Tennessee Wildlife Federation

Statewide Wetland In-Lieu Fee Program

Instrument

November 2011

TABLE OF CONTENTS

FIGURES

TABLES

I. INTRODUCTION

The following Instrument details the circumstances and manner in which the Tennessee Wildlife Federation (TWF) will sponsor an In-Lieu Fee (ILF) program in the state of Tennessee to address compensatory mitigation requirements for impacts to jurisdictional wetlands identified as the waters of the United States and State of Tennessee waters. The Tennessee Wildlife Federation Wetland In-Lieu Fee Program (Program) will replace aquatic functions lost due to permitted impacts as outlined in this Instrument.

The purpose of this Instrument is to establish guidelines, responsibilities and standards for the establishment, use, operation and maintenance of the Program in a way that complies with the revised regulations governing compensatory mitigation for activities authorized by Department of Army permits granted by the United States Army Corps of Engineers (Corps). The Program will apply these guidelines, responsibilities and standards to Aquatic Resources Alterations Permits authorized by the Tennessee Department of Environment and Conservation Division of Water Pollution Control (TDEC), as well.

The Program will be used for compensatory mitigation for unavoidable impacts to waters of the United States and State waters that result from activities authorized under Sections 401 and / or 404 of the Clean Water Act, and Section 10 of the Rivers and Harbors Act. The Program will also be utilized for permit actions requiring compensatory mitigation involving TDEC General Permits, TDEC Individual Permits, Corps General Permits and / or Corps Individual Permits.

II. OBJECTIVES

TWF will establish an ILF mitigation program to satisfy compensatory mitigation requirements for permits issued under Section 404 and / or Section 401 of the Clean Water Act and / or Section 10 of the Rivers and Harbors Act of 1899 within State of Tennessee. The Program will provide effective compensatory mitigation for wetland impacts incurred during permitted activities by implementing wetland restoration, enhancement, establishment, and in some instances preservation projects to compensate for the loss of ecological functions affected by the permitted activities.

The Program will provide a pooled funding base for larger and more ecologically viable mitigation projects than those otherwise available on a permittee responsible basis, and will streamline compensatory mitigation processes in order to more efficiently meet regulatory requirements, thereby facilitating both economic and environmental objectives.

An ILF will provide a mechanism and source of revenue for ongoing wetland and watershed restoration planning and implementation throughout the state of Tennessee, thereby increasing the quality and effectiveness of mitigation by long-term watershed-scale planning. The Program will seek to integrate ILF projects with other conservation activities whenever possible.

III. ESTABLISHMENT

This Instrument shall establish TWF as a qualified ILF mitigation sponsor for Corps and TDEC authorizations in Tennessee. TWF will assume responsibility for a permittee's compensatory mitigation requirements after that permittee has secured the required number of credits from the Sponsor and the appropriate Corps district and TDEC have received sufficient documentation of this transaction. The Program does not affect the statutory authority or responsibilities of the Corps, TDEC, or other participating Interagency Review Team (IRT) member agencies.

IV. OPERATION

An IRT composed of representatives from various federal and state resource agencies will advise the Corps and TDEC on the establishment and management of the ILF Program, while Corps and TDEC representatives will serve as Chairs of the IRT for those projects dealing with mitigation for Corps §404 and §401 authorizations. The Corps and TDEC will invite representatives from other federal and state agencies with a programmatic interest in the establishment and management of the Program to participate in the IRT. For ARAP authorizations that are not under Corps jurisdiction, TDEC's representative shall serve as the Chair of the IRT. The compensatory mitigation projects will require separate credit and financial accounting, but will be held to the same standards and accountability as those addressing compensatory mitigation for Corps §404 authorizations.

This Instrument provides the framework under which the Program will identify, fund, operate, maintain and manage compensatory mitigation projects. The Instrument authorizes the Program to generate credits to be used as compensatory mitigation for approved state and federal permits. As projects are identified, the Program will submit site-specific mitigation plans to the IRT for review and approval as amendments to the Instrument through the process outlined in the site specific project mitigation plans.

Project mitigation plans will include the following information:

1.) Project objectives
2.) Site selection factors
3.) Site protection instrument
4.) Baseline information
5.) Determination of credits and credit release schedule
6.) Work plan
7.) Maintenance plan
8.) Performance standards
9.) Monitoring requirements
10.) Long-term management plan

11.) Adaptive management plan
12.) Long-term funding mechanism
13.) Other information deemed necessary by the District Engineer

The Program monies will be administered for wetland restoration, enhancement, establishment, and in some instances preservation. Potential projects will be brought before the IRT for consideration. Projects may be brought to the Program by various stakeholders such as private developers, Tennessee Department of Transportation, state agencies, municipal governments, federal government, and other conservation organizations. The Program will manage each project for consistency with the review criteria and each project will be added as an instrument amendment following IRT review and Corps approval. The Program will remain responsible for the implementation, performance, and long-term management of compensatory mitigation projects.

V. PROPOSED SERVICE AREAS

The Program will operate throughout the state of Tennessee, with specific information related to service areas set forth as follows. The geographic service areas for the Program will be defined at various scales based upon a watershed approach. In urban areas, a U.S. Geological Survey 8-digit hydrologic unit code (HUC) watershed or a smaller watershed will be used. In rural areas, several contiguous 8-digit HUCs or a 6-digit HUC watershed will allow greater flexibility to provide functional compensatory mitigation within a given ecoregion and still provide compensation for resource losses at a watershed scale, as appropriate **(Figure 1)**. This approach allows for special provisions for areas such as the Mill Creek Watershed in Davidson and Williamson Counties, which is a HUC-10 with a separate Service Area and provides compensatory mitigation on a watershed basis.

The Program will provide compensatory mitigation for permitted impacts within the same geographic service area in which the impacts occur unless the district engineer, in consultation with the IRT, has agreed to an exemption. The service areas were selected because TWF has concluded that the scale is appropriate to ensure that the projects selected will be able to effectively compensate for adverse environmental impacts across the entire service area. These service areas will also allow the Program to focus efforts in areas with the most need, by combining watersheds with relatively fewer impacts and existing wetlands, or those that have historically been covered within the service area of approved mitigation banks.

The Program will not accept fees from a permittee in service areas in which the Program has been unable to identify appropriate mitigation project sites for prior accepted payments. Individual projects will be proposed for specific service areas in project-specific mitigation plans.

Rationale for Service Area selection is further discussed within the Compensation Planning Framework.

VI. NEED AND TECHNICAL FEASIBILTY

Since 2003, the Tennessee Stream Mitigation Program (TSMP) has provided In-lieu fee compensatory mitigation for impacts to stream resources in Tennessee. No state-wide program is available in Tennessee to provide compensatory mitigation for impacts to wetland resources. Since 2000, approximately 1,530 acres of compensatory mitigation have been required by TDEC ARAP permits for impacts to wetlands. Approximately 23% of these impacts have been mitigated by the purchase of credits from a compensatory mitigation bank, or similarly functioning mitigation entity – sometimes at an increased mitigation ratio due to impacts outside of the mitigation bank service area. The remaining impacts were mitigated by onsite or offsite permittee-responsible mitigation projects, or some combination thereof.

The Federal Compensatory Mitigation for Losses of Aquatic Resources, Final Rule, 33 CFR 325 and 332 (Mitigation Rule) indicates a preference for the use of mitigation banks and in lieu fee programs to provide compensatory mitigation due to their ability to consolidate compensatory mitigation projects and resources to target more ecologically significant functions, provide financial planning and scientific expertise, reduce temporal losses of function, and reduce uncertainty over project success. Of 623 permitted impacts requiring mitigation by TDEC from December 1999 to September 2009, 231 occurred outside the service area of an approved mitigation bank (37% of impacts). If permitted impacts within a mitigation bank's service area, but outside the 8-digit HUC are considered (for those banks with a service area delineated by political boundaries), that number increases to 393 projects (63% of impacts). The number of permitted impacts without available coverage at authorized mitigation banks indicates the need for a statewide in lieu fee program.

Additionally, the existing wetland mitigation banks in Tennessee are beginning to experience credit shortages. Recently both the Harpeth River Wetland Mitigation Bank and the Coffee County Wetland Mitigation Bank sold all of their remaining credits and sponsors of the Harpeth River Wetland Mitigation Bank (Swamp Road Wetland Mitigation Bank) and Shady Valley Wetland Mitigation Bank have had new banks in their respective watersheds approved in 2010 due to credit shortages at the existing bank sites. Additionally, the Madison County and Obion Wetland Mitigation Banks are single-user banks that can only be used by the Tennessee Department of Transportation. As the amount of available credit in wetland mitigation banks continues to decrease, a viable alternative such as an in-lieu fee program is needed to identify and implement meaningful compensatory mitigation on a watershed scale.

VII. OWNERSHIP ARRANGEMENTS AND LONG-TERM MANAGEMENT

Long-term management plans will be defined in each Project Mitigation Plan, and will contain the provisions for the operation, maintenance, and long-term management of the ILF project site. Each ILF project site will be protected in perpetuity by real estate instruments and other mechanisms. Such instruments and mechanisms may include conservation easements held by the TWF or other qualified entities and recorded at the appropriate county office, recorded restrictive covenants or deed restriction recorded at the appropriate county office, or other appropriate restrictions. The long-term arrangement mechanism will protect the site from land use activities that would diminish the efficacy of the compensatory mitigation project. Whichever mechanism is utilized, the protection mechanism will remain with the property permanently in the instance that the title to the property is transferred to another party.

In some instances, TWF may maintain ownership of properties in accordance with the terms of the long-term management plan and the conservation easement. If ILF Project sites are located on property owned by other entities, those entities will be responsible for site maintenance after the Corps has determined that the ILF Project has met all of its success criteria, unless such responsibility is stipulated via real estate instrument as remaining with TWF. In all instances, long-term management responsibilities will be defined in the Project Mitigation Plan.

VIII. ADVANCE CREDITS

Upon approval of the final Instrument, the Program will be permitted to sell advance credits. Advance credits are those credits available for sale prior to being fulfilled in accordance with an approved mitigation plan. In considering the number of advance credits to allow in each watershed, TWF analyzed not only the historic wetland impacts in each watershed **(Figure 2)**, but also the amount of watershed area covered by soils classified by the Natural Resources Conservation Service (NRCS) as hydric soils **(Figure 3)**. This investigation considered not only the historic impact in each watershed, but also the potential existing wetland area that may be affected by future development activities. The number of advance credits available for sale varies by watershed, as indicated **(Table 1 and Figure 4)**.

As the milestones in the schedule are reached (i.e., restoration, creation, enhancement, establishment and/or preservation is implemented), advance credits will convert to released credits. Credit release schedules may vary by project and will be specified in each individual Project mitigation plan. Credits will not be released until the Program has obtained IRT approval of the mitigation plan for the site, has achieved the applicable milestones in the credit release schedule, and the credit releases have been approved by the district engineer.

Each Service Area will have a minimum of five advance credits. This will ensure that the program has the capacity to manage projects of an adequate size to invest the time necessary to provide compensation for ecological services and functions lost due to impacts in that service area. A smaller amount of advance credits may limit the size and scope of projects that are available to the Program and limit the capability of the program to meet the administrative goals within the Service Area.

Once TWF has sold all of its advance credits in a given Service Area, no more advance credits may be sold until an equivalent number of credits have been released in accordance with the approved credit release schedule outlined in a project-specific mitigation plan, or the IRT issues additional advance credits through the streamlined Instrument amendment process. As advance credits are fulfilled and have been released, an equivalent number of advance credits will be made available for sale.

The Program shall complete land acquisition and initial physical and biological improvements by the third full growing season after the sale of advance credits. If the Program fails to meet these deadlines, then the district engineer must either make a determination that more time is needed to plan and implement an in-lieu fee project or, if doing so would not be in the public interest, direct the Program to disburse funds from the Program account to provide alternative compensatory mitigation to fulfill those compensation obligations.

Physical and biological improvements, and the timeline for completion of project phases will be identified in the project-specific mitigation plan.

In the event that mitigation projects result in a surplus of credits in a watershed, the Program will utilize the surplus credits to fulfill compensatory mitigation requirements at a future time as approved by the IRT.

IX. DESCRIPTION OF PROGRAM ACCOUNT

Credit Fees

Fees for the ILF Program are based on a full cost accounting analysis of the expected costs associated with the restoration, establishment, enhancement, and/or preservation of aquatic resources and associated upland buffers in the service areas described in this instrument. Upland buffers must extend a minimum of 50 feet from the edge of restoration, establishment, or enhancement activities to qualify for credit. The program costs in this analysis include land evaluation, land acquisition, project planning and design, construction, plant materials, labor, legal fees, monitoring, remediation or adaptive management measures, program implementation, contingency costs over the life of the project, establishment of a long-term management and protection fund, financial assurances that are expected to ensure successful completion of the in-lieu fee project, an administrative fee, and may reflect other factors as deemed appropriate by the Program. These fees will be reviewed annually by the Program and will be adjusted as necessary to represent full cost accounting of project expenses. The fee schedule will be provided to the appropriate Corps Districts, so that Corps staff can provide the information to permit applicants. Credits generated will be determined at the time each project is proposed for funding and using the current District compensatory mitigation guidance ratios in place at that time.

A draft fee schedule and the basis for that schedule are attached as Appendix A. Changes made to the draft fee schedule by the Program in accordance with 33 CFR §332.8(o)(5)(ii) are not considered modifications to this Instrument.

Where an impact project or mitigation project involves a connected stream and a wetland, the Program may seek to partner with an approved ILF provider of stream mitigation credits to cooperatively identify and mitigate at a site that suitably compensates for the lost function of the impacted system as a whole.

Financial accounting

The ILF Program account will track funds accepted from permittees separately from those accepted from other entities and for other purposes. The Program account will be held at a financial institution that is a member of the Federal Deposit Insurance Corporation. Any and all interest accruing from the ILF Program account will be used for program expenses in administration and providing compensatory mitigation for impacts to aquatic resources.

The program account will be established after this instrument is approved and before any fees are accepted. If the Corps and/ or TDEC determine that the Program is failing to provide compensatory mitigation by the third full growing season after the first advance credit is secured, that agency may direct the funds to alternative compensatory mitigation projects. The Corps and/ or TDEC have the authority to audit the program account records at any time.

Funds paid into the Program account may only be used for the direct replacement and management of aquatic resources. This means the evaluation, selection, design, acquisition (i.e., appraisals, surveys, title insurance, etc.), implementation, and management of in-lieu fee compensatory mitigation projects. This may include fees associated with securing a permit for conducting mitigation activities, activities related to the restoration, enhancement, creation, and/ or preservation of aquatic resources, maintenance and monitoring of mitigation sites, and the purchase of credits from mitigation banks. Use of fees is explicitly prohibited for activities such as upland preservation (other than buffers), research, education and outreach, or implementation of best management practices for wetlands.

In the first two years of operation, up to 15% of the fees paid into Program may be used for administrative costs. After two years, the amount of the fees paid into the Program that may be used for administrative costs may be re-evaluated and adjusted to a rate agreed to by the Program and the IRT and approved by the district engineer.

There is a core administrative cost to running the Program whether the Program has one project or dozens of projects. The proposal for a flexible administrative rate cap allows for the Program to cover its administrative costs at the beginning of the Program's life, and as the program grows, it allows for the administrative cap to be decreased. In other words, administrative costs for each project will be higher (as a percentage of the Program's operating budget) in the beginning of the Program and should reduce over time. An exception to this thinking would be if the Program were to receive a large infusion of funds at one time, which would allow for a smaller administrative rate percentage to cover the needs of the Program.

Nationwide, the percentage limit placed on administrative costs in ILF programs ranges from 2 to 20 percent. TWF anticipates that administrative costs will be greatest at Program initiation. The ability of any Program to cover costs are determined by a combination of the costs of credits, and the demand for the service, with a consideration given to the hard costs of providing compensatory mitigation. While TWF anticipates a demand for wetland credits in Tennessee, this demand remains in question, and justifies a temporarily higher cap on administrative expenses. While it is not anticipated that a full 15% of the fees paid into the Program will be utilized for this purpose, the Program will incur significant administrative expenses at the Program outset, and these initial expenses justify this percentage. If at any time the administrative cost cap requires modification, this cap may be adjusted with the approval of the District Engineer, in consultation with the IRT.

Such costs include bank charges associated with the establishment and operation of the program, staff time for carrying out program responsibilities, expenses for day to day management of the program, such as bookkeeping, mailing expenses, printing, office supplies, computer hardware or software, training, travel, and hiring private contractors or consultants.

The Annual Report shall include a ledger of funds paid into the account and project expenses paid from the account, including the amount of interest accrued to the Program (**Tables 2 and 3)**.

<u>Credit accounting</u>

TWF shall establish and maintain an annual report ledger that tracks the production of released credits for the Program and for each individual in-lieu fee project.

On the income side, the Program shall track the fees and all other income received, the source of the income (i.e., permitted impact, penalty fee, etc.), and any interest earned by the program account. The ledgers shall also include a list of all the permits for which in-lieu fee program funds were accepted, including the appropriate permit number (Corps or state permit), the service area in which the specific authorized impacts are located, the amount (acreage) of authorized impacts, the aquatic resource type impacted by Cowardin class, the amount of compensatory mitigation required, the amount paid to the in-lieu fee program for each of the authorized impacts, and the date the funds were received from the permittee **(Table 4)**.

The Program shall establish and maintain a report ledger for the Program that will track all program disbursements/expenditures and the nature of the disbursement (i.e., costs of site evaluation, selection, land acquisition, planning, construction, monitoring, maintenance, contingencies, adaptive management, and administration). Funds that have been obligated or committed, but not yet disbursed would be tracked, as necessary.

The ledger shall also include, for each project, the permit numbers for which the project is being used to offset compensatory mitigation requirements, the service area in which the project is located, the amount of compensation being provided by method (i.e., restoration, establishment, enhancement, or preservation), the aquatic resource type(s) represented (e.g., Cowardin class), the amount of compensatory mitigation being provided (acres), and the number of credits certified by the IRT **(Table 4)**.

The annual report ledger shall also include a balance of advance credits and released credits at the end of the report period for each service area **(Table 4)**.

X. DEFAULT AND CLOSURE PROVISIONS

Default

If the Corps and / or TDEC determine that the Program has failed to provide the required compensatory mitigation within the specified time frame, the Program may be determined to be in default. Default determination could be due to failure to: 1) meet performance-based milestones identified in the project-specific mitigation plan, 2) meet ecological performance standards specified in project specific mitigation plans, 3) submit monitoring reports in a timely manner, 4) establish and maintain an annual ledger report and individual ledgers for each project in accordance with the provisions in Section 'accounting procedures', 5) submit an annual financial assurances and long-term management funding report, 6) report approved credit transactions, 7) complete land acquisitions and initial physical and biological improvements by the third full growing season after the minimum number of advance credits have been sold per service area, and/or 8) otherwise comply with the terms of the Instrument and all approved mitigation plans. If default is determined, the district engineer must take appropriate action to achieve compliance with the terms of the instrument and all approved mitigation plans. These actions may include suspending credit sales, decreasing available credits, requiring adaptive management measures, utilizing financial assurances or contingency funds, terminating the agreement, using the financial assurances or contingency funds to provide alternative compensation, directing the use of in-lieu fee program account funds to provide alternative mitigation (such as purchasing credits from an available bank).

Any delay or failure of the Program to comply with the terms of this agreement shall not constitute a default if and to the extent that such delay or failure is primarily caused by any force majeure or other conditions beyond the Program's reasonable control and that significantly adversely affects its ability to perform its obligations hereunder, such as flood, drought, lightning, earthquake, fire, landslide, effects of climate change on habitat or hydrology, condemnation or other taking by governmental body. Other conditions beyond the Program's control will include: interference by third parties; condemnation or other taking by any governmental body; change in applicable law, regulation, rule, ordinance, or permit condition, or the interpretation or enforcement thereof; any order, judgment, action or determination of any federal, state or local court, administrative agency or governmental body; and/or suspension or interruption of any permit, license, consent, authorization or approval. The Program shall provide written notice to the district engineer and IRT if the performance of any in-lieu fee projects is affected by any such event as soon as it is reasonably practical, documenting why a given event should be considered a *force majeure* event. The District Engineer, in consultation with the IRT, shall determine whether the event qualifies and recommend the necessary repairs or modifications required at the site or modifications to monitoring requirements or performance standards.

Any payments for lands sold that were acquired for Program projects will be put back into the appropriate account. Deeds and easements will contain language that, should any of the land be taken by eminent domain, substitute mitigation for lost functions will be provided by the party invoking the right of eminent domain.

Closure

The Corps, TDEC or TWF may terminate the agreement within 90 days of the written notification to the other parties. In the event that the Program operated by TWF is terminated, TWF is responsible for fulfilling any remaining project obligations for which funds have been collected including the successful completion of ongoing mitigation projects, relevant maintenance, monitoring, reporting, and long-term management requirements. TWF shall remain responsible for fulfilling these obligations and ensuring the long-term ownership of all mitigation lands has been transferred to the party responsible for ownership and all long-term management of the project.

Fund Allocation and Remaining Obligations

Excess funds remaining in the Program account after the above obligations are satisfied must continue to be used for the restoration, establishment and enhancement, and/or preservation of aquatic resources and associated upland buffers. The Corps shall direct TWF to use these funds to provide further restoration, enhancement or preservation activities, or secure credits from another source of third-party mitigation, or disburse funds to another entity such as a governmental or non-profit natural resource management entity willing to undertake further compensation activities. The Corps itself cannot accept directly, retain, or draw upon those funds in the event of a default.

XI. REPORTS AND REPORTING PROTOCOLS

Monitoring Reports

Monitoring is required of all compensatory mitigation projects to determine if the project is meeting its performance standards and if additional measures are necessary to ensure that the compensatory mitigation project is accomplishing the objective(s). If the Program fails to submit reports within 60 days of the deadlines outlined in the mitigation plan(s), the Corps may take appropriate compliance actions (see Default and Closure section).

Project-specific mitigation plans will detail the parameters to be monitored, the length of the monitoring period, the dates that the reports must be submitted, and the frequency for submitting monitoring reports to the Corps. The Program will be responsible for conducting the monitoring and responsible for submitting monitoring reports to TDEC, the Corps and the IRT no later than October 31st each year.

Credit Transaction Reports

This instrument establishes the terms by which the legal responsibility for compensation requirements is transferred from the permittee to the Program. These terms require the Program to submit a credit sale letter to the Corps, a draft sample of which is included in Appendix B. The credit sale letter must be signed by the Program and the permittee and dated. The credit sale letter must include the permit number(s) for which the Program is accepting fees, identify the permitee(s), the permit location(s), the authorized impact acreage(s), and the authorized impact resource type(s). The Program must submit to the district engineer the signed and dated credit sale letter within 30 days of receiving the fees from the permittee.

Annual Program Report

The Program will submit a report annually (annual ledger report) to TDEC, the Corps, and the IRT. The report will be made available to the public upon request. The Corps and / or TDEC may post the report on their website. The annual program report will be submitted no later than March 31st of each year and will include summaries of each project from the previous calendar year (January 1 – December 31). The annual report will include the following information:

1) Program account reporting (financial)
    a. All income received and interest earned by the program account for the program and by service area.
    b. A list of all permits for which in-lieu fee program funds were accepted by service area including:
        i. The Corps permit numbers (and/or TDEC number or project name)
        ii. The service area in which the authorized impacts are located
        iii. The amount of authorized impacts
        iv. The amount of required compensatory mitigation
        v. The amount paid to the in-lieu fee program
        vi. The date the funds were received from the permittee
    c. A description of in-lieu fee program expenditure/disbursements from the account for the program and the service area, including the amount subtracted as the administrative fee for the Program.
2) Ledger reporting (credit)
    a. The balance of advance credits and released credits at the end of the report period for the program and by service area.
    b. The permitted impacts for each resource type
    c. All additions and subtractions of credits

d. Other changes in credit availability

(see ‘credit accounting’ section for detail of the ledger report)

Annual Financial Assurances Report

The Program will submit an annual report on financial assurances and long-term management to TDEC, the Corps and IRT. The Program is required to give the Corps at least 120 days advanced notice if required financial assurances will be terminated or revoked. In addition, the financial assurance instrument must be written in such a way that it is the obligation of the bonding company or financial institution to provide the Corps notice. The financial assurances and long-term management funding report will include:

- Beginning and ending balances of the individual project accounts providing funds for financial assurance and long-term management.
- Deposits into and any withdrawals from the individual project accounts providing funds for financial assurances and long-term management
- Information on the amount of required financial assurances and the status of those assurances, including their potential expiration for each individual project.

XII. COMPENSATION PLANNING FRAMEWORK

The Program will be established to provide compensatory mitigation for impacts to wetlands within the State of Tennessee. The Program will use a watershed approach to select the location and design for ILF project sites. This approach includes research on the historic and existing wetland resources, including degraded resources within each proposed service area. The Program will identify short-term and long-term wetland resource needs within a watershed-based service area. Service area boundaries were selected to ensure that compensatory mitigation activities will replace impacted wetland resources within similar settings and conditions. A discussion of each watershed and compensation planning framework for each service area follows.

1. Conasauga River Service Area

A. Geographic Service Area

The Conasauga watershed is part of the Coosa-Tallapoosa system, originating just north of the Tennessee-Georgia border, and extending into central north Georgia, before crossing the Georgia-Alabama state line into north Alabama, and continuing across central and south Alabama before terminating in Mobile Bay. The service area will be that portion of the Coosa-Tallapoosa River watershed that is within Tennessee, which is limited to the HUC 12 Conasauga River Watershed **(Figure 5)**. The Conasauga River begins in southeast Tennessee and drains an area of 727 square miles (124 square miles in Tennessee) **(Table 6)**. The system flows through Polk and Bradley counties in Tennessee and Fannin, Whitfield, Gilmer, Gordon, Murray, Walker and Catoosa counties in Georgia.

This service area was selected because this is the only portion of the 8–digit or 6-digit HUC that is within the state of Tennessee. Despite its small size and lack of prior permitted impacts, five advance credits are requested in service area due to the prevalence of hydric soils (%4.88 of the land area is covered by soils identified as hydric), especially in the flat, low-lying valleys.

