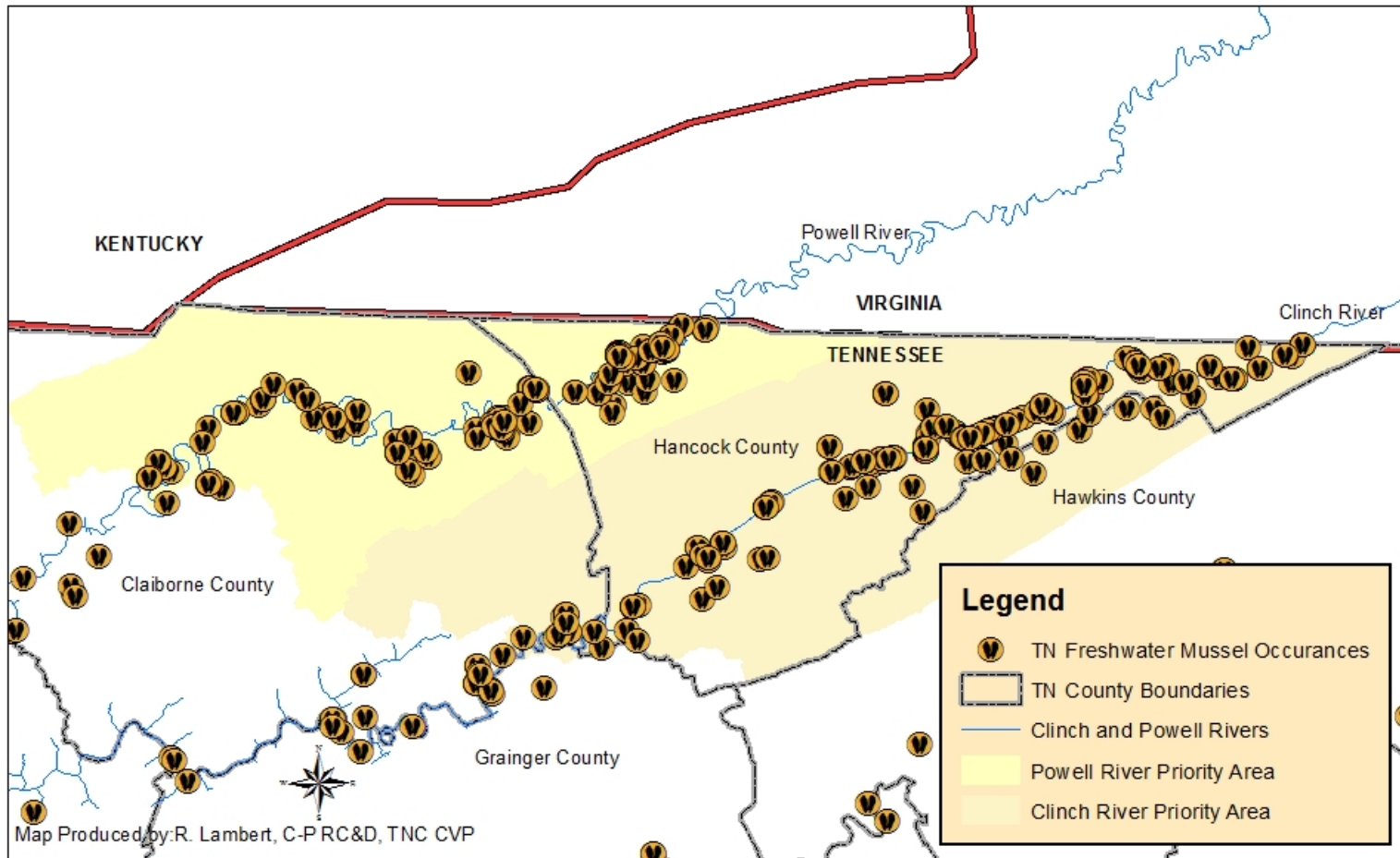
Map 2: 303(d) listed streams within the Clinch Powell Priority Area.



Map 3: Tennessee High Quality Streams – TDEC Tier 2 and Tier 3 streams located in the Clinch-Powell Priority Project Area.



Map 4: Freshwater Mussel distribution within the Clinch Powell Priority Area.



Map 5: Example of GIS Based modeling.