The watershed lies predominantly in the Ridge and Valley ecoregion, a relatively low-lying region between the Blue Ridge Mountains to the east and the Cumberland Plateau on the west. As a result of extreme folding and faulting events, the roughly parallel ridges and valleys comprise a variety of widths, heights, and geologic materials, including limestone, dolomite, shale, siltstone, sandstone, chert, and mudstone. Springs and caves are relatively common. Forests cover about 50% of the region. The ecoregion has great aquatic habitat diversity in Tennessee and supports a diverse fish fauna rivaled only by that of the Highland Rim.

Level IV ecoregions include:

> The **Southern Dissected Ridges and Knobs** contain more crenulated, broken, or hummocky ridges, compared to the smoother, more sharply pointed sandstone ridges of Ecoregion 67h. Although shale is common, there is a mixture and interbedding of geologic materials. The ridges on the east side of Tennessee's Ridge and Valley tend to be associated with the Ordovician-age Sevier shale, Athens shale, and Holston and Lenoir limestones. These can include calcareous shale, limestone, siltstone, sandstone, and conglomerate. In the central and western part of Ecoregion 67, the shale ridges are associated with the Cambrian-age Rome Formation: shale and siltstone with beds of sandstone. Chestnut oak forests and pine forests are typical for the higher elevations of the ridges, with areas of white oak, mixed mesophytic forest, and tulip poplar on the lower elevations.
>
> The **Southern Limestone/Dolomite Valleys and Low Rolling Hills** form a heterogeneous region composed predominantly of limestone and cherty dolomite. Landforms are mostly low rolling ridges and valleys, and the soils vary

in their productivity. Landcover includes intensive agriculture, urban and industrial, or areas of thick forest. White oak forests, bottomland oak forests, and sycamore-ash-elm riparian forests are the common forest types, and grassland barrens intermixed with cedar-pine glades also occur here.

The **Southern Sandstone Ridges** ecoregion encompasses the major sandstone ridges, but these ridges also have areas of shale and siltstone. The steep, forested ridges have narrow crests, and the soils are typically stony, sandy, and of low fertility. The chemistry of streams flowing down the ridges can vary greatly depending on the geologic material. The higher elevation ridges are in the north, including Wallen Ridge, Powell Mountain, Clinch Mountain and Bays Mountain. White Oak Mountain in the south has some sandstone on the west side, but abundant shale and limestone as well. Grindstone Mountain, capped by the Gizzard Group sandstone, is the only remnant of Pennsylvanian age strata in the Ridge and Valley of Tennessee.

The **Southern Metasedimentary Mountains** are steep, dissected, biologically diverse mountains that include Clingmans Dome (6643 feet), the highest point in Tennessee. The Precambrian-age metamorphic and sedimentary geologic materials are generally older and more metamorphosed than the Southern Sedimentary Ridges (66e) to the west and north. The Appalachian oak forests and, at higher elevations, the northern hardwoods forests include a variety of oaks and pines, as well as silverbell, hemlock, yellow poplar, basswood, buckeye, yellow birch, and beech. Spruce-fir forests, found generally above 5500 feet, have been affected greatly over the past twenty-five years by the balsam woolly adelgid. The Copper Basin, in the southeast corner of Tennessee, was the site of copper mining and smelting from the 1850's to 1987, and once left more than fifty square miles of eroded bare earth.

B. <u>Threats and Historic Resource Loss</u>

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that no acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 6)**. An analysis of these features within the service area indicates that historic wetlands would have largely been situated in the broad, low-gradient valleys along riparian corridors and in depressional features within the valleys. Many of these areas have been converted to agricultural uses such as farm ponds, pasture or row cropping.

The Conasauga River watershed remains largely forested, with some areas cleared for agricultural uses. Those areas that have been cleared tend to be located along the valley floor where historically wetlands would typically be found.

C. <u>Current Resource Conditions</u>

Most historic wetland areas have been converted to agriculture or developed in residential or commercial areas. Some small depression wetlands remain, but these largely remain unidentified and unassessed.

Tennessee lists 27.5 stream miles within the watershed as not supporting their designated uses due to nutrient loading, E. coli and loss of habitat due to siltation **(Figure 7)**. The primary sources are pasture grazing and septic tanks.

Georgia lists 121 miles of streams in the Coosa basin as partially supporting their designated uses and 371 miles as not supporting their uses. Urban runoff and high PCB concentrations in fish are the most commonly cited problems.

Alabama lists 39 miles of streams in the Coosa basin that either do not support or only partially support their designated uses. Gravel mining, feedlots, cropland erosion, and hydroelectric power production are sources for organic enrichment and low DO concentrations in the basin. The Coosa river is generally more enriched in nutrients (nitrogen and phosphorous) than the Tallapoosa.

D. <u>Aquatic Resource Goals and Objectives</u>

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior--converted farmland, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions and bottomland hardwoods due to the historic location of wetland resources in the low-lying valley areas;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to create/ restore 5 acres of wetlands, and enhance 5 acres of existing wetlands within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized,
- Hydrologic conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance.

Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,

- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed

2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available

3.) Preservation is determined by the district engineer to be appropriate and practicable

4.) The resources are under threat of destruction or adverse modifications

5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field

observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

2. Barren River Service Area

A. <u>Geographic Service Area</u>

The Barren River is part of the Green River Watershed. The Green River watershed is considered the most biologically diverse and rich branch of the Ohio River system. Approximately 1,350 square miles, the watershed is predominantly in central Kentucky; and includes the upper Green River watershed, its tributaries, and the Mammoth Cave National Park. The service area will be that portion of the Green River watershed that is within Tennessee, which is limited to the HUC 12 Barren River Watershed **(Figure 8)**. The Barren River Watershed is approximately 1,661 square miles with distribution in Kentucky and Tennessee (432 mi^2 in Tennessee) and includes parts of Clay, Macon and Sumner Counties in Middle Tennessee **(Table 7)**. The watershed has 563.2 stream miles and 45 lake acres in Tennessee. Twelve rare plant and animal species have been documented in the watershed, including seven rare fish species and one rare snail species.

This area is underlain by karst geology. Sinkholes, springs, disappearing streams and caves characterize karst topography. In karst areas, the ground water flows through solution-enlarged channels, bedding planes and microfractures within the rock. The characteristic landforms of karst regions are: closed depressions of various size and arrangement; disrupted surface drainage; and caves and underground drainage systems.

This service area was selected because this is the only portion of the 8–digit or 6-digit HUC that is within the state of Tennessee. Despite its small size and lack of many prior permitted impacts, five advance credits are requested in service area as the minimum number of advance credits requested per service area.

The watershed lies predominantly in the Interior Plateau ecoregion, a diverse ecoregion extending from southern Indiana and Ohio to northern Alabama. Rock types are distinctly different from the coastal plain sands of western Tennessee ecoregions, and elevations are lower than the Appalachian ecoregions to the east. Mississippian to Ordovician-age limestone, chert, sandstone, siltstone and shale compose the landforms of open hills, irregular plains, and tablelands. The natural vegetation is primarily oak-hickory forest, with some areas of bluestem prairie and cedar glades. The region has the most diverse fish fauna in Tennessee.

Level IV ecoregions include:

> The **Eastern Highland Rim** has more level terrain than the Western Highland Rim (71f), with landforms characterized as tablelands of moderate relief and irregular plains. Mississippian-age limestone, chert, shale, and dolomite predominate, and karst terrain sinkholes and depressions are especially noticeable between Sparta and McMinnville. Numerous springs and spring-associated fish fauna also typify the region. Natural vegetation for the region is transitional between the oak-hickory type to the west and the mixed mesophytic forests of the Appalachian ecoregions (68, 69) to the east. Bottomland hardwoods forests were once

abundant in some areas, although much of the original bottomland forest has been inundated by several large impoundments. Barrens and former prairie areas are now mostly oak thickets or pasture and cropland.

The **Western Pennyroyal Karst** is a flatter area of irregular plains, with fewer perennial streams, compared to the open hills of the Western Highland Rim (71f). Small sinkholes and depressions are common. The productive soils of this notable agricultural area are formed mostly from a thin loess mantle over residuum of Mississippian-age limestones. Most of the region is cultivated or in pasture; tobacco and livestock are the principal agricultural products, with some corn, soybeans, and small grains. The natural vegetation consisted of oak-hickory forest with mosaics of bluestem prairie. The barrens of Kentucky that extended south into Stewart, Montgomery, and Robertson counties, were once some of the largest natural grasslands in Tennessee.

B. Threats and Historic Resource Loss

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 0.46 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 9)**. An analysis of these areas within the service area indicate that historic wetlands would have largely been situated in depressions at higher elevations in low-slope plateau-like areas and at the headwaters of stream system, with some riparian wetlands along higher order streams on floodplains in wide valleys. Many of these areas have been converted to agricultural uses such as farm ponds, pasture or row crop, or developed for commercial or residential purposes.

Current land use trends include some urbanization and development, mostly clustered in those areas with prior development, with a continued predominant agricultural footprint.

C. Current Resource Conditions

Most historic wetland areas have been converted to agriculture or developed in residential or commercial areas. Some small depression wetlands remain, but these largely remain unidentified and unassessed.

TDEC's assessment of the chemical, physical, and biological parameters of the watershed resulted in placing seven streams and two lakes on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters **(Figure 10)**. The most common reasons for classification are nutrient loading, Escherichia coli, and flow and habitat alterations. The sources of these are largely from agricultural operations and point source municipal discharges.

Water quality issues in the watershed tend to be related to agriculture (i.e. nutrient loading, fecal coliform), or from point source discharges, such wastewater treatment or industrial facilities.

D. Aquatic Resource Goals and Objectives

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions and headwater resources;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to create/ restore 5 acres of wetland resources, and enhance 5 acres of existing wetlands within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized,
- Hydrologic conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and

mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. <u>Explanation of Preservation Goals</u>

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed
2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available
3.) Preservation is determined by the district engineer to be appropriate and practicable
4.) The resources are under threat of destruction or adverse modifications
5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. <u>Public & Private Stakeholder Involvement</u>

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

3. Upper Cumberland River Service Area

A. <u>Geographic Service Area</u>

The Upper Cumberland River Watershed is approximately 9,924 square miles (5,526 in Tennessee) and includes six HUC-8 watershed and parts of twenty-eight Tennessee counties **(Figure 11)**.

This service area was selected because this is the 6-digit HUC. This region of the state has relatively low prevalence of hydric soils, with only %1.28 of all soils categorized as hydric. The relative rate of impact acres in this service area is still very low, and having some larger service areas with relatively low rates of impacts will allow the Program to devote watershed planning efforts to those service areas with the greatest needs and the greatest amounts of impacts. 10 advance credits are being requested in the service area due to its size and the amount of historic impact.

The Cumberland Lake watershed is approximately 1,823 square miles (34 mi2 in Tennessee) and includes parts of Clay County **(Table 8)**. A part of the Cumberland River drainage basin, the watershed has 52.2 stream miles in Tennessee. One rare plant species has been documented in the Tennessee portion of the watershed.

The South Fork Cumberland River Watershed is approximately 1,365 square miles (976 mi2 in Tennessee) and includes parts of Anderson, Campbell, Fentress, Morgan, Pickett, and Scott Counties. A part of the Cumberland River drainage basin, the watershed has 1,378 stream miles and 5 lake acres in Tennessee. The watershed features the Big South Fork National River and Recreation Area, a park spanning Tennessee and Kentucky, which is administered by the National Park Service. Eighty-eight rare plant and animal species have been documented in the watershed, including eight rare fish species, five rare mussel species, and three rare crustacean species. Portions of eight streams in the South Fork Cumberland River Watershed are listed in the National Rivers Inventory as having one or more outstanding natural or cultural values and a portion of the South Fork Cumberland River is designated as Outstanding National Resource Water.

The Obey River Watershed is approximately 961 square miles (775 mi2 in Tennessee) and includes parts of Clay, Cumberland, Fentress, Overton, Pickett, and Putnam Counties.. A part of the Cumberland River drainage basin, the watershed has 776.4 stream miles and 22,000 lake acres in Tennessee. Near its mouth, the Obey River is impounded by the U.S. Army Corps of Engineers Dale Hollow Reservoir, site of a fish hatchery run by the federal government. This dam impounds the Obey River for essentially its entire length, causing slack water well up both major tributaries, the East and West Forks. This lake is relatively deep due to the height of the dam and the depth of the gorges through which the Obey River and its tributaries flowed; the impoundment also enters Kentucky in its Wolf River and Sulphur Creek embayments.

The Cordell Hull Lake Watershed is approximately 790 square miles and includes parts of Clay, Jackson, Macon, Overton, Putnam, and Smith Counties. A part of the Cumberland River drainage basin, the watershed has 893.8 stream miles and 13,901 lake acres. Forty-three rare plant and animal species have been documented in the watershed, including six rare fish species, one rare mussel species, two rare snail species, three rare amphibian species, and one rare crustacean species. Portions of four streams in the Cordell Hull Lake Watershed are listed in the National Rivers Inventory as having one or more outstanding natural or cultural values.

The Collins River Watershed is approximately 811 square miles and includes parts of Cannon, Coffee, De Kalb, Grundy, Marion, Sequatchie, Van Buren, and Warren Counties. A part of the Cumberland River drainage basin, the watershed has 1,003 stream miles and 69 lake acres. The Collins River Watershed contains low to moderate gradient streams, with productive, nutrient-rich waters, resulting in algae, rooted vegetation, and occasionally high densities of fish. There are numerous springs and spring-associated fish fauna. Land in the Collins River Watershed is utilized by cattle, grain production, and tobacco farms as well as an abundance of plant nurseries. Streams in the watershed have cut down into the limestone, but the gorge talus slopes are composed of colluvium with huge angular, slabby blocks of sandstone. Natural areas in this region are among the most scenic in the state.

The Caney Fork River Watershed is approximately 1,771 square miles and includes parts of Bledsoe, Cannon, Cumberland, DeKalb, Putnam, Sequatchie, Smith, Van Buren, Warren, White, and Wilson Counties. A part of the Cumberland River drainage basin, the watershed has 2,038 stream miles and 25,817 lake acres. Sixty rare plant and animal species have been documented in the watershed, including four rare fish species, seven rare mussel species, one rare snail species, and one rare crustacean species. Portions of eight streams in the Caney Fork River Watershed are listed in the National Rivers Inventory as having one or more outstanding natural or cultural values. The Caney Fork River Watershed contains low to moderate gradient streams, with productive, nutrient-rich waters, resulting in algae, rooted vegetation, and occasionally high densities of fish. There are numerous springs and spring-associated fish fauna. Streams in the watershed have cut down into the limestone, but the gorge talus slopes are composed of colluvium with huge angular, slabby blocks of sandstone. The area contains numerous waterfalls, cascades, and timberlands. It is the location of several scenic recreation areas.

The Service Area lies predominantly in the Southwestern and Central Appalachian and Interior Plateau Ecoregions. These areas are characterized by rugged terrain, deep ravines, cool climate, and infertile soils limit agriculture, resulting in a mostly forested landcover. The high hills and low mountains are covered by a mixed mesophytic forest with areas of Appalachian oak and northern hardwoods forest. Bituminous coal mines are common, and have caused the siltation and acidification of streams.

Generally, the Southwestern Appalachians are describes as stretching from Kentucky to Alabama, these open low mountains contain a mosaic of forest and woodland with some cropland and pasture. The eastern boundary of the ecoregion in Tennessee, along the more abrupt escarpment where it meets the Ridge and Valley (67), is relatively smooth and only slightly notched by small eastward flowing stream drainages. The western boundary, next to the Interior Plateau's Eastern Highland Rim (71g), is more crenulated with a rougher escarpment that is more deeply incised. The mixed mesophytic forest is restricted mostly to the deeper ravines and escarpment slopes, and the upland forests are dominated by mixed oaks with shortleaf pine.

The Central Appalachian ecoregion, stretching from northern Tennessee to central Pennsylvania, is primarily a high, dissected, rugged plateau composed of sandstone, shale, conglomerate, and coal. The rugged terrain, cool climate, and infertile soils limit agriculture, resulting in a mostly forested landcover. The high hills and low mountains are covered by a mixed mesophytic forest with areas of Appalachian oak and northern hardwoods forest. Bituminous coal mines are common, and have caused the siltation and acidification of streams.

The Interior Plateau is a diverse ecoregion extending from southern Indiana and Ohio to northern Alabama. Rock types are distinctly different from the coastal plain sands of western Tennessee ecoregions, and elevations are lower than the Appalachian ecoregions to the east. Mississippian to Ordovician-age limestone, chert, sandstone, siltstone and shale compose the landforms of open hills, irregular plains, and tablelands. The natural vegetation is primarily oak-hickory forest, with some areas of bluestem prairie and cedar glades. The region has the most diverse fish fauna in Tennessee.

Level IV ecoregions include:

> The **Cumberland Plateau's** tablelands and open low mountains are about 1000 feet higher than the Eastern Highland Rim (71g) to the west, and receive slightly more precipitation with cooler annual temperatures than the surrounding lower-elevation ecoregions. The plateau surface is less dissected with lower relief compared to the Cumberland Mountains (69d) or the Plateau Escarpment (68c). Elevations are generally 1200-2000 feet, with the Crab Orchard Mountains reaching over 3000 feet. Pennsylvanian age conglomerate, sandstone, siltstone, and shale is covered by mostly well-drained, acid soils of low fertility. The region is forested, with some agriculture and coal mining activities.
>
> The **Plateau Escarpment** is characterized by steep, forested slopes and high velocity, high gradient streams. Local relief is often 1000 feet or more. The geologic strata include Mississippian-age limestone, sandstone, shale, and siltstone, and Pennsylvanian-age shale, siltstone, sandstone, and conglomerate. Streams have cut down into the limestone, but the gorge talus slopes are composed of colluvium with huge angular, slabby blocks of sandstone. Vegetation community types in the ravines and gorges include mixed oak and chestnut oak on the upper slopes, more mesic forests on the middle and lower slopes (beech-tulip poplar, sugar maple-basswood-ash-buckeye), with hemlock along rocky streamsides and river birch along floodplain terraces.
>
> The **Cumberland Mountains**, in contrast to the sandstone-dominated Cumberland Plateau (68a) to the west and southwest, are more highly dissected,

with narrow-crested steep slopes, and younger Pennsylvanian-age shales, sandstones, siltstones, and coal. Narrow, winding valleys separate the mountain ridges, and relief is often 2000 feet. Cross Mountain, west of Lake City, reaches 3534 feet in elevation. Soils are generally well-drained, loamy, and acidic, with low fertility. The natural vegetation is a mixed mesophytic forest, although composition and abundance vary greatly depending on aspect, slope position, and degree of shading from adjacent land masses. Large tracts of land are owned by lumber and coal companies, and there are many areas of stripmining.

The **Eastern Highland Rim** has more level terrain than the Western Highland Rim (71f), with landforms characterized as tablelands of moderate relief and irregular plains. Mississippian-age limestone, chert, shale, and dolomite predominate, and karst terrain sinkholes and depressions are especially noticeable between Sparta and McMinnville. Numerous springs and spring-associated fish fauna also typify the region. Natural vegetation for the region is transitional between the oak-hickory type to the west and the mixed mesophytic forests of the Appalachian ecoregions (68, 69) to the east. Bottomland hardwoods forests were once abundant in some areas, although much of the original bottomland forest has been inundated by several large impoundments. Barrens and former prairie areas are now mostly oak thickets or pasture and cropland.

The **Outer Nashville Basin** is a more heterogeneous region than the Inner Nashville Basin (71i), with more rolling and hilly topography and slightly higher elevations. The region encompasses most all of the outer areas of the generally non-cherty Ordovician limestone bedrock. The higher hills and knobs are capped by the more cherty Mississippian age formations, and some Devonian-age Chattanooga shale, remnants of the Highland Rim. The region's limestone rocks and soils are high in phosphorus, and commercial phosphate is mined. Deciduous forest with pasture and cropland are the dominant land covers. Streams are low to moderate gradient, with productive, nutrient-rich waters, resulting in algae, rooted vegetation, and occasionally high densities of fish. The Nashville Basin as a whole has a distinctive fish fauna, notable for fish that avoid the region, as well as those that are present.

B. Threats and Historic Resource Loss

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 22.99 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 12)**. The region is characterized by narrow, winding valleys separating the mountain ridges, and relief is often 2000 feet. An analysis of the service area indicates that potential wetlands are limited almost exclusively to lower-sloped areas at the valley base. With few flat areas available for agricultural purposes, these areas were likely converted during early settlement of the region, and although few hydric soils are identified, there are even fewer identified wetlands in the region.

C. <u>Current Resource Conditions</u>

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the South Fork Cumberland River watershed resulted in placing portions of twelve streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters **(Figure 13)**. The most common reasons for classification are siltation, pH, and Escherichia coli. The sources of these are largely from historic mining impacts, and point source municipal discharges.

TDEC's assessment of the chemical, physical, and biological parameters of the Obey River watershed resulted in placing portions of eleven streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are pH, iron and siltation. The sources of these are largely from historic mining impacts, and permitted industrial sources.

TDEC's assessment of the chemical, physical, and biological parameters of the Cordell Hull Lake watershed resulted in placing portions of twelve streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are Escherichia coli and dissolved oxygen. The sources of these are largely from agricultural sources, and urbanized high density areas.

TDEC's assessment of the chemical, physical, and biological parameters of the Collins River watershed resulted in placing portions of twelve streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are habitat loss, siltation, Escherichia coli and pH. The sources of these are largely from agricultural sources, and historic mining impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the Caney Fork watershed resulted in placing portions of twelve streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are habitat loss, siltation, Escherichia coli and pH. The sources of these are largely from agricultural sources, and historic mining impacts.

D. Aquatic Resource Goals and Objectives

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions, seasonally flooded lake fringes, and headwater resources;
2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;
3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;
4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 10 acres of wetlands, enhance 10 acres of existing wetlands and create/ enhance 5 acres of upland buffer within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized. Where suitable mitigation sites cannot be found within the 8-digit HUC, suitable sites within the same service area and the same ecoregion will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed
2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available
3.) Preservation is determined by the district engineer to be appropriate and practicable
4.) The resources are under threat of destruction or adverse modifications
5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

4. Lower Cumberland River Service Area

A. <u>Geographic Service Area</u>

The service area consists of three HUC 8 watersheds of the Lower Cumberland River that are outside of Metro Nashville/ Davidson County; the Old Hickory Lake, Red River and Lake Barkley sub-basins **(Figure 14)**.

This service area was selected because this is a portion of the 6-digit HUC outside of the Nashville/ Davidson County Metropolitan area. This region of the state has relatively low prevalence of hydric soils, with only %2.12 of all soils categorized as hydric. The relative rate of impact acres in this service area is still very low, and having some larger service areas with relatively low rates of impacts will allow the Program to devote watershed planning efforts to those service areas with the greatest needs and the greatest amounts of impacts. 10 advance credits are being requested in the service area due to its size and the amount of historic impact.

The Old Hickory Lake Watershed is approximately 983 square miles and includes parts of Davidson, Macon, Robertson, Smith, Sumner, Trousdale, and Wilson Counties. A part of the Cumberland River drainage basin, the watershed has 1,164.3 stream miles and 27,439 lake acres **(Table 9)**. Fifty-three rare plant and animal species have been documented in the watershed, including six rare fish species, one rare amphibian species, and nine rare mussel species. Portions of two streams in the Old Hickory Lake Watershed are listed in the National Rivers Inventory as having one or more outstanding natural or cultural values.

The Lake Barkley Watershed is approximately 2,343 square miles (982 mi2 in Tennessee) and includes parts of Cheatham, Dickson, Houston, Montgomery, Robertson, and Stewart Counties. A part of the Cumberland River drainage basin, the watershed has 1,258.4 stream miles and 27,000 lake acres in Tennessee. Seventy-two rare plant and animal species have been documented in the Tennessee portion of the watershed, including two rare fish species and two rare crustacean species.

The Red River Watershed is approximately 1,444 square miles (801 mi2 in Tennessee) and includes parts of five Tennessee counties. A part of the Cumberland River drainage basin, the watershed has 788.7 stream miles and 15 lake acres in Tennessee. Fifty-seven rare plant and animal species have been documented in the watershed, including five rare fish species, one rare snail species, three rare amphibian species, and two rare crustacean species. Portions of four streams in the Red River Watershed are listed in the National Rivers Inventory as having one or more outstanding natural or cultural values. The stream's name derives from its typical water color. This is caused by a large load of clay and silt which contains iron oxides.

It rises in Sumner County, TN, south of Portland, and trends generally northwest. A major tributary of the Cumberland River, South Fork, forms nearby and runs parallel and south of the main river for several miles. For almost its entire length, it drains the northern Highland Rim of Tennessee and the adjacent (and analogous) Pennyroyal Plateau of Kentucky.

The service area is contained solely within the Interior Plateau ecoregion, a diverse ecoregion extending from southern Indiana and Ohio to northern Alabama. Rock types are distinctly different from the coastal plain sands of western Tennessee ecoregions, and elevations are lower than the Appalachian ecoregions to the east. Mississippian to Ordovician-age limestone, chert, sandstone, siltstone and shale compose the landforms of open hills, irregular plains, and tablelands. The natural vegetation is primarily oak-hickory forest, with some areas of bluestem prairie and cedar glades. The region has the most diverse fish fauna in Tennessee.

Level IV ecoregions include:

The **Western Pennyroyal Karst** is a flatter area of irregular plains, with fewer perennial streams, compared to the open hills of the Western Highland Rim (71f). Small sinkholes and depressions are common. The productive soils of this notable agricultural area are formed mostly from a thin loess mantle over residuum of Mississippian-age limestones. Most of the region is cultivated or in pasture; tobacco and livestock are the principal agricultural products, with some corn, soybeans, and small grains. The natural vegetation consisted of oak-hickory forest with mosaics of bluestem prairie. The barrens of Kentucky that extended south into Stewart, Montgomery, and Robertson counties, were once some of the largest natural grasslands in Tennessee.

The **Western Highland Rim** is characterized by dissected, rolling terrain of open hills, with elevations of 400-1000 feet. The geologic base of Mississippian-age limestone, chert, and shale is covered by soils that tend to be cherty, acid, and low to moderate in fertility. Streams are characterized by coarse chert gravel and sand substrates with areas of bedrock, moderate gradients, and relatively clear water. The oak-hickory natural vegetation was mostly deforested in the mid to late 1800's, in conjunction with the iron-ore related mining and smelting of the mineral limonite, but now the region is again heavily forested. Some agriculture occurs on the flatter interfluves and in the stream and river valleys: mostly hay, pasture, and cattle, with some cultivation of corn and tobacco.

The **Outer Nashville Basin** is a more heterogeneous region than the Inner Nashville Basin (71i), with more rolling and hilly topography and slightly higher elevations. The region encompasses most all of the outer areas of the generally non-cherty Ordovician limestone bedrock. The higher hills and knobs are capped by the more cherty Mississippian age formations, and some Devonian-age Chattanooga shale, remnants of the Highland Rim. The region's limestone rocks and soils are high in phosphorus, and commercial phosphate is mined. Deciduous forest with pasture and cropland are the dominant land covers. Streams are low to moderate gradient, with productive, nutrient-rich waters, resulting in algae, rooted vegetation, and occasionally high densities of fish. The Nashville Basin as a whole has a distinctive fish fauna, notable for fish that avoid the region, as well as those that are present.

The **Inner Nashville Basin** is less hilly and lower than the Outer Nashville Basin (71h), outcrops of the Ordovician-age limestone are common, and the generally shallow soils are redder and lower in phosphorus than those of the outer basin. Streams are lower gradient than surrounding regions, often flowing over large expanses of limestone bedrock. The most characteristic hardwoods within the inner basin are a maple-oak-hickory-ash association. The limestone cedar glades of Tennessee, a unique mixed grassland/forest cedar glades vegetation type with many endemic species, are located primarily on the limestones of the Inner Nashville Basin. The more xeric, open characteristics and shallow soils of the cedar glades also result in a distinct distribution of amphibian and reptile species. Urban, suburban, and industrial land use in the region is increasing.

B. Threats and Historic Resource Loss

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 17 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 15)**. An analysis of these areas within the service area indicate that historic wetlands would have largely been situated in depressions at higher elevations in low-slope plateau-like areas and at the headwaters of stream system, with some riparian wetlands along higher order streams on floodplains in wide valleys. Many of these areas have been converted to agricultural uses such as farm ponds, pasture or row crop, or developed for commercial or residential purposes.

Current land use trends include some urbanization and development, clustered in those areas with some prior development, with a continued predominant agricultural footprint.

Water quality issues in the watershed tend to be related to agriculture (i.e. nutrient loading, fecal coliform), or from point source discharges, such wastewater treatment or industrial facilities.

C. Current Resource Conditions

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts. Some small depression wetlands remain, but these largely remain unidentified and unassessed.

TDEC's assessment of the chemical, physical, and biological parameters of the Old Hickory Lake watershed resulted in placing portions of twenty streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters **(Figure 16)**. The most common reasons for classification are siltation, nutrient loading, Escherichia coli, and flow and habitat alterations. The sources of these are largely from agricultural operations, development in the watershed, and point source municipal discharges.
TDEC's assessment of the chemical, physical, and biological parameters of the Lake Barkley watershed resulted in placing portions of nine streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are nutrient loading, and Escherichia coli. The sources of these are largely from agricultural operations.

TDEC's assessment of the chemical, physical, and biological parameters of the Red River watershed resulted in placing portions of twenty-five streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters(including some reaches on the Red River) . The most common reasons for classification are siltation, nutrient loading, Escherichia coli, and flow and habitat alterations. The sources of these are largely from agricultural operations, development in the watershed and collection system failures.

D. Aquatic Resource Goals and Objectives

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions, seasonally flooded lake fringes, seasonally inundated floodplain flats, and headwater resources;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to create/ restore 5 acres of wetland riparian corridor and 10 acres of wetlands, enhance 10 acres of existing wetlands and create/ enhance 5 acres of upland buffer within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized. Where suitable mitigation sites cannot be found within the 8-digit HUC, suitable sites within the same service area and the same ecoregion will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance.

Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,

- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed

2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available

3.) Preservation is determined by the district engineer to be appropriate and practicable

4.) The resources are under threat of destruction or adverse modifications

5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field

observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

5. Cheatham Lake Service Area

A. <u>Geographic Service Area</u>

The service area is the Cheatham Lake watershed, excluding the Mill Creek 10-digit HUC, which will be managed separately due to the presence of the federally endangered Nashville Crayfish (*Orconectes shoupi*) **(Figure 17)**.

The Cheatham Lake Watershed is approximately 647 square miles and includes parts of Cheatham, Davidson, Robertson, Rutherford, Sumner, and Williamson Counties. A part of the Cumberland River drainage basin, the watershed has 773.3 stream miles and 7,507 lake acres **(Table 10)**. Sixty rare plant and animal species have been documented in the watershed, including five rare fish species, one rare crayfish species, and one rare mussel species.

This service area was selected because this 8-digit HUC is within the greater Nashville/ Davidson County metropolitan area. Although this region of the state has relatively low prevalence of hydric soils, with only %1.28 of all soils categorized as hydric, the 8-digit HUC is an appropriate planning scale in urban areas such as this. The relative rate of impact acres in this service area is somewhat high, given the amount of urbanization. Planning on the 8-digit HUC scale will allow the Program to devote more watershed planning efforts to service areas such as this one a greater need for planning efforts. 10 advance credits are being requested in the service area due to its urban area, size and the amount of historic impact.

The service area is contained solely within the Interior Plateau ecoregion, a diverse ecoregion extending from southern Indiana and Ohio to northern Alabama. Rock types are distinctly different from the coastal plain sands of western Tennessee ecoregions, and elevations are lower than the Appalachian ecoregions to the east. Mississippian to Ordovician-age limestone, chert, sandstone, siltstone and shale compose the landforms of open hills, irregular plains, and tablelands. The natural vegetation is primarily oak-hickory forest, with some areas of bluestem prairie and cedar glades. The region has the most diverse fish fauna in Tennessee.

Level IV ecoregions include:

> The **Western Pennyroyal Karst** is a flatter area of irregular plains, with fewer perennial streams, compared to the open hills of the Western Highland Rim (71f). Small sinkholes and depressions are common. The productive soils of this notable agricultural area are formed mostly from a thin loess mantle over residuum of Mississippian-age limestones. Most of the region is cultivated or in pasture; tobacco and livestock are the principal agricultural products, with some corn, soybeans, and small grains. The natural vegetation consisted of oak-hickory forest with mosaics of bluestem prairie. The barrens of Kentucky that extended south into Stewart, Montgomery, and Robertson Counties, were once some of the largest natural grasslands in Tennessee.

The **Western Highland Rim** is characterized by dissected, rolling terrain of open hills, with elevations of 400-1000 feet. The geologic base of Mississippian-age limestone, chert, and shale is covered by soils that tend to be cherty, acid, and low to moderate in fertility. Streams are characterized by coarse chert gravel and sand substrates with areas of bedrock, moderate gradients, and relatively clear water. The oak-hickory natural vegetation was mostly deforested in the mid to late 1800's, in conjunction with the iron-ore related mining and smelting of the mineral limonite, but now the region is again heavily forested. Some agriculture occurs on the flatter interfluves and in the stream and river valleys: mostly hay, pasture, and cattle, with some cultivation of corn and tobacco.

The **Outer Nashville Basin** is a more heterogeneous region than the Inner Nashville Basin (71i), with more rolling and hilly topography and slightly higher elevations. The region encompasses most all of the outer areas of the generally non-cherty Ordovician limestone bedrock. The higher hills and knobs are capped by the more cherty Mississippian age formations, and some Devonian-age Chattanooga shale, remnants of the Highland Rim. The region's limestone rocks and soils are high in phosphorus, and commercial phosphate is mined. Deciduous forest with pasture and cropland are the dominant land covers. Streams are low to moderate gradient, with productive, nutrient-rich waters, resulting in algae, rooted vegetation, and occasionally high densities of fish. The Nashville Basin as a whole has a distinctive fish fauna, notable for fish that avoid the region, as well as those that are present.

B. Threats and Historic Resource Loss

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 6.2 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 18)**. An analysis of these areas within the service area indicate that historic wetlands would have largely been situated in depressions at higher elevations in low-slope plateau-like areas and at the headwaters of stream system, with some riparian wetlands along higher order streams on floodplains in wide valleys. Many of these areas have been converted to agricultural uses such as farm ponds, pasture or row crop, or developed for commercial or residential purposes.

Current land use trends include some urbanization and development, mostly clustered in those areas with prior development, with a continued predominant agricultural footprint.

C. Current Resource Conditions

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts. Some small depression wetlands remain, but these largely remain unidentified and unassessed.

TDEC's assessment of the chemical, physical, and biological parameters of the Cheatham Lake watershed resulted in placing portions of forty-six streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are siltation, nutrient loading, Escherichia coli, and flow and habitat alterations. The sources of these are largely from agricultural operations, development in the watershed and point source municipal discharges.

Water quality issues in the watershed tend to be related to agriculture (i.e. nutrient loading, fecal coliform), and mining (pH, siltation).

D. Aquatic Resource Goals and Objectives

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions, seasonally flooded lake fringes, and headwater resources;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 10 acres of wetlands, and enhance 15 acres of existing wetlands within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,

- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. <u>Explanation of Preservation Goals</u>

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed
2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available
3.) Preservation is determined by the district engineer to be appropriate and practicable
4.) The resources are under threat of destruction or adverse modifications
5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. <u>Public & Private Stakeholder Involvement</u>

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work

closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the

acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

6. Stones River Service Area

A. <u>Geographic Service Area</u>

The service area includes the Stones River Watershed 8-digit HUC **(Figure 20)**.

The Stones River Watershed contains low to moderate gradient streams, with productive, nutrient-rich waters, which result in algae, rooted vegetation, and occasionally high densities of fish. Its streams flow over large expanses of limestone bedrock. Land in the Stones River Watershed is utilized by agriculture, industry, and urbanization. The Stones River Watershed is approximately 935 square miles and is located in Middle Tennessee and includes parts of Cannon, Davidson, Rutherford, and Wilson Counties **(Table 11)**.

This service area was selected because this 8-digit HUC is within the greater Nashville/ Davidson County metropolitan area. This region of the state has relatively moderate prevalence of hydric soils, with %3.22 of all soils categorized as hydric. The 8-digit HUC is an appropriate planning scale in urban areas such as this. The relative rate of impact acres in this service area is high, due to the large amount of urbanization. Planning on the 8-digit HUC scale will allow the Program to devote more watershed planning efforts to service areas such as this one a greater need for planning efforts. 20 advance credits are being requested in the service area due to its urban area, size and the amount of historic impact.

The service area is contained solely within the Interior Plateau ecoregion, a diverse ecoregion extending from southern Indiana and Ohio to northern Alabama. Rock types are distinctly different from the coastal plain sands of western Tennessee ecoregions, and elevations are lower than the Appalachian ecoregions to the east. Mississippian to Ordovician-age limestone, chert, sandstone, siltstone and shale compose the landforms of open hills, irregular plains, and tablelands. The natural vegetation is primarily oak-hickory forest, with some areas of bluestem prairie and cedar glades. The region has the most diverse fish fauna in Tennessee.

Level IV ecoregions include:

> The **Outer Nashville Basin** is a more heterogeneous region than the Inner Nashville Basin (71i), with more rolling and hilly topography and slightly higher elevations. The region encompasses most all of the outer areas of the generally non-cherty Ordovician limestone bedrock. The higher hills and knobs are capped by the more cherty Mississippian age formations, and some Devonian-age Chattanooga shale, remnants of the Highland Rim. The region's limestone rocks and soils are high in phosphorus, and commercial phosphate is mined. Deciduous forest with pasture and cropland are the dominant land covers. Streams are low to moderate gradient, with productive, nutrient-rich waters, resulting in algae, rooted vegetation, and occasionally high densities of fish. The Nashville Basin as a whole has a distinctive fish fauna, notable for fish that avoid the region, as well as those that are present.

The **Inner Nashville Basin** is less hilly and lower than the Outer Nashville Basin (71h), outcrops of the Ordovician-age limestone are common, and the generally shallow soils are redder and lower in phosphorus than those of the outer basin. Streams are lower gradient than surrounding regions, often flowing over large expanses of limestone bedrock. The most characteristic hardwoods within the inner basin are a maple-oak-hickory-ash association. The limestone cedar glades of Tennessee, a unique mixed grassland/forest cedar glades vegetation type with many endemic species, are located primarily on the limestones of the Inner Nashville Basin. The more xeric, open characteristics and shallow soils of the cedar glades also result in a distinct distribution of amphibian and reptile species. Urban, suburban, and industrial land use in the region is increasing.

B. Threats and Historic Resource Loss

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 28.99 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 21)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in high portions of the floodplain including ridges and natural levees that are only temporarily flooded, isolated depressions without outlets in upland landscapes that may pond water well into the growing season and have saturated soils for much of the year, groundwater discharge areas on or at the base of a slope that results in semi-permanent to permanent saturation, and meandering drainages characterized by temporary flooding and saturated soils found in upland landscapes in association with headwater areas.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. Current Resource Conditions

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the Stone river watershed resulted in placing portions of thirty-two streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters **(Figure 22)**. The most common reasons for classification are siltation, nutrient loading, Escherichia coli, and flow and habitat alterations. The sources of these are largely from agricultural operations, development in the watershed and point source municipal discharges.

D. Aquatic Resource Goals and Objectives

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions, seasonally flooded lake fringes, and headwater resources;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to 5 acres of wetlands, and enhance 5 acres of existing wetlands within 10 years of Program initiation.

E. <u>Prioritization Strategy</u>

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat

corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed
2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available
3.) Preservation is determined by the district engineer to be appropriate and practicable
4.) The resources are under threat of destruction or adverse modifications
5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

7. Harpeth River Service Area

A. Geographic Service Area

The Harpeth River Service Area is limited to the Harpeth River watershed 8-digit HUC **(Figure 23)**.

The Harpeth River Watershed includes cool springs with moderate gradient originating in the Inner Nashville Basin and warm water streams with shallow gradient flowing over exposed limestone in the Outer Nashville Basin. Even though the Harpeth River Watershed is mostly rural, a few urbanized areas are developing very rapidly. The Harpeth River Watershed is approximate 863 square miles and is located in Middle Tennessee and includes parts of Cheatham, Davidson, Dickson, Hickman, Rutherford, and Williamson Counties **(Table 12)**.

This service area was selected because this 8-digit HUC is within the greater Nashville/ Davidson County metropolitan area. Although this region of the state has relatively moderate-to-high prevalence of hydric soils, with %4.73 of all soils categorized as hydric, the 8-digit HUC is an appropriate planning scale in urban areas such as this. The relative rate of impact acres in this service area is somewhat high, given the amount of urbanization. Planning on the 8-digit HUC scale will allow the Program to devote more watershed planning efforts to service areas such as this one a greater need for planning efforts. 6 advance credits are being requested in the service area due to the historic activity of established mitigation banks, its urban area, size and the amount of historic impact.

The service area is contained solely within the Interior Plateau ecoregion, a diverse ecoregion extending from southern Indiana and Ohio to northern Alabama. Rock types are distinctly different from the coastal plain sands of western Tennessee ecoregions, and elevations are lower than the Appalachian ecoregions to the east. Mississippian to Ordovician-age limestone, chert, sandstone, siltstone and shale compose the landforms of open hills, irregular plains, and tablelands. The natural vegetation is primarily oak-hickory forest, with some areas of bluestem prairie and cedar glades. The region has the most diverse fish fauna in Tennessee.

Level IV ecoregions include:

> The **Western Highland Rim** is characterized by dissected, rolling terrain of open hills, with elevations of 400-1000 feet. The geologic base of Mississippian-age limestone, chert, and shale is covered by soils that tend to be cherty, acid, and low to moderate in fertility. Streams are characterized by coarse chert gravel and sand substrates with areas of bedrock, moderate gradients, and relatively clear water. The oak-hickory natural vegetation was mostly deforested in the mid to late 1800's, in conjunction with the iron-ore related mining and smelting of the mineral limonite, but now the region is again heavily forested. Some agriculture occurs on the flatter interfluves and in the stream and river valleys: mostly hay, pasture, and cattle, with some cultivation of corn and tobacco.

The **Outer Nashville Basin** is a more heterogeneous region than the Inner Nashville Basin (71i), with more rolling and hilly topography and slightly higher elevations. The region encompasses most all of the outer areas of the generally non-cherty Ordovician limestone bedrock. The higher hills and knobs are capped by the more cherty Mississippian age formations, and some Devonian-age Chattanooga shale, remnants of the Highland Rim. The region's limestone rocks and soils are high in phosphorus, and commercial phosphate is mined. Deciduous forest with pasture and cropland are the dominant land covers. Streams are low to moderate gradient, with productive, nutrient-rich waters, resulting in algae, rooted vegetation, and occasionally high densities of fish. The Nashville Basin as a whole has a distinctive fish fauna, notable for fish that avoid the region, as well as those that are present.

The **Inner Nashville Basin** is less hilly and lower than the Outer Nashville Basin (71h), outcrops of the Ordovician-age limestone are common, and the generally shallow soils are redder and lower in phosphorus than those of the outer basin. Streams are lower gradient than surrounding regions, often flowing over large expanses of limestone bedrock. The most characteristic hardwoods within the inner basin are a maple-oak-hickory-ash association. The limestone cedar glades of Tennessee, a unique mixed grassland/forest cedar glades vegetation type with many endemic species, are located primarily on the limestones of the Inner Nashville Basin. The more xeric, open characteristics and shallow soils of the cedar glades also result in a distinct distribution of amphibian and reptile species. Urban, suburban, and industrial land use in the region is increasing.

B. <u>Threats and Historic Resource Loss</u>

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 10.17 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 24)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in high portions of the floodplain including ridges and natural levees that are only temporarily flooded, isolated depressions without outlets in upland landscapes that may pond water well into the growing season and have saturated soils for much of the year, groundwater discharge areas on or at the base of a slope that results in semi-permanent to permanent saturation, and meandering drainages characterized by temporary flooding and saturated soils found in upland landscapes in association with headwater areas.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

About one-third of the Harpeth River watershed is located in Williamson County, one of the fastest growing regions in the country. Rapid development, certain agricultural activities, some poorly functioning sewage systems, and other growth pressures have led to wetland impacts throughout the Service Area. Growth remains the primary threat to wetlands in the region. Development in the watershed has led to increased runoff, siltation and habitat impairment.

C. <u>Current Resource Conditions</u>

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the watershed resulted in placing portions of fifty streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters (including some reaches on the Harpeth River) **(Figure 25)**. The most common reasons for classification are siltation, nutrient loading, low dissolved oxygen, and flow and habitat alterations. The sources of these are largely from agricultural operations, development in the watershed and point source municipal discharges.

D. <u>Aquatic Resource Goals and Objectives</u>

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions, seasonally inundated floodplain flats, and headwater resources;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 5 acres of wetlands, and enhance 5 acres of existing wetlands within 10 years of Program initiation.

E. <u>Prioritization Strategy</u>

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance.

Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,

- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed

2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available

3.) Preservation is determined by the district engineer to be appropriate and practicable

4.) The resources are under threat of destruction or adverse modifications

5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field

observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

8. Mill Creek Service Area

A. <u>Geographic Service Area</u>

The Mill Creek Service Area is confined to the Mill Creek ten-digit HUC **(Figure 26)**

Mill Creek drains southeastern Davidson County and northwestern Williamson County. It originates two miles south of Nolensville and flows northward to its confluence with the Cumberland River in Nashville. The Mill Creek watershed is 108 square miles, with 72 in Davidson County and 36 in Williamson County **(Table 13)**. Mill Creek is the only known habitat for the Nashville Crayfish ((*Orconectes shoupi*).

The Nashville Crayfish is listed as an endangered species by the Tennessee Wildlife Resources Agency and U.S. Fish and Wildlife Service. Its preferred habitat includes free-flowing waters dominated by large slab rocks atop a bedrock substrate. The crayfish is present in main stem Mill Creek and numerous tributaries of various sizes, and in certain areas is the most abundant crayfish species. But that apparently broad distribution within the Mill Creek system does not imply security, as a single catastrophic event could result in the loss of thousands of individuals from Mill Creek or its larger tributaries. It remains an integral and vibrant part of the ecology of the Mill Creek watershed.

This service area was selected in order to protect the habitat of the Nashville Crayfish. Although this region of the state has relatively low prevalence of hydric soils, with only %1.25 of all soils categorized as hydric, the 8-digit HUC is an appropriate planning scale in urban areas such as this. The relative rate of impact acres in this service area is somewhat high, given the amount of urbanization. Planning on this scale will allow the Program to devote more watershed planning efforts to service areas such as this one a greater need for planning efforts. 6 advance credits are being requested in the service area due to its urban area, size and the amount of historic impact.

The service area is contained solely within the Interior Plateau ecoregion, a diverse ecoregion extending from southern Indiana and Ohio to northern Alabama. Rock types are distinctly different from the coastal plain sands of western Tennessee ecoregions, and elevations are lower than the Appalachian ecoregions to the east. Mississippian to Ordovician-age limestone, chert, sandstone, siltstone and shale compose the landforms of open hills, irregular plains, and tablelands. The natural vegetation is primarily oak-hickory forest, with some areas of bluestem prairie and cedar glades. The region has the most diverse fish fauna in Tennessee.

Level IV ecoregions include:

> The **Outer Nashville Basin** is a more heterogeneous region than the Inner Nashville Basin (71i), with more rolling and hilly topography and slightly higher elevations. The region encompasses most all of the outer areas of the generally non-cherty Ordovician limestone bedrock. The higher hills and knobs are capped by the more cherty Mississippian age formations, and some Devonian-age

Chattanooga shale, remnants of the Highland Rim. The region's limestone rocks and soils are high in phosphorus, and commercial phosphate is mined. Deciduous forest with pasture and cropland are the dominant land covers. Streams are low to moderate gradient, with productive, nutrient-rich waters, resulting in algae, rooted vegetation, and occasionally high densities of fish. The Nashville Basin as a whole has a distinctive fish fauna, notable for fish that avoid the region, as well as those that are present.

The **Inner Nashville Basin** is less hilly and lower than the Outer Nashville Basin (71h), outcrops of the Ordovician-age limestone are common, and the generally shallow soils are redder and lower in phosphorus than those of the outer basin. Streams are lower gradient than surrounding regions, often flowing over large expanses of limestone bedrock. The most characteristic hardwoods within the inner basin are a maple-oak-hickory-ash association. The limestone cedar glades of Tennessee, a unique mixed grassland/forest cedar glades vegetation type with many endemic species, are located primarily on the limestones of the Inner Nashville Basin. The more xeric, open characteristics and shallow soils of the cedar glades also result in a distinct distribution of amphibian and reptile species. Urban, suburban, and industrial land use in the region is increasing.

B. Threats and Historic Resource Loss

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 0.4 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 27)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in high portions of the floodplain including ridges and natural levees that are only temporarily flooded, isolated depressions without outlets in upland landscapes that may pond water well into the growing season and have saturated soils for much of the year, groundwater discharge areas on or at the base of a slope that results in semi-permanent to permanent saturation, and meandering drainages characterized by temporary flooding and saturated soils found in upland landscapes in association with headwater areas.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. Current Resource Conditions

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the watershed resulted in placing portions of Mill Creek and thirteen tributaries on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters (including some reaches on Mill Creek) **(Figure 28)**. The most common reasons for classification are siltation, nutrient loading, Escherichia coli, and flow and habitat alterations. The sources of these are largely from MS4 discharges, collection system failures, and development in the watershed.

D. Aquatic Resource Goals and Objectives

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions, and headwater resources;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to 5 acres of wetlands, enhance 5 acres of existing wetlands and create/ enhance 2 acres of upland buffer within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors

identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.

- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed

2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available

3.) Preservation is determined by the district engineer to be appropriate and practicable

4.) The resources are under threat of destruction or adverse modifications

5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods

for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of

individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

9. Holston / French Broad Rivers Service Area

A. Geographic Service Area

The service area is delineated by the HUC 6 watershed that includes the French Broad River and Holston River sub-basins **(Figure 29)**. The watershed is approximately 8,897 square miles in the northeast portion of Tennessee, with parts of the watershed in Virginia and North Carolina **(Table 14)**. Approximately 4,426 square miles of the watershed are located within Tennessee.

This service area was selected because this is the 6-digit HUC. This region of the state has relatively low prevalence of hydric soils, with only %2.07 of all soils categorized as hydric. The relative rate of impact acres in this service area is still very low, and having some larger service areas with relatively low rates of impacts will allow the Program to devote watershed planning efforts to those service areas with the greatest needs and the greatest amounts of impacts. 10 advance credits are being requested in the service area due to its size and the amount of historic impact.

The Tennessee portion of the North Fork Holston River Watershed is approximately 18 square miles and includes parts of includes portions of Hawkins and Sullivan Counties. A part of the Tennessee River drainage basin, the watershed has 46 stream miles in Tennessee. Ten rare plant and animal species have been documented in the watershed, including three rare fish species, four rare mussel species, and one rare snail species.

The Tennessee portion of the South Fork Holston River Watershed is approximately 551 square miles and includes parts of Carter, Johnson, and Sullivan Counties. A part of the Tennessee River drainage basin, the watershed has 542 stream miles and 11,977 lake acres. Eighty rare plant and animal species have been documented in the watershed, including four rare fish species, three rare mussel species and two rare snail species.

The South Fork Holston River watershed consists of lowlands, rolling valleys, and slopes and hilly areas that are dominated by shale materials. The well-drained soils of the watershed are often slightly acid to neutral. The low-lying region contains roughly parallel ridges and valleys in a variety of geologic materials. Springs and caves are relatively numerous.

The Tennessee portion of Watauga River Watershed includes parts of Carter, Johnson, Sullivan, Unicoi, and Washington Counties. The Watauga River Watershed includes cool, clear streams with high gradient and rugged terrain. It contains one of the richest centers of biodiversity in the eastern U.S. Springs and caves are relatively numerous in the Southern Limestone/Dolomite Valleys and Low Rolling Hills. The watershed has great aquatic habitat diversity and supports a diverse fish fauna.

The Holston River Watershed is approximately 999 square miles and includes parts of nine Tennessee counties. A part of the Tennessee River drainage basin, the watershed has 1,175.6 stream miles and 6,499 lake acres. Fifty-six rare plant and animal species have been documented in the watershed, including eight rare fish species, eleven rare mussel species, and one rare snail species. A portion of one stream in the Holston River Watershed is listed in the National Rivers Inventory as having one or more outstanding natural or cultural values.

The Holston River is a major river system of southwestern Virginia and East Tennessee. The three major forks of the Holston (its North, Middle, and South Forks) rise in southwestern Virginia and have their confluence near Kingsport, TN. From there the river flows roughly southwestward until it reaches its confluence with the French Broad River just east of downtown Knoxville, TN. This confluence is considered to be the headwaters of the Tennessee River.

The Upper French Broad River Watershed is approximately 1,859 square miles (215 mi2 in Tennessee) and is located in parts of Cocke and Greene Counties. A part of the Tennessee River drainage basin, the watershed has 380.0 stream miles. Forty-six rare plant and animal species have been documented in the watershed, including two rare fish species.

The Pigeon River Watershed is approximately 704 square miles (153 mi2 in Tennessee) and is located predominantly in one county (Cocke). A part of the Tennessee River drainage basin, the watershed has 310.8 stream miles. Eighteen rare plant and animal species have been documented in the watershed, including two rare fish species.

The Lower French Broad River Watershed is approximately 796 square miles and includes parts of Blount, Cocke, Jefferson, Knox, and Sevier Counties. A part of the Tennessee River drainage basin, the watershed has 1,205.6 stream miles and 30,400 lake acres. One hundred thirty-one rare plant and animal species have been documented in the watershed, including nine rare fish species, ten rare mussel species, and one rare crustacean species.

The Nolichucky River Watershed is approximately 1,128 square miles and includes parts of Cocke, Greene, Hamblen, Hawkins, Jefferson, Unicoi, and Washington Counties. A part of the Tennessee River drainage basin, the watershed has 2,854 stream miles and 383 lake acres. One hundred twenty-eight rare plant and animal species have been documented in the watershed, including seven rare fish species and ten rare mussel species.

The Holston / French Broad Rivers Service Area exists in the Blue Ridge Mountain and Great Valley of East Tennessee ecoregions.

The Blue Ridge Mountains of Tennessee are characterized by forested slopes, high gradient, cool, clear streams, and rugged terrain on a mix of igneous, metamorphic, and sedimentary geology. Annual precipitation of nearly 80 inches can occur on the well-exposed high peaks of the Great Smoky Mountains that reach over 6000 feet. The southern Blue Ridge is one of the richest centers of biodiversity in the eastern U.S. It is the most floristically diverse ecoregion of the state, and includes Appalachian oak forests, northern hardwoods, and Southeastern spruce-fir forests. Shrub, grass, and heath balds, hemlock, cove hardwoods, and oak-pine communities are also significant.

Also known as the Great Valley of East Tennessee, this is a relatively low-lying region between the Blue Ridge Mountains to the east and the Cumberland Plateau on the west. As a result of extreme folding and faulting events, the roughly parallel ridges and valleys come in a variety of widths, heights, and geologic materials, including limestone, dolomite, shale, siltstone, sandstone, chert, mudstone, and marble. Springs and caves are relatively numerous. Present-day forests cover about 50% of the region. The ecoregion has great aquatic habitat diversity in Tennessee and supports a diverse fish fauna rivaled only by that of the Highland Rim.

Level IV ecoregions include:

> The **Southern Igneous Ridges and Mountains** occur in Tennessee's northeastern Blue Ridge near the North Carolina border, primarily on Precambrian-age igneous and high-grade metamorphic rocks. The typical crystalline rock types include granite, gneiss, schist, and metavolcanics, covered by well-drained, acidic brown loamy soils. Elevations of this rough, dissected region range from 2000-6200 feet, with Roan Mountain reaching 6286 feet. Although there are a few small areas of pasture and apple orchards, the region is mostly forested; Appalachian oak and northern hardwoods forests predominate.
>
> The **Southern Sedimentary Ridges** in Tennessee include some of the westernmost foothill areas of the Blue Ridge Mountains ecoregion, such as the Bean, Starr, Chilhowee, English, Stone, Bald and Iron Mountain areas. Slopes are steep, and elevations are generally 1000-4500 feet. The rocks are primarily Cambrian-age sedimentary (shale, sandstone, siltstone, quartzite, conglomerate), although some lower stream reaches occur on limestone. Soils are predominantly friable loams and fine sandy loams with variable amounts of sandstone rock fragments, and support mostly mixed oak and oak-pine forests.
>
> **Limestone Valleys and Coves** are small but distinct lowland areas of the Blue Ridge, with elevations mostly between 1500 and 2500 feet. About 450 million years ago, older Blue Ridge rocks to the east were forced up and over younger rocks to the west. In places, the Precambrian rocks have eroded through to Cambrian or Ordovician-age limestones, as seen especially in isolated, deep cove areas that are surrounded by steep mountains. The main areas of limestone include the Mountain City lowland area and Shady Valley in the north; and Wear Cove, Tuckaleechee Cove, and Cades Cove of the Great Smoky Mountains in the south. Hay and pasture, with some tobacco patches on small farms, are typical land uses.
>
> The **Southern Metasedimentary Mountains** are steep, dissected, biologicallydiverse mountains that include Clingmans Dome (6643 feet), the highest point in Tennessee. The Precambrian-age metamorphic and sedimentary geologic materials are generally older and more metamorphosed than the Southern Sedimentary Ridges (66e) to the west and north. The Appalachian oak forests and, at higher elevations, the northern hardwoods forests include a variety of oaks and pines, as well as silverbell, hemlock, yellow poplar,

basswood, buckeye, yellow birch, and beech. Spruce-fir forests, found generally above 5500 feet, have been affected greatly over the past twenty-five years by the balsam woolly aphid. The Copper Basin, in the southeast corner of Tennessee, was the site of copper mining and smelting from the 1850's to 1987, and once left more than fifty square miles of eroded bare earth.

The **Southern Dissected Ridges and Knobs** contain more crenulated, broken, or hummocky ridges, compared to the smoother, more sharply pointed sandstone ridges of Ecoregion 67h. Although shale is common, there is a mixture and interbedding of geologic materials. The ridges on the east side of Tennessee's Ridge and Valley tend to be associated with the Ordovician-age Sevier shale, Athens shale, and Holston and Lenoir limestones. These can include calcareous shale, limestone, siltstone, sandstone, and conglomerate. In the central and western part of Ecoregion 67, the shale ridges are associated with the Cambrian-age Rome Formation: shale and siltstone with beds of sandstone. Chestnut oak forests and pine forests are typical for the higher elevations of the ridges, with areas of white oak, mixed mesophytic forest, and tulip poplar on the lower

The **Southern Limestone/Dolomite Valleys and Low Rolling Hills** form a heterogeneous region composed predominantly of limestone and cherty dolomite. Landforms are mostly low rolling ridges and valleys, and the soils vary in their productivity. Landcover includes intensive agriculture, urban and industrial, or areas of thick forest. White oak forests, bottomland oak forests, and sycamore-ash-elm riparian forests are the common forest types, and grassland barrens intermixed with cedar-pine glades also occur here.

The **Southern Shale Valleys** consist of lowlands, rolling valleys, and slopes and hilly areas that are dominated by shale materials. The northern areas are associated with Ordovician-age calcareous shale, and the well-drained soils are often slightly acid to neutral. In the south, the shale valleys are associated with Cambrian-age shales that contain some narrow bands of limestone, but the soils tend to be strongly acid. Small farms and rural residences subdivide the land. The steeper slopes are used for pasture or have reverted to brush and forested land, while small fields of hay, corn, tobacco, and garden crops are grown on the foot slopes and bottom land.

The **Southern Sandstone Ridges** ecoregion encompasses the major sandstone ridges, but these ridges also have areas of shale and siltstone. The steep, forested ridges have narrow crests, and the soils are typically stony, sandy, and of low fertility. The chemistry of streams flowing down the ridges can vary greatly depending on the geologic material. The higher elevation ridges are in the north, including Wallen Ridge, Powell Mountain, Clinch Mountain and Bays Mountain. White Oak Mountain in the south has some sandstone on the west side, but abundant shale and limestone as well. Grindstone Mountain, capped by the Gizzard Group sandstone, is the only remnant of Pennsylvanian age strata in the Ridge and Valley of Tennessee.

B. Threats and Historic Resource Loss

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 14 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 30)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in high portions of the floodplain including ridges and natural levees that are only temporarily flooded, isolated depressions without outlets in upland landscapes that may pond water well into the growing season and have saturated soils for much of the year, groundwater discharge areas on or at the base of a slope that results in semi-permanent to permanent saturation, and meandering drainages characterized by temporary flooding and saturated soils found in upland landscapes in association with headwater areas.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. Current Resource Conditions

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the North Fork Holston River watershed resulted in placing a 6.1 mile reach of the mainstem of the North Fork of the Holston River on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters **(Figure 31)**. The reach was classified due to high mercury levels, likely from industrial point sources originating upstream in Virginia.

TDEC's assessment of the chemical, physical, and biological parameters of the South Fork of the Holston watershed resulted in placing portions of thirty-eight streams and two lakes on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are nutrient loading, habitat loss, and Escherichia coli. The sources of these are largely from agricultural operations and municipal discharges.

TDEC's assessment of the chemical, physical, and biological parameters of the Watauga watershed resulted in placing portions of nineteen streams and two lakes on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are nutrient loading, habitat loss, and Escherichia coli. The sources of these are largely from agricultural operations and municipal discharges.

TDEC's assessment of the chemical, physical, and biological parameters of the Holston River watershed resulted in placing portions of thirty-two streams and three lakes on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are nutrient loading, habitat loss, and Escherichia coli. The sources of these are largely from agricultural operations and municipal discharges.

TDEC's assessment of the chemical, physical, and biological parameters of the Upper French Broad River watershed resulted in placing portions of thirteen streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters (this includes listed waters in the Pigeon River watershed, including the mainstem of the Pigeon River). The most common reasons for classification are pH, habitat loss, and Escherichia coli. The sources of these are largely from agricultural operations, unknown sources (pH), and point source discharges.

TDEC's water quality assessmentfor the Lower French Broad watershed is included in the Upper French Broad watershed.

TDEC's assessment of the chemical, physical, and biological parameters of the Lower French Broad watershed resulted in placing portions of twenty-six streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are pH, habitat loss, and Escherichia coli. The sources of these are largely from agricultural operations, unknown sources (pH), and point source discharges.

TDEC's assessment of the chemical, physical, and biological parameters of the Nolichucky River watershed resulted in placing portions of seventy-nine streams and one lake on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are siltation, habitat loss, and Escherichia coli. The sources of these are largely from agricultural operations.

D. Aquatic Resource Goals and Objectives

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions, seasonally flooded lake fringes, and headwater resources;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to create/ restore 10 acres of wetlands, and enhance 5 acres of existing wetlands within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized. Where suitable mitigation sites cannot be found within the 8-digit HUC, suitable sites within the same service area and the same ecoregion will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,

- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed
2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available
3.) Preservation is determined by the district engineer to be appropriate and practicable
4.) The resources are under threat of destruction or adverse modifications
5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.

- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. <u>Periodic Evaluation and Reporting</u>

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

10. Emory River / Watts Barr Lake Service Area

A. Geographic Service Area

The Service Area includes three eight-digit HUC's; the Watts Barr Reservoir, Little Tennessee River and Emory River watersheds **(Figure 32)**. The service area includes 3,011 square miles of the watershed within Tennessee.

This service area was selected because this is part of the 6-digit HUC. This region of the state has relatively low prevalence of hydric soils, with only %1.48 of all soils categorized as hydric. The relative rate of impact acres in this service area is still very low, and having some larger service areas with relatively low rates of impacts will allow the Program to devote watershed planning efforts to those service areas with the greatest needs and the greatest amounts of impacts. 10 advance credits are being requested in the service area due to its size and the amount of historic impact.

The Watts Bar/Fort Loudoun Watershed is approximately 1355 square miles. The Watts Bar portion is approximately 684 square miles and includes parts of Bledsoe, Cumberland, Loudon, Meigs, McMinn, Monroe, Rhea, and Roane Counties **(Table 15)**. There are 875 stream miles (1,842 stream miles in the entire HUC 8 watershed) and 15,600 lake acres recorded in the Watts Bar Watershed. Watts Bar Reservoir was created when the Tennessee River was dammed in 1942. Many resorts are located on Watts Bar Lake, which is known for its supply of black bass and crappie. Springs and caves are relatively numerous in the area. There is great habitat diversity supporting the diverse fish fauna. Many waterfalls occur in the watershed where softer rocks erode under the sandstone cap.

The Tennessee portion of the Little Tennessee River Watershed is approximately 783 square miles and includes parts of Blount, Loudon, and Monroe Counties. A part of the Tennessee River drainage basin, the watershed has 1,082 stream miles and 18,878 lake acres in Tennessee. One hundred thirty rare plant and animal species have been documented in the watershed, including twelve rare fish species, two rare mussel species, and nine rare snail species.

The Emory River Watershed is approximately 872 square miles and drains to the Clinch River embayment of Watts bar Reservoir in and includes parts of Bledsoe, Cumberland, Fentress, Morgan, and Roane counties. The Emory River Watershed includes cool, clear streams with high gradients. Parts of Clear Creek, Daddy's Creek, the Emory River, and the Obed River are part of the National Wild and Scenic River System.

The service area exists in the Blue Ridge Mountain, Central Appalachian, Ridge and Valley and Southwestern Appalachian ecoregions.

The Blue Ridge Mountains of Tennessee are characterized by forested slopes, high gradient, cool, clear streams, and rugged terrain on a mix of igneous, metamorphic, and sedimentary geology. Annual precipitation of nearly 80 inches can occur on the well-exposed high peaks of the Great Smoky Mountains that reach over 6000 feet. The southern Blue Ridge is one of the richest centers of biodiversity in the eastern U.S. It is the most floristically diverse ecoregion of the state, and includes Appalachian oak forests, northern hardwoods, and Southeastern spruce-fir forests. Shrub, grass, and heath balds, hemlock, cove hardwoods, and oak-pine communities are also significant.

Also known as the Great Valley of East Tennessee, the Ridge and Valley is a relatively low-lying region between the Blue Ridge Mountains to the east and the Cumberland Plateau on the west. As a result of extreme folding and faulting events, the roughly parallel ridges and valleys come in a variety of widths, heights, and geologic materials, including limestone, dolomite, shale, siltstone, sandstone, chert, mudstone, and marble. Springs and caves are relatively numerous. Present-day forests cover about 50% of the region. The ecoregion has great aquatic habitat diversity in Tennessee and supports a diverse fish fauna rivaled only by that of the Highland Rim.

Stretching from Kentucky to Alabama, the Southwestern Appalachians mountains contain a mosaic of forest and woodland with some cropland and pasture. The eastern boundary of the ecoregion in Tennessee, along the more abrupt escarpment where it meets the Ridge and Valley (67), is relatively smooth and only slightly notched by small eastward flowing stream drainages. The western boundary, next to the Interior Plateau’s Eastern Highland Rim (71g), is more crenulated with a rougher escarpment that is more deeply incised. The mixed mesophytic forest is restricted mostly to the deeper ravines and escarpment slopes, and the upland forests are dominated by mixed oaks with shortleaf pine.

The Central Appalachian ecoregion, stretching from northern Tennessee to central Pennsylvania, is primarily a high, dissected, rugged plateau composed of sandstone, shale, conglomerate, and coal. The rugged terrain, cool climate, and infertile soils limit agriculture, resulting in a mostly forested landcover. The high hills and low mountains are covered by a mixed mesophytic forest with areas of Appalachian oak and northern hardwoods forest. Bituminous coal mines are common, and have caused the siltation and acidification of streams.
The Central Appalachian ecoregion, stretching from northern Tennessee to central Pennsylvania, is primarily a high, dissected, rugged plateau composed of sandstone, shale, conglomerate, and coal. The rugged terrain, cool climate, and infertile soils limit agriculture, resulting in a mostly forested landcover. The high hills and low mountains are covered by a mixed mesophytic forest with areas of Appalachian oak and northern hardwoods forest. Bituminous coal mines are common, and have caused the siltation and acidification of streams.

Level IV ecoregions include:

> The **Southern Sedimentary Ridges** in Tennessee include some of the westernmost foothill areas of the Blue Ridge Mountains ecoregion, such as the Bean, Starr, Chilhowee, English, Stone, Bald and Iron Mountain areas. Slopes are steep, and elevations are generally 1000-4500 feet. The rocks are primarily Cambrian-age sedimentary (shale, sandstone, siltstone, quartzite, conglomerate), although some lower stream reaches occur on limestone. Soils

are predominantly friable loams and fine sandy loams with variable amounts of sandstone rock fragments, and support mostly mixed oak and oak-pine forests.

Limestone Valleys and Coves are small but distinct lowland areas of the Blue Ridge, with elevations mostly between 1500 and 2500 feet. About 450 million years ago, older Blue Ridge rocks to the east were forced up and over younger rocks to the west. In places, the Precambrian rocks have eroded through to Cambrian or Ordovician-age limestones, as seen especially in isolated, deep cove areas that are surrounded by steep mountains. The main areas of limestone include the Mountain City lowland area and Shady Valley in the north; and Wear Cove, Tuckaleechee Cove, and Cades Cove of the Great Smoky Mountains in the south. Hay and pasture, with some tobacco patches on small farms, are typical land uses.

The **Southern Metasedimentary Mountains** are steep, dissected, biologicallydiverse mountains that include Clingmans Dome (6643 feet), the highest point in Tennessee. The Precambrian-age metamorphic and sedimentary geologic materials are generally older and more metamorphosed than the Southern Sedimentary Ridges (66e) to the west and north. The Appalachian oak forests and, at higher elevations, the northern hardwoods forests include a variety of oaks and pines, as well as silverbell, hemlock, yellow poplar, basswood, buckeye, yellow birch, and beech. Spruce-fir forests, found generally above 5500 feet, have been affected greatly over the past twenty-five years by the balsam woolly aphid. The Copper Basin, in the southeast corner of Tennessee, was the site of copper mining and smelting from the 1850's to 1987, and once left more than fifty square miles of eroded bare earth.

The **Southern Dissected Ridges and Knobs** contain more crenulated, broken, or hummocky ridges, compared to the smoother, more sharply pointed sandstone ridges of Ecoregion 67h. Although shale is common, there is a mixture and interbedding of geologic materials. The ridges on the east side of Tennessee's Ridge and Valley tend to be associated with the Ordovician-age Sevier shale, Athens shale, and Holston and Lenoir limestones. These can include calcareous shale, limestone, siltstone, sandstone, and conglomerate. In the central and western part of Ecoregion 67, the shale ridges are associated with the Cambrian-age Rome Formation: shale and siltstone with beds of sandstone. Chestnut oak forests and pine forests are typical for the higher elevations of the ridges, with areas of white oak, mixed mesophytic forest, and tulip poplar on the lower

The **Southern Limestone/Dolomite Valleys and Low Rolling Hills** form a heterogeneous region composed predominantly of limestone and cherty dolomite. Landforms are mostly low rolling ridges and valleys, and the soils vary in their productivity. Landcover includes intensive agriculture, urban and industrial, or areas of thick forest. White oak forests, bottomland oak forests, and sycamore-ash-elm riparian forests are the common forest types, and grassland barrens intermixed with cedar-pine glades also occur here.

The **Southern Shale Valleys** consist of lowlands, rolling valleys, and slopes and hilly areas that are dominated by shale materials. The northern areas are associated with Ordovician-age calcareous shale, and the well-drained soils are often slightly acid to neutral. In the south, the shale valleys are associated with Cambrian-age shales that contain some narrow bands of limestone, but the soils tend to be strongly acid. Small farms and rural residences subdivide the land. The steeper slopes are used for pasture or have reverted to brush and forested land, while small fields of hay, corn, tobacco, and garden crops are grown on the foot slopes and bottom land.

The **Southern Sandstone Ridges** ecoregion encompasses the major sandstone ridges, but these ridges also have areas of shale and siltstone. The steep, forested ridges have narrow crests, and the soils are typically stony, sandy, and of low fertility. The chemistry of streams flowing down the ridges can vary greatly depending on the geologic material. The higher elevation ridges are in the north, including Wallen Ridge, Powell Mountain, Clinch Mountain and Bays Mountain. White Oak Mountain in the south has some sandstone on the west side, but abundant shale and limestone as well. Grindstone Mountain, capped by the Gizzard Group sandstone, is the only remnant of Pennsylvanian age strata in the Ridge and Valley of Tennessee.

The **Cumberland Plateau's** tablelands and open low mountains are about 1000 feet higher than the Eastern Highland Rim (71g) to the west, and receive slightly more precipitation with cooler annual temperatures than the surrounding lower-elevation ecoregions. The plateau surface is less dissected with lower relief compared to the Cumberland Mountains (69d) or the Plateau Escarpment (68c). Elevations are generally 1200-2000 feet, with the Crab Orchard Mountains reaching over 3000 feet. Pennsylvanian age conglomerate, sandstone, siltstone, and shale is covered by mostly well-drained, acid soils of low fertility. The region is forested, with some agriculture and coal mining activities.

The **Plateau Escarpment** is characterized by steep, forested slopes and high velocity, high gradient streams. Local relief is often 1000 feet or more. The geologic strata include Mississippian-age limestone, sandstone, shale, and siltstone, and Pennsylvanian-age shale, siltstone, sandstone, and conglomerate. Streams have cut down into the limestone, but the gorge talus slopes are composed of colluvium with huge angular, slabby blocks of sandstone. Vegetation community types in the ravines and gorges include mixed oak and chestnut oak on the upper slopes, more mesic forests on the middle and lower slopes (beech-tulip poplar, sugar maple-basswood-ash-buckeye), with hemlock along rocky streamsides and river birch along floodplain terraces.

The **Cumberland Mountains**, in contrast to the sandstone-dominated Cumberland Plateau (68a) to the west and southwest, are more highly dissected, with narrow-crested steep slopes, and younger Pennsylvanian-age shales, sandstones, siltstones, and coal. Narrow, winding valleys separate the mountain ridges, and relief is often 2000 feet. Cross Mountain, west of Lake City, reaches 3534 feet in elevation. Soils are generally well-drained, loamy, and acidic, with low fertility. The natural vegetation is a mixed mesophytic forest, although composition and abundance vary greatly depending on aspect, slope position, and degree of shading from adjacent land masses. Large tracts of land are owned by lumber and coal companies, and there are many areas of stripmining.

B. Threats and Historic Resource Loss

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 17.53 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 33)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in high portions of the floodplain including ridges and natural levees that are only temporarily flooded, isolated depressions without outlets in upland landscapes that may pond water well into the growing season and have saturated soils for much of the year, groundwater discharge areas on or at the base of a slope that results in semi-permanent to permanent saturation, and meandering drainages characterized by temporary flooding and saturated soils found in upland landscapes in association with headwater areas.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. Current Resource Conditions

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the Watts Barr/ Fort Loudon watershed resulted in placing portions of sixty-three streams and two lakes on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters (this includes the Watts Barr and Fort Loudon reservoirs) **(Figure 34)**. The most common reasons for classification are siltation, habitat loss, and Escherichia coli. The sources of these are largely from municipal discharges, and agricultural operations.

TDEC's assessment of the chemical, physical, and biological parameters of the Little Tennessee River watershed resulted in placing portions of fourteen streams and one lake on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters (this includes the Tellico Lake Reservoir). The most common reasons for stream classification are siltation, habitat loss, and Escherichia coli. The sources of these are largely from agricultural operations. The Tellico Reservoir is listed due to PCB's and mercury from contaminated sediments and atmospheric deposition.

TDEC's assessment of the chemical, physical, and biological parameters of the emory River watershed resulted in placing portions of fourteen streams and one lake on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are pH, habitat loss, and toxicity. The sources of these are largely from abandoned mines, and municipal discharges. The Watts Barr Reservoir is listed due to PCB's and chlordane from industrial point sources and contaminated sediments.

D. Aquatic Resource Goals and Objectives

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions, seasonally flooded lake fringes, and headwater resources;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 10 acres of wetlands, and enhance 5 acres of existing wetlands within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized. Where suitable mitigation sites cannot be found within the 8-digit HUC, suitable sites within the same service area and the same ecoregion will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,

- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed
2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available
3.) Preservation is determined by the district engineer to be appropriate and practicable
4.) The resources are under threat of destruction or adverse modifications
5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work

closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the

acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

11. Lower Clinch River Service Area

A. <u>Geographic Service Area</u>

The Service Area will be the Lower Clinch River watershed eight-digit HUC **(Figure 35)**.

The Lower Clinch River Watershed is approximately 633 square miles and includes parts of Anderson, Campbell, Grainger, Knox, Loudon, Morgan, Roane, and Union Counties **(Table 16)**. A part of the Tennessee River drainage basin, the watershed has 802 stream miles and 6,690 lake acres. Eighty-nine rare plant and animal species have been documented in the watershed, to include seven rare fish species, fourteen rare mussel species, one rare snail species, and two rare reptile species. A portion of the Lower Clinch River has been designated as a State Scenic River.

This service area was selected because this 8-digit HUC is within the greater Knox County metropolitan area. Although this region of the state has relatively low prevalence of hydric soils, with only %1.84 of all soils categorized as hydric, the 8-digit HUC is an appropriate planning scale in urban areas such as this. The relative rate of impact acres in this service area is somewhat high, given the amount of urbanization. Planning on the 8-digit HUC scale will allow the Program to devote more watershed planning efforts to service areas such as this one a greater need for planning efforts. 10 advance credits are being requested in the service area due to its urban area, size and the amount of historic impact.

The service area exists in the Central Appalachian and Ridge and Valley ecoregions.

Also known as the Great Valley of East Tennessee, the Ridge and Valley is a relatively low-lying region between the Blue Ridge Mountains to the east and the Cumberland Plateau on the west. As a result of extreme folding and faulting events, the roughly parallel ridges and valleys come in a variety of widths, heights, and geologic materials, including limestone, dolomite, shale, siltstone, sandstone, chert, mudstone, and marble. Springs and caves are relatively numerous. Present-day forests cover about 50% of the region. The ecoregion has great aquatic habitat diversity in Tennessee and supports a diverse fish fauna rivaled only by that of the Highland Rim.

The Central Appalachian ecoregion, stretching from northern Tennessee to central Pennsylvania, is primarily a high, dissected, rugged plateau composed of sandstone, shale, conglomerate, and coal. The rugged terrain, cool climate, and infertile soils limit agriculture, resulting in a mostly forested landcover. The high hills and low mountains are covered by a mixed mesophytic forest with areas of Appalachian oak and northern hardwoods forest. Bituminous coal mines are common, and have caused the siltation and acidification of streams.
The Central Appalachian ecoregion, stretching from northern Tennessee to central Pennsylvania, is primarily a high, dissected, rugged plateau composed of sandstone, shale, conglomerate, and coal. The rugged terrain, cool climate, and infertile soils limit agriculture, resulting in a mostly forested landcover. The high hills and low mountains are covered by a

mixed mesophytic forest with areas of Appalachian oak and northern hardwoods forest. Bituminous coal mines are common, and have caused the siltation and acidification of streams.

Level IV ecoregions include:

> The **Southern Dissected Ridges and Knobs** contain more crenulated, broken, or hummocky ridges, compared to the smoother, more sharply pointed sandstone ridges of Ecoregion 67h. Although shale is common, there is a mixture and interbedding of geologic materials. The ridges on the east side of Tennessee's Ridge and Valley tend to be associated with the Ordovician-age Sevier shale, Athens shale, and Holston and Lenoir limestones. These can include calcareous shale, limestone, siltstone, sandstone, and conglomerate. In the central and western part of Ecoregion 67, the shale ridges are associated with the Cambrian-age Rome Formation: shale and siltstone with beds of sandstone. Chestnut oak forests and pine forests are typical for the higher elevations of the ridges, with areas of white oak, mixed mesophytic forest, and tulip poplar on the lower
>
> The **Southern Limestone/Dolomite Valleys and Low Rolling Hills** form a heterogeneous region composed predominantly of limestone and cherty dolomite. Landforms are mostly low rolling ridges and valleys, and the soils vary in their productivity. Landcover includes intensive agriculture, urban and industrial, or areas of thick forest. White oak forests, bottomland oak forests, and sycamore-ash-elm riparian forests are the common forest types, and grassland barrens intermixed with cedar-pine glades also occur here.
>
> The **Cumberland Mountains**, in contrast to the sandstone-dominated Cumberland Plateau (68a) to the west and southwest, are more highly dissected, with narrow-crested steep slopes, and younger Pennsylvanian-age shales, sandstones, siltstones, and coal. Narrow, winding valleys separate the mountain ridges, and relief is often 2000 feet. Cross Mountain, west of Lake City, reaches 3534 feet in elevation. Soils are generally well-drained, loamy, and acidic, with low fertility. The natural vegetation is a mixed mesophytic forest, although composition and abundance vary greatly depending on aspect, slope position, and degree of shading from adjacent land masses. Large tracts of land are owned by lumber and coal companies, and there are many areas of stripmining.

B. <u>Threats and Historic Resource Loss</u>

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 10.32 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 36)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in high portions of the floodplain including ridges and natural levees that are only temporarily flooded, isolated depressions without outlets in upland landscapes that may pond water well into the growing season and have saturated soils for much of the year, groundwater discharge areas on or at the base of a slope that results in semi-permanent to permanent saturation, and meandering drainages characterized by temporary flooding and saturated soils found in upland landscapes in association with headwater areas.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. <u>Current Resource Conditions</u>

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the Lower Clinch River watershed resulted in placing portions of twenty-six streams and two lakes on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters (this includes portions of the mainstem of the Lower Clinch river) **(Figure 37)**. The most common reasons for classification are siltation, habitat loss, and Escherichia coli. The sources of these are largely from municipal discharges, and agricultural operations.

D. <u>Aquatic Resource Goals and Objectives</u>

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions, seasonally flooded lake fringes, seasonally inundated floodplain flats, and headwater resources;
2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;
3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;
4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 5 acres of wetlands and enhance 5 acres of existing wetlands within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized. Where suitable mitigation sites cannot be found within the 8-digit HUC, suitable sites within the same service area and the same ecoregion will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water

source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,

- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. <u>Explanation of Preservation Goals</u>

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed

2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available

3.) Preservation is determined by the district engineer to be appropriate and practicable

4.) The resources are under threat of destruction or adverse modifications

5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field

observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

12) Upper Tennessee River Service Area

A. Geographic Service Area

The Upper Tennessee River Service Area is made up of the Upper Clinch River and Powell River eight-digit HUC's **(Figure 38)**.

This service area was selected because these 8-digit HUCs are in an area with traditionally low rates of development and few historic impacts. This region of the state has relatively low prevalence of hydric soils, with only %1.34 of all soils categorized as hydric. The relative rate of impact acres in this service area is very low. Planning on the multiple 8-digit HUC scale in areas with few impacts such as this will allow the Program to devote more watershed planning efforts to service areas with a greater need for planning efforts. 5 advance credits are being requested in the service area due to its urban area, size and the amount of historic impact.

The Upper Clinch River Watershed is approximately 1,944 square miles (709 mi2 in Tennessee) and includes parts of Anderson, Campbell, Claiborne, Hancock, Grainger, Hawkins, and Union Counties **(Table 17)**. A part of the Tennessee River drainage basin, the watershed has 757.1 stream miles and 34,681 lake acres in Tennessee. Eighty-one rare plant and animal species have been documented in the watershed, including fourteen rare fish species, twenty rare mussel species, and two rare snail species. A portion of one stream in the Upper Clinch River Watershed is listed in the National Rivers Inventory as having one or more outstanding natural or cultural values.

The Powell River Watershed is approximately 954 square miles (402 mi2 in Tennessee) and includes parts of Campbell, Claiborne, Hancock, and Union Counties. A part of the Tennessee River drainage basin, the watershed has 429 stream miles Tennessee. Seventy-four rare plant and animal species have been documented in the watershed, including six rare fish species, eighteen rare mussel species, two rare amphibian species, one rare snail species, and one rare crustacean species. A portion of one stream in the Powell River Watershed is listed in the National Rivers Inventory as having one or more outstanding natural or cultural values.

The service area exists in the Central Appalachian and Ridge and Valley ecoregions.

Also known as the Great Valley of East Tennessee, the Ridge and Valley is a relatively low-lying region between the Blue Ridge Mountains to the east and the Cumberland Plateau on the west. As a result of extreme folding and faulting events, the roughly parallel ridges and valleys come in a variety of widths, heights, and geologic materials, including limestone, dolomite, shale, siltstone, sandstone, chert, mudstone, and marble. Springs and caves are relatively numerous. Present-day forests cover about 50% of the region. The ecoregion has great aquatic habitat diversity in Tennessee and supports a diverse fish fauna rivaled only by that of the Highland Rim.

The Central Appalachian ecoregion, stretching from northern Tennessee to central Pennsylvania, is primarily a high, dissected, rugged plateau composed of sandstone, shale, conglomerate, and coal. The rugged terrain, cool climate, and infertile soils limit agriculture, resulting in a mostly forested landcover. The high hills and low mountains are covered by a mixed mesophytic forest with areas of Appalachian oak and northern hardwoods forest. Bituminous coal mines are common, and have caused the siltation and acidification of streams.

Level IV ecoregions include:

> The **Southern Dissected Ridges and Knobs** contain more crenulated, broken, or hummocky ridges, compared to the smoother, more sharply pointed sandstone ridges of Ecoregion 67h. Although shale is common, there is a mixture and interbedding of geologic materials. The ridges on the east side of Tennessee's Ridge and Valley tend to be associated with the Ordovician-age Sevier shale, Athens shale, and Holston and Lenoir limestones. These can include calcareous shale, limestone, siltstone, sandstone, and conglomerate. In the central and western part of Ecoregion 67, the shale ridges are associated with the Cambrian-age Rome Formation: shale and siltstone with beds of sandstone. Chestnut oak forests and pine forests are typical for the higher elevations of the ridges, with areas of white oak, mixed mesophytic forest, and tulip poplar on the lower
>
> The **Southern Limestone/Dolomite Valleys and Low Rolling Hills** form a heterogeneous region composed predominantly of limestone and cherty dolomite. Landforms are mostly low rolling ridges and valleys, and the soils vary in their productivity. Landcover includes intensive agriculture, urban and industrial, or areas of thick forest. White oak forests, bottomland oak forests, and sycamore-ash-elm riparian forests are the common forest types, and grassland barrens intermixed with cedar-pine glades also occur here.
>
> The **Southern Sandstone Ridges** ecoregion encompasses the major sandstone ridges, but these ridges also have areas of shale and siltstone. The steep, forested ridges have narrow crests, and the soils are typically stony, sandy, and of low fertility. The chemistry of streams flowing down the ridges can vary greatly depending on the geologic material. The higher elevation ridges are in the north, including Wallen Ridge, Powell Mountain, Clinch Mountain and Bays Mountain. White Oak Mountain in the south has some sandstone on the west side, but abundant shale and limestone as well. Grindstone Mountain, capped by the Gizzard Group sandstone, is the only remnant of Pennsylvanian age strata in the Ridge and Valley of Tennessee.
>
> The **Cumberland Mountains**, in contrast to the sandstone-dominated Cumberland Plateau (68a) to the west and southwest, are more highly dissected, with narrow-crested steep slopes, and younger Pennsylvanian-age shales, sandstones, siltstones, and coal. Narrow, winding valleys separate the mountain ridges, and relief is often 2000 feet. Cross Mountain, west of Lake City, reaches 3534 feet in elevation. Soils are generally well-drained, loamy, and acidic, with low fertility. The natural vegetation is a mixed mesophytic forest, although composition and abundance vary greatly depending on aspect, slope position,

and degree of shading from adjacent land masses. Large tracts of land are owned by lumber and coal companies, and there are many areas of stripmining.

B. Threats and Historic Resource Loss

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 1.34 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 39)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in high portions of the floodplain including ridges and natural levees that are only temporarily flooded, isolated depressions without outlets in upland landscapes that may pond water well into the growing season and have saturated soils for much of the year, groundwater discharge areas on or at the base of a slope that results in semi-permanent to permanent saturation, and meandering drainages characterized by temporary flooding and saturated soils found in upland landscapes in association with headwater areas.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. Current Resource Conditions

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the Upper Clinch River watershed resulted in placing portions of eight streams and one lake on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters (this includes the Norris Lake Reservoir) **(Figure 40)**. The most common reasons for stream classification are siltation, habitat loss, and Escherichia coli. The sources of these are largely from agricultural operations, and municipal discharges. The Norris Reservoir is listed due to PCB's and mercury from atmospheric deposition.

TDEC's assessment of the chemical, physical, and biological parameters of the Powell River watershed resulted in placing portions of ten streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for stream classification are nutrients, habitat loss, and Escherichia coli. The sources of these are largely from agricultural operations.

D. Aquatic Resource Goals and Objectives

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions, seasonally flooded lake fringes, and headwater resources;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 5 acres of wetlands, and enhance 5 acres of existing wetlands within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized. Where suitable mitigation sites cannot be found within the 8-digit HUC, suitable sites within the same service area and the same ecoregion will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or

protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed
2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available
3.) Preservation is determined by the district engineer to be appropriate and practicable
4.) The resources are under threat of destruction or adverse modifications
5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

13. Chickamauga / Nickajack Service Area

A. Geographic Service Area

The Nickajack/ Chickamauga Reservoirs Portion of the Tennessee portion of the Lower Tennessee River Watershed is approximately 1,189 square miles and includes parts of Bledsoe, Bradley, Hamilton, Loudon, McMinn, Meigs, Rhea, Roane, and Sequatchie Counties **(Figure 41)**. A part of the Tennessee River drainage basin, the watershed include 974 stream miles in the 1,199 square mile drainage basin **(Table 18)**. Over one hundred rare plant and animal species have been documented in the watershed, including six rare fish species, eight rare mussel species, one rare snail species, and one rare crustacean species.

This service area was selected because these 8-digit HUCs are in an area with traditionally low rates of development and few historic impacts. This region of the state has relatively low prevalence of hydric soils, with only %1.34 of all soils categorized as hydric. The relative rate of impact acres in this service area is very low. Planning on the multiple 8-digit HUC scale in areas with few impacts such as this will allow the Program to devote more watershed planning efforts to service areas with a greater need for planning efforts. 8 advance credits are being requested in the service area due to its urban area, size and the amount of historic impact.

The Chickamauga/ Nickajack watershed exists in the Ridge and valley and Southwest Appalachian ecoregions.

Also known as the Great Valley of East Tennessee, the Ridge and Valley ecoregion is a relatively low-lying region between the Blue Ridge Mountains to the east and the Cumberland Plateau on the west. As a result of extreme folding and faulting events, the roughly parallel ridges and valleys come in a variety of widths, heights, and geologic materials, including limestone, dolomite, shale, siltstone, sandstone, chert, mudstone, and marble. Springs and caves are relatively numerous. Present-day forests cover about 50% of the region. The ecoregion has great aquatic habitat diversity in Tennessee and supports a diverse fish fauna rivaled only by that of the Highland Rim.

Stretching from Kentucky to Alabama, the Southwest Appalachian Mountains contain a mosaic of forest and woodland with some cropland and pasture. The eastern boundary of the ecoregion in Tennessee, along the more abrupt escarpment where it meets the Ridge and Valley (67), is relatively smooth and only slightly notched by small eastward flowing stream drainages. The western boundary, next to the Interior Plateau's Eastern Highland Rim (71g), is more crenulated with a rougher escarpment that is more deeply incised. The mixed mesophytic forest is restricted mostly to the deeper ravines and escarpment slopes, and the upland forests are dominated by mixed oaks with shortleaf pine.

Level IV ecoregions include:

> The **Southern Dissected Ridges and Knobs** contain more crenulated, broken, or hummocky ridges, compared to the smoother, more sharply pointed sandstone

ridges of Ecoregion 67h. Although shale is common, there is a mixture and interbedding of geologic materials. The ridges on the east side of Tennessee's Ridge and Valley tend to be associated with the Ordovician-age Sevier shale, Athens shale, and Holston and Lenoir limestones. These can include calcareous shale, limestone, siltstone, sandstone, and conglomerate. In the central and western part of Ecoregion 67, the shale ridges are associated with the Cambrian-age Rome Formation: shale and siltstone with beds of sandstone. Chestnut oak forests and pine forests are typical for the higher elevations of the ridges, with areas of white oak, mixed mesophytic forest, and tulip poplar on the lower

The **Southern Limestone/Dolomite Valleys and Low Rolling Hills** form a heterogeneous region composed predominantly of limestone and cherty dolomite. Landforms are mostly low rolling ridges and valleys, and the soils vary in their productivity. Landcover includes intensive agriculture, urban and industrial, or areas of thick forest. White oak forests, bottomland oak forests, and sycamore-ash-elm riparian forests are the common forest types, and grassland barrens intermixed with cedar-pine glades also occur here.

The **Southern Shale Valleys** consist of lowlands, rolling valleys, and slopes and hilly areas that are dominated by shale materials. The northern areas are associated with Ordovician-age calcareous shale, and the well-drained soils are often slightly acid to neutral. In the south, the shale valleys are associated with Cambrian-age shales that contain some narrow bands of limestone, but the soils tend to be strongly acid. Small farms and rural residences subdivide the land. The steeper slopes are used for pasture or have reverted to brush and forested land, while small fields of hay, corn, tobacco, and garden crops are grown on the foot slopes and bottom land.

The **Cumberland Plateau's** tablelands and open low mountains are about 1000 feet higher than the Eastern Highland Rim (71g) to the west, and receive slightly more precipitation with cooler annual temperatures than the surrounding lower-elevation ecoregions. The plateau surface is less dissected with lower relief compared to the Cumberland Mountains (69d) or the Plateau Escarpment (68c). Elevations are generally 1200-2000 feet, with the Crab Orchard Mountains reaching over 3000 feet. Pennsylvanian age conglomerate, sandstone, siltstone, and shale is covered by mostly well-drained, acid soils of low fertility. The region is forested, with some agriculture and coal mining activities.

The **Plateau Escarpment** is characterized by steep, forested slopes and high velocity, high gradient streams. Local relief is often 1000 feet or more. The geologic strata include Mississippian-age limestone, sandstone, shale, and siltstone, and Pennsylvanian-age shale, siltstone, sandstone, and conglomerate. Streams have cut down into the limestone, but the gorge talus slopes are composed of colluvium with huge angular, slabby blocks of sandstone. Vegetation community types in the ravines and gorges include mixed oak and chestnut oak on the upper slopes, more mesic forests on the middle and lower slopes (beech-tulip poplar, sugar maple-basswood-ash-buckeye), with hemlock along rocky streamsides and river birch along floodplain terraces.

B. Threats and Historic Resource Loss

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 9.38 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 42)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in high portions of the floodplain including ridges and natural levees that are only temporarily flooded, isolated depressions without outlets in upland landscapes that may pond water well into the growing season and have saturated soils for much of the year, groundwater discharge areas on or at the base of a slope that results in semi-permanent to permanent saturation, and meandering drainages characterized by temporary flooding and saturated soils found in upland landscapes in association with headwater areas.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. Current Resource Conditions

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the Nickajack/ Chickamauga Reservoirs watershed resulted in placing portions of fourty-one streams and one lake on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters (this includes the Nickajack Reservoir) **(Figure 43)**. The most common reasons for classification are pH, habitat loss, Escherichia coli and siltation. The sources of these are largely from abandoned mines, agricultural sources and municipal discharges. The Nickajack Lake Reservoir is listed due to PCB's and dioxins from contaminated sediments.

D. Aquatic Resource Goals and Objectives

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.
The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions, seasonally flooded lake fringes, and headwater resources;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 10 acres of wetlands, and enhance 10 acres of existing wetlands within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized. Where suitable mitigation sites cannot be found within the

8-digit HUC, suitable sites within the same service area and the same ecoregion will be prioritized,

- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. <u>Explanation of Preservation Goals</u>

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed
2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available
3.) Preservation is determined by the district engineer to be appropriate and practicable
4.) The resources are under threat of destruction or adverse modifications
5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. <u>Public & Private Stakeholder Involvement</u>

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. <u>Long-Term Protection and Management</u>

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. <u>Periodic Evaluation and Reporting</u>

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

14. Hiwassee / Ocoee Rivers Service Area

A. <u>Geographic Service Area</u>

The Hiwassee – Ocoee Service Area includes the Hiwassee River and Ocoee River eight-digit HUCs **(Figure 44)**. The service area includes 1,209 square miles within the state of Tennessee.

This service area was selected because these 8-digit HUCs are in an area with traditionally low rates of development and few historic impacts. This region of the state has moderately high prevalence of hydric soils, with only %3.42 of all soils categorized as hydric. The relative rate of impact acres in this service area is moderate. Planning on the multiple 8-digit HUC scale in areas with few impacts such as this will allow the Program to devote more watershed planning efforts to service areas with a greater need for planning efforts. 20 advance credits are being requested in the service area due to its urban area, size and the amount of historic impact.

The Tennessee Portion of the Hiwassee River Watershed is approximately 1,011 square miles and includes parts of Bradley, Hamilton, McMinn, Meigs, Monroe, and Polk Counties. A part of the Tennessee River drainage basin, the watershed has 1,657 stream miles **(Table 19)**. Sixty-two rare plant and animal species have been documented in the watershed, including four rare fish species and three rare mussel species. Portions of two streams in the Tennessee portion of the Hiwassee River Watershed are listed in the National Rivers Inventory as having one or more outstanding natural or cultural values. The area is characterized by forested slopes, high gradient, clear streams, and rugged terrain. There is great aquatic habitat diversity in the watershed.

The Ocoee River Watershed is approximately 665 square miles (207 of which are in Tennessee) and drains to the Hiwassee River. The Tennessee portion of the Ocoee River Watershed is wholly contained within Polk County in East Tennessee. The Ocoee River Watershed includes cool, clear streams with high gradient in the Blue Ridge Mountains, and great aquatic habitat diversity in the Ridge and Valley region.

The service area exists in the Blue Ridge Mountain and Ridge and Valley ecoregions.

The Blue Ridge Mountains of Tennessee are characterized by forested slopes, high gradient, cool, clear streams, and rugged terrain on a mix of igneous, metamorphic, and sedimentary geology. Annual precipitation of nearly 80 inches can occur on the well-exposed high peaks of the Great Smoky Mountains that reach over 6000 feet. The southern Blue Ridge is one of the richest centers of biodiversity in the eastern U.S. It is the most floristically diverse ecoregion of the state, and includes Appalachian oak forests, northern hardwoods, and Southeastern spruce-fir forests. Shrub, grass, and heath balds, hemlock, cove hardwoods, and oak-pine communities are also significant.

Also known as the Great Valley of East Tennessee, the Ridge and Valley ecoregion is a relatively low-lying region between the Blue Ridge Mountains to the east and the Cumberland Plateau on the west. As a result of extreme folding and faulting events, the roughly parallel ridges and valleys come in a variety of widths, heights, and geologic materials, including limestone, dolomite, shale, siltstone, sandstone, chert, mudstone, and marble. Springs and caves are relatively numerous. Present-day forests cover about 50% of the region. The ecoregion has great aquatic habitat diversity in Tennessee and supports a diverse fish fauna rivaled only by that of the Highland Rim.

Level IV ecoregions include:

The **Southern Sedimentary Ridges** in Tennessee include some of the westernmost foothill areas of the Blue Ridge Mountains ecoregion, such as the Bean, Starr, Chilhowee, English, Stone, Bald and Iron Mountain areas. Slopes are steep, and elevations are generally 1000-4500 feet. The rocks are primarily Cambrian-age sedimentary (shale, sandstone, siltstone, quartzite, conglomerate), although some lower stream reaches occur on limestone. Soils are predominantly friable loams and fine sandy loams with variable amounts of sandstone rock fragments, and support mostly mixed oak and oak-pine forests.

Limestone Valleys and Coves are small but distinct lowland areas of the Blue Ridge, with elevations mostly between 1500 and 2500 feet. About 450 million years ago, older Blue Ridge rocks to the east were forced up and over younger rocks to the west. In places, the Precambrian rocks have eroded through to Cambrian or Ordovician-age limestones, as seen especially in isolated, deep cove areas that are surrounded by steep mountains. The main areas of limestone include the Mountain City lowland area and Shady Valley in the north; and Wear Cove, Tuckaleechee Cove, and Cades Cove of the Great Smoky Mountains in the south. Hay and pasture, with some tobacco patches on small farms, are typical land uses.

The **Southern Metasedimentary Mountains** are steep, dissected, biologicallydiverse mountains that include Clingmans Dome (6643 feet), the highest point in Tennessee. The Precambrian-age metamorphic and sedimentary geologic materials are generally older and more metamorphosed than the Southern Sedimentary Ridges (66e) to the west and north. The Appalachian oak forests and, at higher elevations, the northern hardwoods forests include a variety of oaks and pines, as well as silverbell, hemlock, yellow poplar, basswood, buckeye, yellow birch, and beech. Spruce-fir forests, found generally above 5500 feet, have been affected greatly over the past twenty-five years by the balsam woolly aphid. The Copper Basin, in the southeast corner of Tennessee, was the site of copper mining and smelting from the 1850's to 1987, and once left more than fifty square miles of eroded bare earth.

The **Southern Dissected Ridges and Knobs** contain more crenulated, broken, or hummocky ridges, compared to the smoother, more sharply pointed sandstone ridges of Ecoregion 67h. Although shale is common, there is a mixture and interbedding of geologic materials. The ridges on the east side of Tennessee's Ridge and Valley tend to be associated with the Ordovician-age Sevier shale, Athens shale, and Holston and Lenoir limestones. These can include calcareous shale, limestone, siltstone, sandstone, and conglomerate. In the central and western part of Ecoregion 67, the shale ridges are associated with the Cambrian-age Rome Formation: shale and siltstone with beds of sandstone. Chestnut oak forests and pine forests are typical for the higher elevations of the ridges, with areas of white oak, mixed mesophytic forest, and tulip poplar on the lower

The **Southern Limestone/Dolomite Valleys and Low Rolling Hills** form a heterogeneous region composed predominantly of limestone and cherty dolomite. Landforms are mostly low rolling ridges and valleys, and the soils vary in their productivity. Landcover includes intensive agriculture, urban and industrial, or areas of thick forest. White oak forests, bottomland oak forests, and sycamore-ash-elm riparian forests are the common forest types, and grassland barrens intermixed with cedar-pine glades also occur here.

The **Southern Shale Valleys** consist of lowlands, rolling valleys, and slopes and hilly areas that are dominated by shale materials. The northern areas are associated with Ordovician-age calcareous shale, and the well-drained soils are often slightly acid to neutral. In the south, the shale valleys are associated with Cambrian-age shales that contain some narrow bands of limestone, but the soils tend to be strongly acid. Small farms and rural residences subdivide the land. The steeper slopes are used for pasture or have reverted to brush and forested land, while small fields of hay, corn, tobacco, and garden crops are grown on the foot slopes and bottom land.

B. <u>Threats and Historic Resource Loss</u>

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 19.21 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 45)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in high portions of the floodplain including ridges and natural levees that are only temporarily flooded, isolated depressions without outlets in upland landscapes that may pond water well into the growing season and have saturated soils for much of the year, groundwater discharge areas on or at the base of a slope that results in semi-permanent to permanent saturation, and meandering drainages characterized by temporary flooding and saturated soils found in upland landscapes in association with headwater areas.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. Current Resource Conditions

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the Hiwassee River watershed resulted in placing portions of twenty-one streams and one lake on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters (this includes the Hiwassee Embayment of Chickamauga Reservoir) **(Figure 46)**. The most common reasons for classification are habitat loss, Escherichia coli and siltation. The sources of these are largely from agricultural sources and municipal discharges. The Hiwassee Embayment of Chickamauga Reservoir is listed due to mercury from an industrial point source.

TDEC's assessment of the chemical, physical, and biological parameters of the Ocoee River watershed resulted in placing portions of six streams (including the main stem of the Ocoee) and three lakes on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are pH, iron, copper and zinc. The sources of these are largely from mining impacts.

D. Aquatic Resource Goals and Objectives

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions, seasonally flooded lake fringes, and headwater resources;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 20 acres of wetlands, enhance 10 acres of existing wetlands and create or enhance 10 acres of upland buffer within 10 years of Program initiation.

E. <u>Prioritization Strategy</u>

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized. Where suitable mitigation sites cannot be found within the 8-digit HUC, suitable sites within the same service area and the same ecoregion will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should

be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,

- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed

2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available

3.) Preservation is determined by the district engineer to be appropriate and practicable

4.) The resources are under threat of destruction or adverse modifications

5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field

observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

15. Sequatchie River Service Area

A. <u>Geographic Service Area</u>

The Sequatchie River Service area is limited to the Sequatchie River eight-digit HUC **(Figure 47)**.

The Sequatchie River Watershed is approximately 602 square miles and includes parts of Bledsoe, Cumberland, Grundy, Marion, Sequatchie, and Van Buren Counties **(Table 20)**. A part of the Tennessee River drainage basin, the watershed has 909.3 stream miles. Forty-six rare plant and animal species have been documented in the watershed, including five rare fish species, two rare crustacean species, and two rare mussel species. The Sequatchie's source is a massive spring which flows out of Devilstep Hollow Cave, a large limestone cavern. It receives the drainage of Grassy Cove, a pastoral limestone region several miles to the north from which the drainage has no surface outlet, but flows through a spectacular series of underground passages.

This service area was selected because this 8-digit HUC is composed of a narrow valley and steep ridges and is very self-contained. This service area has a relatively low prevalence of hydric soils, with only %1.8 of all soils categorized as hydric. The relative rate of impact acres in this service area is very low. 5 advance credits are being requested in the service area due to its size and the amount of historic impact.

The Sequatchie River watershed is contained entirely in the Southwestern Appalachian ecoregion.

Stretching from Kentucky to Alabama, these open low mountains contain a mosaic of forest and woodland with some cropland and pasture. The eastern boundary of the ecoregion in Tennessee, along the more abrupt escarpment where it meets the Ridge and Valley (67), is relatively smooth and only slightly notched by small eastward flowing stream drainages. The western boundary, next to the Interior Plateau’s Eastern Highland Rim (71g), is more crenulated with a rougher escarpment that is more deeply incised. The mixed mesophytic forest is restricted mostly to the deeper ravines and escarpment slopes, and the upland forests are dominated by mixed oaks with shortleaf pine.

Level IV ecoregions include:

> The **Cumberland Plateau’s** tablelands and open low mountains are about 1000 feet higher than the Eastern Highland Rim (71g) to the west, and receive slightly more precipitation with cooler annual temperatures than the surrounding lower-elevation ecoregions. The plateau surface is less dissected with lower relief compared to the Cumberland Mountains (69d) or the Plateau Escarpment (68c). Elevations are generally 1200-2000 feet, with the Crab Orchard Mountains reaching over 3000 feet. Pennsylvanian age conglomerate, sandstone, siltstone, and shale is covered by mostly well-drained, acid soils of low fertility. The region is forested, with some agriculture and coal mining activities.

The **Plateau Escarpment** is characterized by steep, forested slopes and high velocity, high gradient streams. Local relief is often 1000 feet or more. The geologic strata include Mississippian-age limestone, sandstone, shale, and siltstone, and Pennsylvanian-age shale, siltstone, sandstone, and conglomerate. Streams have cut down into the limestone, but the gorge talus slopes are composed of colluvium with huge angular, slabby blocks of sandstone. Vegetation community types in the ravines and gorges include mixed oak and chestnut oak on the upper slopes, more mesic forests on the middle and lower slopes (beech-tulip poplar, sugar maple-basswood-ash-buckeye), with hemlock along rocky streamsides and river birch along floodplain terraces.

The **Sequatchie Valley** is structurally associated with an anticline, where erosion of broken rock to the south of the Crab Orchard Mountains scooped out the linear valley. The open, rolling, valley floor, 600-1000 feet in elevation, is generally 1000 feet below the top of the Cumberland Plateau. A low, central, cherty ridge separates the west and east valleys of Mississippian to Ordovician-age limestones, dolomites, and shales. Similar to parts of the Ridge and Valley (67), this is an agriculturally productive region, with areas of pasture, hay, soybeans, small grain, corn, and tobacco.

B. Threats and Historic Resource Loss

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 0.1 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in high portions of the floodplain including ridges and natural levees that are only temporarily flooded, isolated depressions without outlets in upland landscapes that may pond water well into the growing season and have saturated soils for much of the year, groundwater discharge areas on or at the base of a slope that results in semi-permanent to permanent saturation, and meandering drainages characterized by temporary flooding and saturated soils found in upland landscapes in association with headwater areas.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. <u>Current Resource Conditions</u>

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the Sequatchie River watershed resulted in placing portions of twenty-two streams (including the main stem of the Sequatchie) on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are siltation, Escherichia coli and manganese. The sources of these are largely from agricultural sources and mining discharges.

D. <u>Aquatic Resource Goals and Objectives</u>

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions, seasonally inundated floodplain flats, and headwater resources;
2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;
3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;
4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 10 acres of wetlands, and enhance 5 acres of existing wetlands within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors

identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.

- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed

2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available

3.) Preservation is determined by the district engineer to be appropriate and practicable

4.) The resources are under threat of destruction or adverse modifications

5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods

for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of

individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

16. Elk River / Border Lakes Service Area

A. <u>Geographic Service Area</u>

The service area is made up of the six-digit Middle Tennessee - Elk River HUC, and includes approximately 3,131 square miles in middle Tennessee. The service area includes portions of 5 HUC 8 watersheds, three of which drain to reservoirs with the majority of their watershed in Alabama and six level IV ecoregions **(Figure 50)**.

This service area was selected because these multiple 8-digit HUCs straddle the southern Tennessee border with most of their drainage area flowing in bordering states. Even with a moderate prevalence of hydric soils (%3.48 of all soils categorized as hydric), the relative rate of impact acres in this service area is very low. Planning on the multiple 8-digit HUC scale in areas with few impacts such as this will allow the Program to devote more watershed planning efforts to service areas with a greater need for planning efforts. 6 advance credits are being requested in the service area due to its size and the amount of historic impact.

The Guntersville Lake Watershed is approximately 1,983 square miles (337 mi2 in Tennessee) includes parts of Franklin, Grundy, and Marion Counties **(Table 21)**. A part of the Tennessee River drainage basin, the watershed has 424.3 stream miles and 1,479 lake acres in the Tennessee portion of the watershed. Sixty-eight rare plant and animal species have been documented in the watershed, including one rare mussel species and one rare crustacean species.

The Tennessee portion of the Wheeler Lake Watershed is approximately 236 square miles and includes parts of Franklin, Giles, Lawrence, and Lincoln Counties. A part of the Tennessee River drainage basin, the Tennessee portion of the watershed has 313 stream miles. Twenty-six rare plant and animal species have been documented in the watershed, including two rare fish species, four rare mussel species and one rare snail species. Upper elevations of the Wheeler Lake Watershed contain many beautiful streams flowing toward the Alabama border to the Elk River. Swine and dairy farms dot the landscape, and the area's rich timber supply supports lumber mills as a basic industry. Barrens and former prairie areas are now mostly oak thickets or pasture and cropland. Numerous springs and spring-associated fish fauna typify the region.

The Upper Elk River Watershed is approximately 1,277 square miles and includes parts of Bedford, Coffee, Franklin, Giles, Grundy, Lincoln, Marshall, and Moore Counties. A part of the Tennessee River drainage basin, the watershed has 1,813 stream miles. Eighty-seven rare plant and animal species have been documented in the watershed, including four rare fish species, thirteen rare mussel species, three rare snail species, and one rare crustacean species. Portions of one stream in the Upper Elk River Watershed are listed in the National Rivers Inventory as having one or more outstanding natural or cultural values. The Upper Elk River Watershed contains productive, nutrient-rich waters, resulting in algae, rooted vegetation, and occasionally high densities of fish. The plateau of the watershed receives slightly more precipitation with cooler annual temperatures than the surrounding lower-elevation regions and is characterized by high gradient streams. The land supports cotton, corn, and soybean production as well as swine and cattle.

The Tennessee portion of the Lower Elk River Watershed is approximately 715 square miles and eleven rare plant and animal species have been documented in the watershed, including two rare fish species, one rare mussel species, and one rare snail species. Portions of one stream in the Lower Elk River Watershed are listed in the National Rivers Inventory as having one or more outstanding natural or cultural values. A part of the Lower Tennessee River drainage basin, the watershed has 1,117 stream miles. Eleven rare plant and animal species have been documented in the watershed, including two rare fish species, one rare mussel species, and one rare snail species. Portions of one stream in the Lower Elk River Watershed are listed in the National Rivers Inventory as having one or more outstanding natural or cultural values. Eleven rare plant and animal species have been documented in the watershed, including two rare fish species, one rare mussel species, and one rare snail species. Portions of one stream in the Lower Elk River Watershed are listed in the National Rivers Inventory as having one or more outstanding natural or cultural values.

The Tennessee portion of the Pickwick Lake Watershed is approximately 639 square miles and includes parts of three Middle Tennessee counties. A part of the Lower Tennessee River drainage basin, the Tennessee portion of the watershed has 953 stream miles and 5,840 lake acres. Twenty-five rare plant and animal species have been documented in the Tennessee portion of the watershed, including eight rare fish species, one rare mussel species and two rare snail species. Streams in the Pickwick watershed are characterized by coarse chert gravel and sand substrates with areas of bedrock, moderate gradients, and relatively clear water. Some agriculture occurs in the flatter areas and in the stream and river valley. includes parts of Hardin, Lawrence, and Wayne Counties.

The service area contains parts of the Southeastern Plains, Southwestern Appalachians, and Interior Plateau ecoregions.

The Southeastern Plains have a mosaic of cropland, pasture, woodland, and oak-hickory-pine forest. The Cretaceous or Tertiary-age sands, silts, and clays of the region contrast geologically with the older limestone, chert, and shale found in the Interior Plateau (71). Elevations and relief are greater than the loess plains of Ecoregion 74 to the west, but generally less than the Interior Plateau (71) to the east. Streams in this area are relatively low-gradient and sandy-bottomed.

Stretching from Kentucky to Alabama, the Southwestern Appalachians open low mountains contain a mosaic of forest and woodland with some cropland and pasture. The eastern boundary of the ecoregion in Tennessee, along the more abrupt escarpment where it meets the Ridge and Valley (67), is relatively smooth and only slightly notched by small eastward flowing stream drainages. The western boundary, next to the Interior Plateau's Eastern Highland Rim (71g), is more crenulated with a rougher escarpment that is more deeply incised. The mixed mesophytic forest is restricted mostly to the deeper ravines and escarpment slopes, and the upland forests are dominated by mixed oaks with shortleaf pine.

The Interior Plateau is a diverse ecoregion extending from southern Indiana and Ohio to northern Alabama. Rock types are distinctly different from the coastal plain sands of western Tennessee ecoregions, and elevations are lower than the Appalachian ecoregions to the east. Mississippian to Ordovician-age limestone, chert, sandstone, siltstone and shale compose the landforms of open hills, irregular plains, and tablelands. The natural vegetation is primarily oak-hickory forest, with some areas of bluestem prairie and cedar glades. The region has the most diverse fish fauna in Tennessee.

Level IV ecoregions include:

> The **Fall Line Hills** ecoregion, comprising the Tennessee or Tombigbee Hills in Mississippi and the Fall Line Hills in Alabama, is composed primarily of Cretaceous-age coastal plain sandy sediments. The sand and chert gravel surficial materials are covered by sandy loam topsoils. It is mostly forested terrain of oak-hickory-pine on open hills with 100-200 feet of relief. Elevations in the small Tennessee portion, roughly between Chambers Creek and Pickwick Lake in Hardin County, are 450-685 feet.
>
> The **Transition Hills** have the highest elevations in Ecoregion 65, and contain characteristics of both the Southeastern Plains and the Interior Plateau (71) ecoregions. Many streams of this transition area have cut down into the Mississippian, Devonian, and Silurian-age rocks and may look similar to those of the Interior Plateau (71). Cretaceous-age coastal plain deposits of silt, sand, clay, and gravel, however, overlie the older limestone, shale, and chert. It is a mostly forested region of oak-hickory-pine, and has had pine plantation activities associated with pulp and paper operations.
>
> The **Cumberland Plateau's** tablelands and open low mountains are about 1000 feet higher than the Eastern Highland Rim (71g) to the west, and receive slightly more precipitation with cooler annual temperatures than the surrounding lower-elevation ecoregions. The plateau surface is less dissected with lower relief compared to the Cumberland Mountains (69d) or the Plateau Escarpment (68c). Elevations are generally 1200-2000 feet, with the Crab Orchard Mountains reaching over 3000 feet. Pennsylvanian age conglomerate, sandstone, siltstone, and shale is covered by mostly well-drained, acid soils of low fertility. The region is forested, with some agriculture and coal mining activities.
>
> The **Sequatchie Valley** is structurally associated with an anticline, where erosion of broken rock to the south of the Crab Orchard Mountains scooped out the linear valley. The open, rolling, valley floor, 600-1000 feet in elevation, is generally 1000 feet and east valleys of Mississippian to Ordovician-age limestones, dolomites, and shales. Similar to parts of the Ridge and Valley (67),

this is an agriculturally productive region, with areas of pasture, hay, soybeans, small grain, corn, and tobacco.

The **Plateau Escarpment** is characterized by steep, forested slopes and high velocity, high gradient streams. Local relief is often 1000 feet or more. The geologic strata include Mississippian-age limestone, sandstone, shale, and siltstone, and Pennsylvanian-age shale, siltstone, sandstone, and conglomerate. Streams have cut down into the limestone, but the gorge talus slopes are composed of colluvium with huge angular, slabby blocks of sandstone. Vegetation community types in the ravines and gorges include mixed oak and chestnut oak on the upper slopes, more mesic forests on the middle and lower slopes (beech-tulip poplar, sugar maple-basswood-ash-buckeye), with hemlock along rocky streamsides and river birch along floodplain terraces.

The **Western Highland Rim** is characterized by dissected, rolling terrain of open hills, with elevations of 400-1000 feet. The geologic base of Mississippian-age limestone, chert, and shale is covered by soils that tend to be cherty, acid, and low to moderate in fertility. Streams are characterized by coarse chert gravel and sand substrates with areas of bedrock, moderate gradients, and relatively clear water. The oak-hickory natural vegetation was mostly deforested in the mid to late 1800's, in conjunction with the iron-ore related mining and smelting of the mineral limonite, but now the region is again heavily forested. Some agriculture occurs on the flatter interfluves and in the stream and river valleys: mostly hay, pasture, and cattle, with some cultivation of corn and tobacco.

The **Eastern Highland Rim** has more level terrain than the Western Highland Rim (71f), with landforms characterized as tablelands of moderate relief and irregular plains. Mississippian-age limestone, chert, shale, and dolomite predominate, and karst terrain sinkholes and depressions are especially noticeable between Sparta and McMinnville. Numerous springs and spring-associated fish fauna also typify the region. Natural vegetation for the region is transitional between the oak-hickory type to the west and the mixed mesophytic forests of the Appalachian ecoregions (68, 69) to the east. Bottomland hardwoods forests were once abundant in some areas, although much of the original bottomland forest has been inundated by several large impoundments. Barrens and former prairie areas are now mostly oak thickets or pasture and cropland.

The **Outer Nashville Basin** is a more heterogeneous region than the Inner Nashville Basin (71i), with more rolling and hilly topography and slightly higher elevations. The region encompasses most all of the outer areas of the generally non-cherty Ordovician limestone bedrock. The higher hills and knobs are capped by the more cherty Mississippian age formations, and some Devonian-age Chattanooga shale, remnants of the Highland Rim. The region's limestone rocks and soils are high in phosphorus, and commercial phosphate is mined. Deciduous forest with pasture and cropland are the dominant land covers. Streams are low to moderate gradient, with productive, nutrient-rich waters, resulting in algae, rooted vegetation, and occasionally high densities of fish. The Nashville Basin as a whole has a distinctive fish fauna, notable for fish that avoid the region, as well as those that are present.

B. Threats and Historic Resource Loss

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 11.82 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 51)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in high portions of the floodplain including ridges and natural levees that are only temporarily flooded, groundwater discharge areas on or at the base of a slope that results in semi-permanent to permanent saturation, and meandering drainages characterized by temporary flooding and saturated soils found in upland landscapes in association with headwater areas.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. Current Resource Conditions

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the Guntersville Lake watershed resulted in placing portions of sixteen streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters **(Figure 52)**. The most common reasons for classification are siltation, Escherichia coli and flow alterations. The sources of these are largely from agricultural sources and septic failures, and impoundments.

TDEC's assessment of the chemical, physical, and biological parameters of the Wheeler Lake watershed resulted in placing portions of six streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are siltation, and Escherichia coli. The sources of these are largely from agricultural sources.

TDEC's assessment of the chemical, physical, and biological parameters of the upper and lower Elk River watersheds resulted in placing portions of thirty streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are siltation, Escherichia coli, nutrients and habitat loss. The sources of these are largely from agricultural sources and septic failures, and municipal point sources.

TDEC's assessment of the chemical, physical, and biological parameters of the Pickwick Lake watershed resulted in placing portions of two streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are siltation, and habitat loss. The sources of these are largely from agricultural sources and industrial point sources.

D. <u>Aquatic Resource Goals and Objectives</u>

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions, seasonally flooded lake fringes, seasonally inundated floodplain flats, and headwater resources;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 15 acres of wetlands, and enhance 10 acres of existing wetlands within 10 years of Program initiation.

E. <u>Prioritization Strategy</u>

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized. Where suitable mitigation sites cannot be found within the 8-digit HUC, suitable sites within the same service area and the same ecoregion will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,

- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed

2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available

3.) Preservation is determined by the district engineer to be appropriate and practicable

4.) The resources are under threat of destruction or adverse modifications

5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work

closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the

acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

17. Buffalo / Duck River Service Area

A. <u>Geographic Service Area</u>

The Buffalo – Duck River Service Area is comprised of the Buffalo River Watershed, and the Upper and Lower Duck River Watershed eight-digit HUCs **(Figure 53)**. The service area is approximately 3,490 square miles.

This service area was selected because this is the 6-digit HUC. This region of the state has relatively low prevalence of hydric soils, with only %2.34 of all soils categorized as hydric. The relative rate of impact acres in this service area is still very low, and having some larger service areas with relatively low rates of impacts will allow the Program to devote watershed planning efforts to those service areas with the greatest needs and the greatest amounts of impacts. 10 advance credits are being requested in the service area due to its size and the amount of historic impact.

The Upper Duck River Watershed is approximately 1,182 square miles and includes parts of Bedford, Coffee, Franklin, Giles, Lincoln, Marshall, Maury, Moore, Rutherford, and Williamson Counties. A part of the Tennessee River drainage basin, the watershed has 1,607 stream miles and 3,260 lake acres **(Table 22)**. One hundred forty-seven rare plant and animal species have been documented in the watershed, to include fourteen rare fish species, fifteen rare mussel species, five rare snail species, and one rare reptile species. A portion of the Upper Duck River has been designated as a State Scenic River. The Duck River flows through some of the most scenic landscapes and least populated counties in Tennessee.

The Lower Duck River Watershed is approximately 1,548 square miles and includes parts of Dickson, Giles, Hickman, Humphreys, Lawrence, Lewis, Maury, Perry, and Williamson Counties. A part of the Tennessee River drainage basin, the watershed has 2,462 stream miles and 13 lake acres. Eighty-one rare plant and animal species have been documented in the watershed, to include thirteen rare fish species, twelve rare mussel species, three rare snail species, and three rare reptile species. A portion of the Lower Duck River has been designated as a State Scenic River.

The Buffalo River Watershed is approximately 763 square miles and includes parts of Hickman, Humphreys, Lawrence, Lewis, Perry, and Wayne Counties. A part of the Tennessee River drainage basin, the watershed has 1,200 stream miles and 349 lake acres. Forty-eight rare plant and animal species have been documented in the watershed, to include eleven rare fish species, three rare mussel species, four rare snail species and one rare crustacean species. Portions of one stream in the Buffalo River Watershed is listed in the National Rivers Inventory as having one or more outstanding natural or cultural values and a portion of the Buffalo River has also been designated as a State Scenic River.

The service area contains parts of the Southeastern Plains, Mississippi Valley Loess Plains, and Interior Plateau ecoregions.

These Southeastern Plains have a mosaic of cropland, pasture, woodland, and oak-hickory-pine forest. The Cretaceous or Tertiary-age sands, silts, and clays of the region contrast geologically with the older limestone, chert, and shale found in the Interior Plateau (71). Elevations and relief are greater than the loess plains of Ecoregion 74 to the west, but generally less than the Interior Plateau (71) to the east. Streams in this area are relatively low-gradient and sandy-bottomed.

The Mississippi Valley Loess Plains ecoregion stretches from near the Ohio River in western Kentucky to Louisiana. It consists primarily of irregular plains, with oak-hickory and oak-hickory-pine natural vegetation. Thick loess tends to be the distinguishing characteristic. With flatter topography than the Southeastern Plains (65) to the east, streams tend to have less gradient and more silty substrates. In Tennessee, agriculture is the dominant land use.

The Interior Plateau is a diverse ecoregion extending from southern Indiana and Ohio to northern Alabama. Rock types are distinctly different from the coastal plain sands of western Tennessee ecoregions, and elevations are lower than the Appalachian ecoregions to the east. Mississippian to Ordovician-age limestone, chert, sandstone, siltstone and shale compose the landforms of open hills, irregular plains, and tablelands. The natural vegetation is primarily oak-hickory forest, with some areas of bluestem prairie and cedar glades. The region has the most diverse fish fauna in Tennessee.

Level IV ecoregions include:

> The **Blackland Prairie,** extending north from Mississippi, is a flat to undulating lowland region covering only a small portion of McNairy County, Tennessee. Although there is some of the Cretaceous-age chalk, marl, and calcareous clay that characterizes the region in Mississippi and Alabama, the northern extent of the Blackland Prairie in Tennessee is not distinct. To the south, the natural vegetation had dominant trees of sweetgum, post oak, and red cedar, along with patches of bluestem prairie. Today, the area is mostly in cropland and pasture, with small patches of mixed hardwoods.
>
> The **Fall Line Hills** ecoregion, comprising the Tennessee or Tombigbee Hills in Mississippi and the Fall Line Hills in Alabama, is composed primarily of Cretaceous-age coastal plain sandy sediments. The sand and chert gravel surficial materials are covered by sandy loam topsoils. It is mostly forested terrain of oak-hickory-pine on open hills with 100-200 feet of relief. Elevations in the small Tennessee portion, roughly between Chambers Creek and Pickwick Lake in Hardin County, are 450-685 feet.
>
> The **Transition Hills** have the highest elevations in Ecoregion 65, and contain characteristics of both the Southeastern Plains and the Interior Plateau (71) ecoregions. Many streams of this transition area have cut down into the Mississippian, Devonian, and Silurian-age rocks and may look similar to those of the Interior Plateau (71). Cretaceous-age coastal plain deposits of silt, sand, clay,

and gravel, however, overlie the older limestone, shale, and chert. It is a mostly forested region of oak-hickory-pine, and has had pine plantation activities associated with pulp and paper operations.

The **Western Highland Rim** is characterized by dissected, rolling terrain of open hills, with elevations of 400-1000 feet. The geologic base of Mississippian-age limestone, chert, and shale is covered by soils that tend to be cherty, acid, and low to moderate in fertility. Streams are characterized by coarse chert gravel and sand substrates with areas of bedrock, moderate gradients, and relatively clear water. The oak-hickory natural vegetation was mostly deforested in the mid to late 1800's, in conjunction with the iron-ore related mining and smelting of the mineral limonite, but now the region is again heavily forested. Some agriculture occurs on the flatter interfluves and in the stream and river valleys: mostly hay, pasture, and cattle, with some cultivation of corn and tobacco.

The **Eastern Highland Rim** has more level terrain than the Western Highland Rim (71f), with landforms characterized as tablelands of moderate relief and irregular plains. Mississippian-age limestone, chert, shale, and dolomite predominate, and karst terrain sinkholes and depressions are especially noticeable between Sparta and McMinnville. Numerous springs and spring-associated fish fauna also typify the region. Natural vegetation for the region is transitional between the oak-hickory type to the west and the mixed mesophytic forests of the Appalachian ecoregions (68, 69) to the east. Bottomland hardwoods forests were once abundant in some areas, although much of the original bottomland forest has been inundated by several large impoundments. Barrens and former prairie areas are now mostly oak thickets or pasture and cropland.

The **Outer Nashville Basin** is a more heterogeneous region than the Inner Nashville Basin (71i), with more rolling and hilly topography and slightly higher elevations. The region encompasses most all of the outer areas of the generally non-cherty Ordovician limestone bedrock. The higher hills and knobs are capped by the more cherty Mississippian age formations, and some Devonian-age Chattanooga shale, remnants of the Highland Rim. The region's limestone rocks and soils are high in phosphorus, and commercial phosphate is mined. Deciduous forest with pasture and cropland are the dominant land covers. Streams are low to moderate gradient, with productive, nutrient-rich waters, resulting in algae, rooted vegetation, and occasionally high densities of fish. The Nashville Basin as a whole has a distinctive fish fauna, notable for fish that avoid the region, as well as those that are present.

The **Inner Nashville Basin** is less hilly and lower than the Outer Nashville Basin (71h), outcrops of the Ordovician-age limestone are common, and the generally shallow soils are redder and lower in phosphorus than those of the outer basin. Streams are lower gradient than surrounding regions, often flowing over large expanses of limestone bedrock. The most characteristic hardwoods within the inner basin are a maple-oak-hickory-ash association. The limestone cedar glades of Tennessee, a unique mixed grassland/forest cedar glades vegetation type with many endemic species, are located primarily on the limestones of the Inner Nashville Basin. The more xeric, open characteristics and shallow soils of the cedar glades also result in a distinct distribution of amphibian and reptile species. Urban, suburban, and industrial land use in the region is increasing.

The **Loess Plains** are gently rolling, irregular plains, 250-500 feet in elevation, with loess up to 50 feet thick. The region is a productive agricultural area of soybeans, cotton, corn, milo, and sorghum crops, along with livestock and poultry. Soil erosion can be a problem on the steeper, upland Alfisol soils; bottom soils are mostly silty Entisols. Oakhickory and southern flooplain forests are the natural vegetation types, although most of the forest cover has been removed for cropland. Some less-disturbed bottomland forest and cypress-gum swamp habitats still remain. Several large river systems with wide floodplains, the Obion, Forked Deer, Hatchie, Loosahatchie, and Wolf, cross the region. Streams are low gradient and murky with silt and sand bottoms, and most have been channelized.

B. <u>Threats and Historic Resource Loss</u>

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 10.25 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 54)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in high portions of the floodplain including ridges and natural levees that are only temporarily flooded, groundwater discharge areas on or at the base of a slope that results in semi-permanent to permanent saturation, and meandering drainages characterized by temporary flooding and saturated soils found in upland landscapes in association with headwater areas.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. Current Resource Conditions

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the Duck River resulted in placing portions of sixty streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters (including portions of the mainstem of the Duck River) **(Figure 55)**. The most common reasons for classification are siltation, Escherichia coli, and habitat loss. The sources of these are largely from agricultural sources and municipal point sources.

TDEC's assessment of the chemical, physical, and biological parameters of the Buffalo River resulted in placing portions of eight streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters (including portions of the mainstem of the Buffalo River). The most common reasons for classification are siltation, Escherichia coli, and habitat loss. The sources of these are largely from agricultural sources and municipal point sources.

D. Aquatic Resource Goals and Objectives

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions, seasonally flooded lake fringes, seasonally inundated floodplain flats, and headwater resources;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 5 acres of wetlands, and enhance 5 acres of existing wetlands within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized. Where suitable mitigation sites cannot be found within the 8-digit HUC, suitable sites within the same service area and the same ecoregion will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,

- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed

2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available

3.) Preservation is determined by the district engineer to be appropriate and practicable

4.) The resources are under threat of destruction or adverse modifications

5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work

closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. <u>Long-Term Protection and Management</u>

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. <u>Periodic Evaluation and Reporting</u>

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the

acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

18. Lower Tennessee River Service Area

A. Geographic Service Area

The service area is made up of two eight-digit HUC's, The Tennessee Western Valley (Beech River) and Tennessee Western Valley (Kentucky Lake) HUC's are part of the TVA system of impoundments along the Tennessee River **(Figure 56)**. The service area is approximately 3,496 square miles.

This service area was selected because this is the 6-digit HUC. This region of the state has relatively moderate prevalence of hydric soils, with %2.75 of all soils categorized as hydric. The relative rate of impact acres in this service area is still very low, and having some larger service areas with relatively low rates of impacts will allow the Program to devote watershed planning efforts to those service areas with the greatest needs and the greatest amounts of impacts. 18 advance credits are being requested in the service area due to its size and the amount of historic impact.

This area is underlain by karst geology. Sinkholes, springs, disappearing streams and caves characterize karst topography. In karst areas, the ground water flows through solution-enlarged channels, bedding planes and microfractures within the rock. The characteristic landforms of karst regions are: closed depressions of various size and arrangement; disrupted surface drainage; and caves and underground drainage systems.

Kentucky Lake was created when TVA completed Kentucky Dam in 1944. The dam, located 22 miles upstream of the confluence of the Tennessee and Ohio Rivers, is 206 feet high and 8,422 feet long; it's the longest in the TVA system. The Western edge of the watershed defines the Tennessee Western Valley (to the west is the Mississippi River Valley). The watershed has been split into the upstream (Beech River) and downstream drainage areas (KY Lake).

The Tennessee Western Valley (Beech River) Watershed is located in Tennessee and Mississippi. The Tennessee portion of the watershed (97.8% of the watershed) includes parts of Benton, Carroll, Chester, Decatur Hardin, Henderson, Humphreys, McNairy, Perry, and Wayne Counties **(Table 23)**.

The Kentucky Lake Watershed is located in Tennessee and Kentucky. The Tennessee portion of the watershed (80.7% of the watershed) includes parts of Benton, Carroll, Decatur, Dickson, Henderson, Henry, Houston, Humphreys, and Stewart Counties. Forty-eight rare plant and animal species have been documented in the watershed, including four rare fish species, four rare mussel species, and one rare crustacean species.

The service exists in ecoregions classified as the Southeastern Plains and the Mississippi Valley Loess Plains.

The Southeastern Plains have a mosaic of cropland, pasture, woodland, and oak-hickory-pine forest. The Cretaceous or Tertiary-age sands, silts, and clays of the region contrast geologically with the older limestone, chert, and shale found in the Interior Plateau (71). Elevations and relief are greater than the loess plains of Ecoregion 74 to the west, but generally less than the Interior Plateau (71) to the east. Streams in this area are relatively low-gradient and sandy-bottomed.

The Mississippi Valley Loess Plains ecoregion stretches from near the Ohio River in western Kentucky to Louisiana. It consists primarily of irregular plains, with oak-hickory and oak-hickory-pine natural vegetation. Thick loess tends to be the distinguishing characteristic. With flatter topography than the Southeastern Plains (65) to the east, streams tend to have less gradient and more silty substrates. In Tennessee, agriculture is the dominant land use.

Level IV ecoregions include:

> The **Blackland Prairie,** extending north from Mississippi, is a flat to undulating lowland region covering only a small portion of McNairy County, Tennessee. Although there is some of the Cretaceous-age chalk, marl, and calcareous clay that characterizes the region in Mississippi and Alabama, the northern extent of the Blackland Prairie in Tennessee is not distinct. To the south, the natural vegetation had dominant trees of sweetgum, post oak, and red cedar, along with patches of bluestem prairie. Today, the area is mostly in cropland and pasture, with small patches of mixed hardwoods.
>
> The **Fall Line Hills** ecoregion, comprising the Tennessee or Tombigbee Hills in Mississippi and the Fall Line Hills in Alabama, is composed primarily of Cretaceous-age coastal plain sandy sediments. The sand and chert gravel surficial materials are covered by sandy loam topsoils. It is mostly forested terrain of oak-hickory-pine on open hills with 100-200 feet of relief. Elevations in the small Tennessee portion, roughly between Chambers Creek and Pickwick Lake in Hardin County, are 450-685 feet.
>
> The **Transition Hills** have the highest elevations in Ecoregion 65, and contain characteristics of both the Southeastern Plains and the Interior Plateau (71) ecoregions. Many streams of this transition area have cut down into the Mississippian, Devonian, and Silurian-age rocks and may look similar to those of the Interior Plateau (71). Cretaceous-age coastal plain deposits of silt, sand, clay, and gravel, however, overlie the older limestone, shale, and chert. It is a mostly forested region of oak-hickory-pine, and has had pine plantation activities associated with pulp and paper operations.
>
> The **Northern Hilly Gulf Coastal Plain** ecoregion contains several northsouth trending bands of sand and clay formations, and extends north to the Kentucky-Tennessee border. Eocene and Paleocene-age sand, clay, and lignite underlie the western part of the region, and Cretaceous-age fine sands and clays lie to the east. In Mississippi, the region includes the prominent Pontotoc Ridge. The ridge is formed from outcroppings of marls and sands on the Ripley Formation cuesta. The marl and sand surficial materials have weathered into a reddish surface

color, contrasting with the darker soils of adjacent 65a and 65b. The boundary to the south with the Southern Hilly Gulf Coastal Plain (65d) is broad and transitional. The climate is generally cooler to the north in 65e and there is a greater density of upland hardwood forests than in 65d.

The **Western Highland Rim** is characterized by dissected, rolling terrain of open hills, with elevations of 400-1000 feet. The geologic base of Mississippian-age limestone, chert, and shale is covered by soils that tend to be cherty, acid, and low to moderate in fertility. Streams are characterized by coarse chert gravel and sand substrates with areas of bedrock, moderate gradients, and relatively clear water. The oak-hickory natural vegetation was mostly deforested in the mid to late 1800's, in conjunction with the iron-ore related mining and smelting of the mineral limonite, but now the region is again heavily forested. Some agriculture occurs on the flatter interfluves and in the stream and river valleys: mostly hay, pasture, and cattle, with some cultivation of corn and tobacco.

B. <u>Threats and Historic Resource Loss</u>

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 20.32 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 57)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in high portions of the floodplain including ridges and natural levees that are only temporarily flooded, groundwater discharge areas on or at the base of a slope that results in semi-permanent to permanent saturation, and meandering drainages characterized by temporary flooding and saturated soils found in upland landscapes in association with headwater areas.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. <u>Current Resource Conditions</u>

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

The area is currently influenced by management of TVA's reservoirs and wetlands are typically semi-permanently flooded lake fringes dominated by herbaceous emergent and shrub vegetation, or higher estuarine fringe zones near lake fringes that are seasonally flooded but in which the soils remain saturated for much of the year.

TDEC's assessment of the chemical, physical, and biological parameters of the Tennessee Western Valley (Beech River) watershed resulted in placing portions of fifteen streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters **(Figure 58)**. The most common reasons for classification are siltation, low dissolved oxygen, and habitat loss. The sources of these are largely from agricultural sources and impoundments.

TDEC's assessment of the chemical, physical, and biological parameters of the Kentucky Lake watershed resulted in placing portions of seventeen streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are siltation, low dissolved oxygen, nutrients, and habitat loss. The sources of these are largely from agricultural sources and impoundments.

D. <u>Aquatic Resource Goals and Objectives</u>

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested wetlands, flow through depressions, seasonally flooded lake fringes, seasonally inundated floodplain flats, and headwater resources;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 10 acres of wetlands within 10 years of Program initiation.

E. <u>Prioritization Strategy</u>

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized. Where suitable mitigation sites cannot be found within the 8-digit HUC, suitable sites within the same service area and the same ecoregion will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education

values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,

- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed

2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available

3.) Preservation is determined by the district engineer to be appropriate and practicable

4.) The resources are under threat of destruction or adverse modifications

5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. <u>Periodic Evaluation and Reporting</u>

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

19. Forked Deer / Obion River Service Area

A. <u>Geographic Service Area</u>

The service area contains the five eight-digit HUC's that make up the Forked Deer and the Obion drainages; the North Fork of the Obion River, the South Fork of the Obion River, the North Fork of the Forked Deer River, the South Fork of the Forked Deer River, and the Middle Fork of the Forked Deer River. In addition, a small area along the Kentucky border with a few square miles in Tennessee, the Bayou De Chien-Mayfield drainage, is included in this service area **(Figure 59)**. The service area is approximately 4,426 square miles.

This service area was selected because all of these 8-digit HUCs have similar characteristics: they all have relatively high prevalence of hydric soils (%14.15 across the service area), they all have been impacted hydrologically via channelization, drainage and tiling for agriculture, and they are all historically well-covered by mitigation banks. The relative rate of impact acres in this service area is high, but due to the mitigation banking activity, the Program does not plan to be very active in this area. Therefore, despite the large number of impacts in these watersheds, having some larger service areas will allow the Program to devote watershed planning efforts to those service areas with the greatest needs and the greatest amounts of impacts. 25 advance credits are being requested in the service area due to its size and the amount of historic impact.

The Obion River system is the primary surfacewater drainage system of northwest Tennessee and is comprised of four major forks, the North Fork, Middle Fork, South Fork and Rutherford Fork, that flow as separate streams for the majority of their lengths. The confluences of these forks are only a few miles above the mouth of the Obion's discharge into the Mississippi River. The North Fork of the Obion River Watershed is approximately 1,313 square miles (1,169 square miles in Tennessee), and includes parts of Dyer, Gibson, Henry, Lake, Lauderdale, Obion, and Weakley Counties **(Table 24)**.

The South Fork of the Obion River Watershed is approximately 1,157 square miles, and is located in West Tennessee and includes parts of Carroll, Gibson, Henderson, Henry, Obion, and Weakley Counties.

The North Fork Forked Deer Watershed contains streams with increased gradient, generally sandy substrates, and distinctive faunal characteristics. The Forked Deer river system has wide floodplains. Most of its streams have been channelized. The North Fork Forked Deer River Watershed is approximately 962 square miles, and includes parts of Carroll, Crockett, Dyer, Gibson, Henderson, and Madison Counties.

The South Fork Forked Deer Watershed includes low-gradient streams with sandy bottoms and silty substrates. Some streams in the watershed have increased gradient and small areas of gravel substrate that create distinct aquatic habitats. Unique, isolated fish assemblages are also found in this region. The South Fork Forked Deer River Watershed is approximately 1,062 square miles, and includes parts of Chester, Crockett, Dyer, Haywood, Henderson, Lauderdale, Madison, and McNairy Counties.

The Forked Deer River Watershed, is approximately 72 square miles, and includes parts of Dyer and Lauderdale Counties. Fishing and hunting are common in this small watershed. Most of the region is in cropland, with some areas of deciduous forest. Soybeans, cotton, corn, sorghum, and vegetables are the main crops. The natural vegetation consists of Southern floodplain forest (oak, tupelo, bald cypress).

The service area contains the Southeastern Plains, Mississippi Alluvial Plains and Miisissippi Loess Plains ecoregions.

Although mostly tree-covered, the Southeastern Plains are irregular plains with a mosaic of cropland, pasture, woodland, and forest land cover. Natural vegetation in the southern portion was predominantly longleaf pine (*Pinus palustris*), with smaller areas of oak-pine and southern mixed forest. In central and northern Mississippi, oak-pine and some western mixed mesophytic forests were dominant. In states to the east of Mississippi, the Cretaceous or Tertiary-age sands, silts, and clays of this region contrast geologically with the older metamorphic and igneous rocks of the Piedmont (45), and with the Paleozoic limestone, chert, and shale of the Interior Plateau (71). The region has thinner loess than Ecoregion 74 to the west, and elevations and relief are greater than in the Southern Coastal Plain (75) and Mississippi Alluvial Plain (73). Streams are low- to moderate-gradient with mostly sandy substrates.

The Mississippi Valley Loess Plains ecoregion stretches from near the Ohio River in western Kentucky to Louisiana. It consists primarily of irregular plains, with oak-hickory and oak-hickory-pine natural vegetation. Thick loess tends to be the distinguishing characteristic. With flatter topography than the Southeastern Plains (65) to the east, streams tend to have less gradient and more silty substrates. In Tennessee, agriculture is the dominant land use.

The Mississippi Alluvial Plain is a riverine ecoregion extending from southern Illinois, at the confluence of the Ohio River with the Mississippi River, south to the Gulf of Mexico. The Mississippi River watershed drains all or parts of thirty-one states, two Canadian provinces, and 1,243,000 square miles before the river finally reaches the Gulf. The Mississippi Alluvial Plain is mostly a broad, flat alluvial plain with river terraces, swales, and levees providing the main elements of relief. Soils are typically finer-textured and more poorly drained than the upland soils of adjacent Ecoregion 74, although there are some areas of coarser, better-drained soils. Winters are mild and summers are hot, with temperatures and precipitation increasing from north to south. Bottomland deciduous forest vegetation covered the region before much of it was cleared for cultivation. The ecoregion contained one of the largest continuous wetland systems in North America and is still a major bird migration corridor. Today, levees restrict the river from overflowing, opening large areas for extensive agricultural use. Almost all of the northern and central parts of the region are in cropland, and they receive large inputs of pesticides. Soybeans, cotton, and rice are the major crops.

Level IV Ecoregions include:

The **Northern Hilly Gulf Coastal Plain** ecoregion contains several northsouth trending bands of sand and clay formations, and extends north to the Kentucky-Tennessee border. Eocene and Paleocene-age sand, clay, and lignite underlie the western part of the region, and Cretaceous-age fine sands and clays lie to the east. In Mississippi, the region includes the prominent Pontotoc Ridge. The ridge is formed from outcroppings of marls and sands on the Ripley Formation cuesta. The marl and sand surficial materials have weathered into a reddish surface color, contrasting with the darker soils of adjacent 65a and 65b. The boundary to the south with the Southern Hilly Gulf Coastal Plain (65d) is broad and transitional. The climate is generally cooler to the north in 65e and there is a greater density of upland hardwood forests than in 65d.

The Loess Plains are gently rolling, irregular plains, 250-500 feet in elevation, with loess up to 50 feet thick. The region is a productive agricultural area of soybeans, cotton, corn, milo, and sorghum crops, along with livestock and poultry. Soil erosion can be a problem on the steeper, upland Alfisol soils; bottom soils are mostly silty Entisols. Oakhickory and southern flooplain forests are the natural vegetation types, although most of the forest cover has been removed for cropland. Some less-disturbed bottomland forest and cypress-gum swamp habitats still remain. Several large river systems with wide floodplains, the Obion, Forked Deer, Hatchie, Loosahatchie, and Wolf, cross the region. Streams are lowgradient and murky with silt and sand bottoms, and most have been channelized.

The Holocene floodplain of the Mississippi alluvial plain contains the meander belt of the present course of the Mississippi River and abandoned meander belts of its previous course. Point bars, oxbows, natural levees, and abandoned channels are all characteristic of the **Northern Holocene Meander Belts** ecoregion. The meander belt is an alluvial ridge that is often at a higher elevation than the more distant floodplain or backswamp areas. The natural levees were the most conspicuous landform of the meander belt, and their distribution influenced human settlements, transportation routes, and agricultural and industrial activities. Soils of this region tend to be silt loams and clay loams derived from alluvium, and are not as sandy as neighboring Northern Pleistocene Valley Trains (73b). The soils are often well drained to somewhat poorly drained. Widespread draining of wetlands and removal of bottomland forest has occurred in this region and agriculture is extensive. Cotton is the primary crop.

The **Northern Pleistocene Valley Trains** ecoregion is made up of Pleistocene glacial outwash deposits from the Mississippi and Ohio Rivers, with surface features that reflect braided-stream depositional regimes. Although they make up about 54% of the entire Mississippi Alluvial Plain ecoregion, the Pleistocene Valley Trains are limited in area in the Yazoo Basin of Mississippi. They have been largely eroded away by lateral channel migration or buried by thick sediments during Holocene times. The remnant valley train landscapes that occur in the northeastern and west-central part of the basin are Late Wisconsin in age, about 10,000-20,000 years before present. Relief is extremely low, with surfaces at or slightly above the adjacent Holocene floodplains, and there is slight or no incision of local drainage. Most of the original bottomland hardwood forest has been removed, replaced with cropland of soybeans and some cotton.

B. Threats and Historic Resource Loss

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 164.76 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 60)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in low-gradient, frequently-inundated areas such old river channels, oxbows, or shallow sloughs, or seasonally inundated floodplain.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. Current Resource Conditions

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the North Fork of the Obion River watershed resulted in placing portions of thirty-five streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters **(Figure 61)**. The most common reasons for classification are siltation, low dissolved oxygen, and habitat loss. The sources of these are largely from channel modifications, agricultural sources and impoundments.

TDEC's assessment of the chemical, physical, and biological parameters of the South Fork of the Obion River watershed resulted in placing portions of twenty-five streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are siltation, low dissolved oxygen, and habitat loss. The sources of these are largely from channel modifications, agricultural sources and impoundments.

TDEC's assessment of the chemical, physical, and biological parameters of the North Fork of the Forked Deer River watershed resulted in placing portions of forty-eight streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are siltation, nutrients, and habitat loss. The sources of these are largely from channel modifications, agricultural sources and impoundments.

TDEC's assessment of the chemical, physical, and biological parameters of the South Fork of the Forked Deer River and the Forked Deer watersheds resulted in placing portions of nineteen streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters. The most common reasons for classification are siltation, low dissolved oxygen, and habitat loss. The sources of these are largely from channel modifications, agricultural sources and impoundments.

D. Aquatic Resource Goals and Objectives

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested bottomland wetlands, flow through depressions, and seasonally inundated floodplain flats;
2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;
3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 40 acres of wetlands, and enhance 10 acres of existing wetlands within 10 years of Program initiation.

E. <u>Prioritization Strategy</u>

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized. Where suitable mitigation sites cannot be found within the 8-digit HUC, suitable sites within the same service area and the same ecoregion will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education

values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,

- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. <u>Explanation of Preservation Goals</u>

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed
2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available
3.) Preservation is determined by the district engineer to be appropriate and practicable
4.) The resources are under threat of destruction or adverse modifications
5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

20. Hatchie River Service Area

A. Geographic Service Area

The Hatchie River Service area is made up of two eight-digit HUC's, the Upper Hatchie River watershed and the Lower Hatchie River Watershed, and is 1,858 square miles **(Figure 62)**.

This service area was selected because the Hatchie as a system is a significant resource in Tennessee, and should be treated as a single system in planning efforts. The area has a moderate prevalence of hydric soils, with %5.33 of all soils categorized as hydric. The relative rate of impact acres in this service area is low, due to the classification of the Hatchie as an Outstanding Natural Resource and a Wild and Scenic River. 20 advance credits are being requested in the service area due to its size and the amount of historic impact.

The Hatchie River is a major watercourse of southwestern Tennessee. It is of considerable geographic, cultural, and historic significance. In large measure this is due to the fact that it is the only major stream of West Tennessee that has never been impounded, channelized, or otherwise modified by human activity to any major degree, although several of its tributaries have. Its environs are indicative of what much of West Tennessee must have resembled prior to the time of pioneer settlement in the early 19th century.

The Hatchie River originates in northern Mississippi and crosses into Hardeman County, TN near the community of Pocahontas. The Hatchie flows north, in a very roundabout, sinuous way, then turns northwest toward the Hardeman County seat of Bolivar. While there is usually a discernable main channel, the Hatchie at this point is largely a zone of wetlands approximately one mile wide. Bolivar was the head of navigation for small, shallow-draught steamboats in the 19th century.

From Bolivar, the Hatchie continues generally northwest, crossing into Haywood County and the southwestern corner of Madison County. At this point it enters the Hatchie National Wildlife Refuge. The rest of the stream course from this point generally trends west. There is a "bow" to the north in the final part of the stream course, which forms the line between Tipton County and Lauderdale County. The Hatchie enters the Mississippi River just north of the Hatchie Towhead and just south of the Lower Hatchie National Refuge. The Hatchie is designated as a "scenic river" under the Tennessee Wild and Scenic Rivers Act.

The Upper Hatchie River Watershed, is approximately 1,461 square miles (1,446 square miles in Tennessee), and includes parts of Chester, Hardeman, and McNairy Counties **(Table 25)**.

The Lower Hatchie River Watershed is approximately 1,461 square miles (1448 square miles in Tennessee), and includes parts of Chester, Fayette, Hardeman, Haywood, Lauderdale, Madison, and Tipton Counties.

The service area contains the Southeastern Plains, Mississippi Alluvial Plains and Miisissippi Loess Plains ecoregions.

Although mostly tree-covered, the Southeastern Plains are irregular plains with a mosaic of cropland, pasture, woodland, and forest land cover. Natural vegetation in the southern portion was predominantly longleaf pine (*Pinus palustris*), with smaller areas of oak-pine and southern mixed forest. In central and northern Mississippi, oak-pine and some western mixed mesophytic forests were dominant. In states to the east of Mississippi, the Cretaceous or Tertiary-age sands, silts, and clays of this region contrast geologically with the older metamorphic and igneous rocks of the Piedmont (45), and with the Paleozoic limestone, chert, and shale of the Interior Plateau (71). The region has thinner loess than Ecoregion 74 to the west, and elevations and relief are greater than in the Southern Coastal Plain (75) and Mississippi Alluvial Plain (73). Streams are low- to moderate-gradient with mostly sandy substrates.

The Mississippi Valley Loess Plains ecoregion stretches from near the Ohio River in western Kentucky to Louisiana. It consists primarily of irregular plains, with oak-hickory and oak-hickory-pine natural vegetation. Thick loess tends to be the distinguishing characteristic. With flatter topography than the Southeastern Plains (65) to the east, streams tend to have less gradient and more silty substrates. In Tennessee, agriculture is the dominant land use.

The Mississippi Alluvial Plain is a riverine ecoregion extending from southern Illinois, at the confluence of the Ohio River with the Mississippi River, south to the Gulf of Mexico. The Mississippi River watershed drains all or parts of thirty-one states, two Canadian provinces, and 1,243,000 square miles before the river finally reaches the Gulf. The Mississippi Alluvial Plain is mostly a broad, flat alluvial plain with river terraces, swales, and levees providing the main elements of relief. Soils are typically finer-textured and more poorly drained than the upland soils of adjacent Ecoregion 74, although there are some areas of coarser, better-drained soils. Winters are mild and summers are hot, with temperatures and precipitation increasing from north to south. Bottomland deciduous forest vegetation covered the region before much of it was cleared for cultivation. The ecoregion contained one of the largest continuous wetland systems in North America and is still a major bird migration corridor. Today, levees restrict the river from overflowing, opening large areas for extensive agricultural use. Almost all of the northern and central parts of the region are in cropland, and they receive large inputs of pesticides. Soybeans, cotton, and rice are the major crops.

Level IV Ecoregions include:

> The **Northern Hilly Gulf Coastal Plain** ecoregion contains several northsouth trending bands of sand and clay formations, and extends north to the Kentucky-Tennessee border. Eocene and Paleocene-age sand, clay, and lignite underlie the western part of the region, and Cretaceous-age fine sands and clays lie to the east. In Mississippi, the region includes the prominent Pontotoc Ridge. The ridge is formed from outcroppings of marls and sands on the Ripley Formation cuesta. The marl and sand surficial materials have weathered into a reddish surface color, contrasting with the darker soils of adjacent 65a and 65b. The boundary to

the south with the Southern Hilly Gulf Coastal Plain (65d) is broad and transitional. The climate is generally cooler to the north in 65e and there is a greater density of upland hardwood forests than in 65d.

The **Loess Plains** are gently rolling, irregular plains, 250-500 feet in elevation, with loess up to 50 feet thick. The region is a productive agricultural area of soybeans, cotton, corn, milo, and sorghum crops, along with livestock and poultry. Soil erosion can be a problem on the steeper, upland Alfisol soils; bottom soils are mostly silty Entisols. Oakhickory and southern flooplain forests are the natural vegetation types, although most of the forest cover has been removed for cropland. Some less-disturbed bottomland forest and cypress-gum swamp habitats still remain. Several large river systems with wide floodplains, the Obion, Forked Deer, Hatchie, Loosahatchie, and Wolf, cross the region. Streams are lowgradient and murky with silt and sand bottoms, and most have been channelized.

The Holocene floodplain of the Mississippi alluvial plain contains the meander belt of the present course of the Mississippi River and abandoned meander belts of its previous course. Point bars, oxbows, natural levees, and abandoned channels are all characteristic of the **Northern Holocene Meander Belts** ecoregion. The meander belt is an alluvial ridge that is often at a higher elevation than the more distant floodplain or backswamp areas. The natural levees were the most conspicuous landform of the meander belt, and their distribution influenced human settlements, transportation routes, and agricultural and industrial activities. Soils of this region tend to be silt loams and clay loams derived from alluvium, and are not as sandy as neighboring Northern Pleistocene Valley Trains (73b). The soils are often well drained to somewhat poorly drained. Widespread draining of wetlands and removal of bottomland forest has occurred in this region and agriculture is extensive. Cotton is the primary crop.

The **Bluff Hills** consist of sand, clay, silt, and lignite, and are capped by loess deposits often greater than 50 feet thick. This disjunct region tends to have deeper loess and is steeper, more dissected, and generally more forested than neighboring 74b. The carved loess has a mosaic of microenvironments, including dry slopes and ridges, moist slopes, ravines, bottomland areas and small cypress swamps. Species with more northern affinities occur far to the south in this region. This combination of northern and southern flora and fauna creates a diverse assemblage of species. While oak-hickory forest is the general natural vegetation type, some of the undisturbed bluff vegetation is rich in mesophytes, such as beech (*Fagus grandifolia*) and maples (*Acer spp*.). Other common forest trees include sweetgum (*Liquidamber styraciflua*), basswood (*Tilia americana*), eastern hophornbeam (*Ostrya virginiana*), and tulip poplar (*Liriondendron tulipifera*), while forests in the southern part of the region contain more southern magnolia (*Magnolia grandiflora*), water oak (*Quercus nigra*), and Spanish moss (*Tillandsia usneoides*). The cool ravines contain some higher gradient streams and areas of gravel substrate, creating distinct aquatic habitats.

Severe erosion has occurred in many parts of 74a, particularly when the soils lack adequate vegetative cover.

The **Blackland Prairie,** extending north from Mississippi, is a flat to undulating lowland region covering only a small portion of McNairy County, Tennessee. Although there is some of the Cretaceous-age chalk, marl, and calcareous clay that characterizes the region in Mississippi and Alabama, the northern extent of the Blackland Prairie in Tennessee is not distinct. To the south, the natural vegetation had dominant trees of sweetgum, post oak, and red cedar, along with patches of bluestem prairie. Today, the area is mostly in cropland and pasture, with small patches of mixed hardwoods.

The **Flatwoods/Alluvial Prairie Margins** extend north from Mississippi, but the distinctiveness of this narrow ecoregion belt fades quickly from Ripley, Mississippi north into Tennessee. In Mississippi and Alabama, this is a transition region between the Blackland Prairie and the more forested plains and hills. Some areas, as the Flatwoods name implies, are heavily forested, but the prairie and alluvial areas now have significant amounts of cropland and pasture. In Tennessee, the small region stands out as lower, less hilly agricultural land compared to the forested Southeastern Plains and Hills (65e) that surround it.

B. <u>Threats and Historic Resource Loss</u>

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 33.84 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 63)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in low-gradient, frequently-inundated areas such old river channels, oxbows, or shallow sloughs, or seasonally inundated floodplain.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. <u>Current Resource Conditions</u>

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the Upper and Lower Hatchie River watersheds resulted in placing portions of forty-five streams on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters **(Figure 64)**. The most common reasons for classification are siltation, Escherichia coli, and habitat loss. The sources of these are largely from agricultural and industrial sources.

D. <u>Aquatic Resource Goals and Objectives</u>

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested bottomland wetlands, flow through depressions, old oxbows and sloughs, and seasonally inundated floodplain flats;
2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;
3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;
4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 20 acres of wetlands, and enhance 20 acres of existing wetlands within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat

corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed
2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available
3.) Preservation is determined by the district engineer to be appropriate and practicable
4.) The resources are under threat of destruction or adverse modifications
5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

21. Loosahatchie River Service Area

A. Geographic Service Area

The service area is the Loosahatchie River eight digit HUC **(Figure 65)**.

The Loosahatchie River Watershed is approximately 738 square miles and includes parts of five West Tennessee counties **(Table 26)**. A part of the Mississippi River drainage basin, the watershed has 1,443 stream miles and 81 lake acres. Seventeen rare plant and animal species have been documented in the watershed, including one rare fish species.

The Loosahatchie River Watershed includes parts of Fayette, Hardeman, Haywood, Shelby, and Tipton Counties. The Loosahatchie River watershed streams have increased gradient, generally sandy substrates, and distinctive faunal characteristics for west Tennessee. Smaller streams of the Bluff Hills have localized reaches of increased gradient and small areas of gravel substrate that create aquatic habitats that are distinct from those to the east. Unique, isolated fish assemblages more typical of upland habitats can be found in these stream reaches. The river system has wide floodplains and many streams have been channelized.

This service area was selected because this 8-digit HUC is within the greater Memphis/ Shelby County metropolitan area. This region of the state has relatively high prevalence of hydric soils, with %13.64 of all soils categorized as hydric. The 8-digit HUC is an appropriate planning scale in urban areas such as this. The relative rate of impact acres in this service area is somewhat high, due to the amount of urbanization. Planning on the 8-digit HUC scale will allow the Program to devote more watershed planning efforts to service areas such as this one a greater need for planning efforts. 12 advance credits are being requested in the service area due to its urban area, size and the amount of historic impact.

The service area contains the Southeastern Plains and Miisissippi Loess Plains ecoregions.

Although mostly tree-covered, the Southeastern Plains are irregular plains with a mosaic of cropland, pasture, woodland, and forest land cover. Natural vegetation in the southern portion was predominantly longleaf pine (*Pinus palustris*), with smaller areas of oak-pine and southern mixed forest. In central and northern Mississippi, oak-pine and some western mixed mesophytic forests were dominant. In states to the east of Mississippi, the Cretaceous or Tertiary-age sands, silts, and clays of this region contrast geologically with the older metamorphic and igneous rocks of the Piedmont (45), and with the Paleozoic limestone, chert, and shale of the Interior Plateau (71). The region has thinner loess than Ecoregion 74 to the west, and elevations and relief are greater than in the Southern Coastal Plain (75) and Mississippi Alluvial Plain (73). Streams are low- to moderate-gradient with mostly sandy substrates.

The Mississippi Valley Loess Plains ecoregion stretches from near the Ohio River in western Kentucky to Louisiana. It consists primarily of irregular plains, with oak-hickory and oak-hickory-pine natural vegetation. Thick loess tends to be the distinguishing characteristic. With flatter topography than the Southeastern Plains (65) to the east, streams tend to have less gradient and more silty substrates. In Tennessee, agriculture is the dominant land use.

Level IV Ecoregions include:

The **Northern Hilly Gulf Coastal Plain** ecoregion contains several northsouth trending bands of sand and clay formations, and extends north to the Kentucky-Tennessee border. Eocene and Paleocene-age sand, clay, and lignite underlie the western part of the region, and Cretaceous-age fine sands and clays lie to the east. In Mississippi, the region includes the prominent Pontotoc Ridge. The ridge is formed from outcroppings of marls and sands on the Ripley Formation cuesta. The marl and sand surficial materials have weathered into a reddish surface color, contrasting with the darker soils of adjacent 65a and 65b. The boundary to the south with the Southern Hilly Gulf Coastal Plain (65d) is broad and transitional. The climate is generally cooler to the north in 65e and there is a greater density of upland hardwood forests than in 65d.

The **Loess Plains** are gently rolling, irregular plains, 250-500 feet in elevation, with loess up to 50 feet thick. The region is a productive agricultural area of soybeans, cotton, corn, milo, and sorghum crops, along with livestock and poultry. Soil erosion can be a problem on the steeper, upland Alfisol soils; bottom soils are mostly silty Entisols. Oakhickory and southern flooplain forests are the natural vegetation types, although most of the forest cover has been removed for cropland. Some less-disturbed bottomland forest and cypress-gum swamp habitats still remain. Several large river systems with wide floodplains, the Obion, Forked Deer, Hatchie, Loosahatchie, and Wolf, cross the region. Streams are lowgradient and murky with silt and sand bottoms, and most have been channelized.

The **Bluff Hills** consist of sand, clay, silt, and lignite, and are capped by loess deposits often greater than 50 feet thick. This disjunct region tends to have deeper loess and is steeper, more dissected, and generally more forested than neighboring 74b. The carved loess has a mosaic of microenvironments, including dry slopes and ridges, moist slopes, ravines, bottomland areas and small cypress swamps. Species with more northern affinities occur far to the south in this region. This combination of northern and southern flora and fauna creates a diverse assemblage of species. While oak-hickory forest is the general natural vegetation type, some of the undisturbed bluff vegetation is rich in mesophytes, such as beech (*Fagus grandifolia*) and maples (*Acer spp*.). Other common forest trees include sweetgum (*Liquidamber styraciflua*), basswood (*Tilia americana*), eastern hophornbeam (*Ostrya virginiana*), and tulip poplar (*Liriondendron tulipifera*), while forests in the southern part of the region contain more southern magnolia (*Magnolia grandiflora*), water oak (*Quercus nigra*), and Spanish moss (*Tillandsia usneoides*). The cool ravines contain some higher gradient streams and areas of gravel substrate, creating distinct aquatic habitats.

Severe erosion has occurred in many parts of 74a, particularly when the soils lack adequate vegetative cover.

B. <u>Threats and Historic Resource Loss</u>

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 6.01 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 66)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in low-gradient, frequently-inundated areas such old river channels, oxbows, or shallow sloughs, or seasonally inundated floodplain.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. <u>Current Resource Conditions</u>

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the Loosahatchie River watershed resulted in placing portions of twenty-two streams (including portions of the mainstem of the Loosahatchie River) on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters **(Figure 67)**. The most common reasons for classification are siltation, Escherichia coli, and habitat loss. The sources of these are largely from agricultural and industrial sources.

D. Aquatic Resource Goals and Objectives

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested bottomland wetlands, flow through depressions, old oxbows and sloughs, and seasonally inundated floodplain flats;
2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;
3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;
4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 30 acres of wetlands, and enhance 20 acres of existing wetlands within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,

- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed

2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available

3.) Preservation is determined by the district engineer to be appropriate and practicable

4.) The resources are under threat of destruction or adverse modifications

5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

22. Wolf River Service Area

A. Geographic Service Area

The service area is the Wolf River eight-digit HUC **(Figure 68)**.

The Wolf River Watershed is located in Tennessee and Mississippi. The Wolf River Watershed drains approximately 819 square miles, 556 square miles of which are in Tennessee, and empties to the Mississippi River **(Table 27)**.The Tennessee portion of the Wolf River Watershed (68.5% of the entire watershed) includes parts of Fayette, Hardeman, and Shelby Counties. Over twenty rare plant and animal species have been documented in the watershed, including three rare fish species and three rare mussel species.

This service area was selected because this 8-digit HUC is within the greater Memphis/ Shelby County metropolitan area. This region of the state has relatively high prevalence of hydric soils, with %7.79 of all soils categorized as hydric. The 8-digit HUC is an appropriate planning scale in urban areas such as this. The relative rate of impact acres in this service area is somewhat high, due to the amount of urbanization. Planning on the 8-digit HUC scale will allow the Program to devote more watershed planning efforts to service areas such as this one a greater need for planning efforts. 25 advance credits are being requested in the service area due to its urban area, size and the amount of historic impact.

The service area contains the Southeastern Plains and Miisissippi Loess Plains ecoregions.

Although mostly tree-covered, the Southeastern Plains are irregular plains with a mosaic of cropland, pasture, woodland, and forest land cover. Natural vegetation in the southern portion was predominantly longleaf pine (*Pinus palustris*), with smaller areas of oak-pine and southern mixed forest. In central and northern Mississippi, oak-pine and some western mixed mesophytic forests were dominant. In states to the east of Mississippi, the Cretaceous or Tertiary-age sands, silts, and clays of this region contrast geologically with the older metamorphic and igneous rocks of the Piedmont (45), and with the Paleozoic limestone, chert, and shale of the Interior Plateau (71). The region has thinner loess than Ecoregion 74 to the west, and elevations and relief are greater than in the Southern Coastal Plain (75) and Mississippi Alluvial Plain (73). Streams are low- to moderate-gradient with mostly sandy substrates.

The Mississippi Valley Loess Plains ecoregion stretches from near the Ohio River in western Kentucky to Louisiana. It consists primarily of irregular plains, with oak-hickory and oak-hickory-pine natural vegetation. Thick loess tends to be the distinguishing characteristic. With flatter topography than the Southeastern Plains (65) to the east, streams tend to have less gradient and more silty substrates. In Tennessee, agriculture is the dominant land use.

Level IV Ecoregions include:

The **Northern Hilly Gulf Coastal Plain** ecoregion contains several northsouth trending bands of sand and clay formations, and extends north to the Kentucky-Tennessee border. Eocene and Paleocene-age sand, clay, and lignite underlie the western part of the region, and Cretaceous-age fine sands and clays lie to the east. In Mississippi, the region includes the prominent Pontotoc Ridge. The ridge is formed from outcroppings of marls and sands on the Ripley Formation cuesta. The marl and sand surficial materials have weathered into a reddish surface color, contrasting with the darker soils of adjacent 65a and 65b. The boundary to the south with the Southern Hilly Gulf Coastal Plain (65d) is broad and transitional. The climate is generally cooler to the north in 65e and there is a greater density of upland hardwood forests than in 65d.

The **Loess Plains** are gently rolling, irregular plains, 250-500 feet in elevation, with loess up to 50 feet thick. The region is a productive agricultural area of soybeans, cotton, corn, milo, and sorghum crops, along with livestock and poultry. Soil erosion can be a problem on the steeper, upland Alfisol soils; bottom soils are mostly silty Entisols. Oakhickory and southern flooplain forests are the natural vegetation types, although most of the forest cover has been removed for cropland. Some less-disturbed bottomland forest and cypress-gum swamp habitats still remain. Several large river systems with wide floodplains, the Obion, Forked Deer, Hatchie, Loosahatchie, and Wolf, cross the region. Streams are lowgradient and murky with silt and sand bottoms, and most have been channelized.

B. <u>Threats and Historic Resource Loss</u>

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 83.04 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 69)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in low-gradient, frequently-inundated areas such old river channels, oxbows, or shallow sloughs, or seasonally inundated floodplain.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. Current Resource Conditions

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the Wolf River watershed resulted in placing portions of twenty-eight streams (including portions of the mainstem of the Wolf River) on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters **(Figure 70)**. The most common reasons for classification are siltation, Escherichia coli, and habitat loss. The sources of these are largely from agricultural sources and municipal discharges.

D. Aquatic Resource Goals and Objectives

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested bottomland wetlands, flow through depressions, old oxbows and sloughs, and seasonally inundated floodplain flats;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 30 acres of wetlands, and enhance 20 acres of existing wetlands within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors

identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.

- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed

2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available

3.) Preservation is determined by the district engineer to be appropriate and practicable

4.) The resources are under threat of destruction or adverse modifications

5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods

for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of

individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

23. Nonconnah Creek Service Area

A. Geographic Service Area

The service area is the Nonconnah Creek eight digit HUC **(Figure 71)**.

The Nonconnah Creek Watershed is approximately 281 square miles (184 square miles in Tennessee), and includes parts of Shelby and Fayette counties **(Table 28)**. The watershed extends into Mississippi. The Nonconnah Creek watershed is heavily urbanized and supports very little recreational fishing, hunting, or boating. It contains areas of low gradient, murky streams with sand and silt bottoms that are mostly channelized. Smaller streams in the watershed have localized reaches of high gradient and small areas of gravel substrate that create aquatic habitats that are distinct from others in the area. Unique, isolated fish assemblages more typical of upland habitats can be found in these stream reaches.

This service area was selected because this 8-digit HUC is within the greater Memphis/ Shelby County metropolitan area. This region of the state has relatively high prevalence of hydric soils, with %9.36 of all soils categorized as hydric. The 8-digit HUC is an appropriate planning scale in urban areas such as this. The relative rate of impact acres in this service area is high, due to the amount of urbanization. Planning on the 8-digit HUC scale will allow the Program to devote more watershed planning efforts to service areas such as this one a greater need for planning efforts. 15 advance credits are being requested in the service area due to its urban area, size and the amount of historic impact.

The service area contains the Mississippi Alluvial Plains and Miisissippi Loess Plains ecoregions.

The Mississippi Valley Loess Plains ecoregion stretches from near the Ohio River in western Kentucky to Louisiana. It consists primarily of irregular plains, with oak-hickory and oak-hickory-pine natural vegetation. Thick loess tends to be the distinguishing characteristic. With flatter topography than the Southeastern Plains (65) to the east, streams tend to have less gradient and more silty substrates. In Tennessee, agriculture is the dominant land use.

The Mississippi Alluvial Plain is a riverine ecoregion extending from southern Illinois, at the confluence of the Ohio River with the Mississippi River, south to the Gulf of Mexico. The Mississippi River watershed drains all or parts of thirty-one states, two Canadian provinces, and 1,243,000 square miles before the river finally reaches the Gulf. The Mississippi Alluvial Plain is mostly a broad, flat alluvial plain with river terraces, swales, and levees providing the main elements of relief. Soils are typically finer-textured and more poorly drained than the upland soils of adjacent Ecoregion 74, although there are some areas of coarser, better-drained soils. Winters are mild and summers are hot, with temperatures and precipitation increasing from north to south. Bottomland deciduous forest vegetation covered the region before much of it was cleared for cultivation. The ecoregion contained one of the largest continuous wetland systems in North America and is still a major bird migration corridor. Today, levees restrict the river from overflowing, opening large areas for extensive agricultural use. Almost all of the northern and central parts of the region are in cropland, and they receive large inputs of pesticides. Soybeans, cotton, and rice are the major crops.

Level IV Ecoregions include:

> The **Loess Plains** are gently rolling, irregular plains, 250-500 feet in elevation, with loess up to 50 feet thick. The region is a productive agricultural area of soybeans, cotton, corn, milo, and sorghum crops, along with livestock and poultry. Soil erosion can be a problem on the steeper, upland Alfisol soils; bottom soils are mostly silty Entisols. Oakhickory and southern flooplain forests are the natural vegetation types, although most of the forest cover has been removed for cropland. Some less-disturbed bottomland forest and cypress-gum swamp habitats still remain. Several large river systems with wide floodplains, the Obion, Forked Deer, Hatchie, Loosahatchie, and Wolf, cross the region. Streams are lowgradient and murky with silt and sand bottoms, and most have been channelized.
>
> The Holocene floodplain of the Mississippi alluvial plain contains the meander belt of the present course of the Mississippi River and abandoned meander belts of its previous course. Point bars, oxbows, natural levees, and abandoned channels are all characteristic of the **Northern Holocene Meander Belts** ecoregion. The meander belt is an alluvial ridge that is often at a higher elevation than the more distant floodplain or backswamp areas. The natural levees were the most conspicuous landform of the meander belt, and their distribution influenced human settlements, transportation routes, and agricultural and industrial activities. Soils of this region tend to be silt loams and clay loams derived from alluvium, and are not as sandy as neighboring Northern Pleistocene Valley Trains (73b). The soils are often well drained to somewhat poorly drained. Widespread draining of wetlands and removal of bottomland forest has occurred in this region and agriculture is extensive. Cotton is the primary crop.
>
> The **Bluff Hills** consist of sand, clay, silt, and lignite, and are capped by loess deposits often greater than 50 feet thick. This disjunct region tends to have deeper loess and is steeper, more dissected, and generally more forested than neighboring 74b. The carved loess has a mosaic of microenvironments, including dry slopes and ridges, moist slopes, ravines, bottomland areas and small cypress swamps. Species with more northern affinities occur far to the south in this region. This combination of northern and southern flora and fauna creates a diverse assemblage of species. While oak-hickory forest is the general natural vegetation type, some of the undisturbed bluff vegetation is rich in mesophytes, such as beech (*Fagus grandifolia*) and maples (*Acer spp*.). Other common forest trees include sweetgum (*Liquidamber styraciflua*), basswood (*Tilia americana*), eastern hophornbeam (*Ostrya virginiana*), and tulip poplar (*Liriondendron tulipifera*), while forests in the southern part of the region contain more southern magnolia (*Magnolia grandiflora*), water oak (*Quercus nigra*), and

Spanish moss (*Tillandsia usneoides*). The cool ravines contain some higher gradient streams and areas of gravel substrate, creating distinct aquatic habitats. Severe erosion has occurred in many parts of 74a, particularly when the soils lack adequate vegetative cover.

B. Threats and Historic Resource Loss

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 9.91 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 72)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in low-gradient, frequently-inundated areas such old river channels, oxbows, or shallow sloughs, or seasonally inundated floodplain.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. Current Resource Conditions

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the Nonconnah Creek watershed resulted in placing portions of twelve streams (including portions of the mainstem of the Nonconnah Creek) on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters **(Figure 73)**. The most common reasons for classification are siltation, Escherichia coli, and habitat loss. The sources of these are largely from agricultural sources and municipal discharges.

D. Aquatic Resource Goals and Objectives

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested bottomland wetlands, flow through depressions, old oxbows and sloughs, and seasonally inundated floodplain flats;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 20 acres of wetlands, and enhance 10 acres of existing wetlands within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Prioritizing mitigation sites in the same 10-digit HUC as the impact. Where suitable mitigation sites cannot be found within the 10-digit HUC, suitable sites within the 8-digit HUC will be prioritized,
- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,

- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,
- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. <u>Explanation of Preservation Goals</u>

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed
2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available
3.) Preservation is determined by the district engineer to be appropriate and practicable
4.) The resources are under threat of destruction or adverse modifications
5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.

- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. <u>Periodic Evaluation and Reporting</u>

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

24. Mississippi River Service Area

A. <u>Geographic Service Area</u>

The Service area is the Mississippi River eight-digit HUC **(Figure 74)**.

The Mississippi River Watershed is approximately 1,086 square miles (583 square miles in Tennessee) and includes parts of Dyer, Lake, Lauderdale, Shelby, and Tipton Counties **(Table 29)**. A part of the Mississippi River drainage basin, the watershed has 519.9 stream miles and 125 lake acres in Tennessee. Thirty-five rare plant and animal species have been documented in the watershed, including seven rare fish species.

This service area was selected because this 8-digit HUC has portions within the greater Memphis/ Shelby County metropolitan area. This region of the state has a very high prevalence of hydric soils, with %19.85 of all soils categorized as hydric. The 8-digit HUC is an appropriate planning scale in urban areas such as this. The relative rate of impact acres in this service area is very high, due to the amount of urbanization, and large amount of wetland acreage adjacent to the Mississippi River. Planning on the 8-digit HUC scale will allow the Program to devote more watershed planning efforts to service areas such as this one a greater need for planning efforts. 25 advance credits are being requested in the service area due to its urban area, size and the amount of historic impact.

The service area contains the Mississippi Alluvial Plains and Miisissippi Loess Plains ecoregions.

The Mississippi Valley Loess Plains ecoregion stretches from near the Ohio River in western Kentucky to Louisiana. It consists primarily of irregular plains, with oak-hickory and oak-hickory-pine natural vegetation. Thick loess tends to be the distinguishing characteristic. With flatter topography than the Southeastern Plains (65) to the east, streams tend to have less gradient and more silty substrates. In Tennessee, agriculture is the dominant land use.

The Mississippi Alluvial Plain is a riverine ecoregion extending from southern Illinois, at the confluence of the Ohio River with the Mississippi River, south to the Gulf of Mexico. The Mississippi River watershed drains all or parts of thirty-one states, two Canadian provinces, and 1,243,000 square miles before the river finally reaches the Gulf. The Mississippi Alluvial Plain is mostly a broad, flat alluvial plain with river terraces, swales, and levees providing the main elements of relief. Soils are typically finer-textured and more poorly drained than the upland soils of adjacent Ecoregion 74, although there are some areas of coarser, better-drained soils. Winters are mild and summers are hot, with temperatures and precipitation increasing from north to south. Bottomland deciduous forest vegetation covered the region before much of it was cleared for cultivation. The ecoregion contained one of the largest continuous wetland systems in North America and is still a major bird migration corridor. Today, levees restrict the river from overflowing, opening large areas for extensive agricultural use. Almost all of the northern and central parts of the region are in cropland, and they receive large inputs of pesticides. Soybeans, cotton, and rice are the major crops.

Level IV Ecoregions include:

The **Loess Plains** are gently rolling, irregular plains, 250-500 feet in elevation, with loess up to 50 feet thick. The region is a productive agricultural area of soybeans, cotton, corn, milo, and sorghum crops, along with livestock and poultry. Soil erosion can be a problem on the steeper, upland Alfisol soils; bottom soils are mostly silty Entisols. Oakhickory and southern flooplain forests are the natural vegetation types, although most of the forest cover has been removed for cropland. Some less-disturbed bottomland forest and cypress-gum swamp habitats still remain. Several large river systems with wide floodplains, the Obion, Forked Deer, Hatchie, Loosahatchie, and Wolf, cross the region. Streams are lowgradient and murky with silt and sand bottoms, and most have been channelized.

The Holocene floodplain of the Mississippi alluvial plain contains the meander belt of the present course of the Mississippi River and abandoned meander belts of its previous course. Point bars, oxbows, natural levees, and abandoned channels are all characteristic of the **Northern Holocene Meander Belts** ecoregion. The meander belt is an alluvial ridge that is often at a higher elevation than the more distant floodplain or backswamp areas. The natural levees were the most conspicuous landform of the meander belt, and their distribution influenced human settlements, transportation routes, and agricultural and industrial activities. Soils of this region tend to be silt loams and clay loams derived from alluvium, and are not as sandy as neighboring Northern Pleistocene Valley Trains (73b). The soils are often well drained to somewhat poorly drained. Widespread draining of wetlands and removal of bottomland forest has occurred in this region and agriculture is extensive. Cotton is the primary crop.

The **Bluff Hills** consist of sand, clay, silt, and lignite, and are capped by loess deposits often greater than 50 feet thick. This disjunct region tends to have deeper loess and is steeper, more dissected, and generally more forested than neighboring 74b. The carved loess has a mosaic of microenvironments, including dry slopes and ridges, moist slopes, ravines, bottomland areas and small cypress swamps. Species with more northern affinities occur far to the south in this region. This combination of northern and southern flora and fauna creates a diverse assemblage of species. While oak-hickory forest is the general natural vegetation type, some of the undisturbed bluff vegetation is rich in mesophytes, such as beech (*Fagus grandifolia*) and maples (*Acer spp*.). Other common forest trees include sweetgum (*Liquidamber styraciflua*), basswood (*Tilia americana*), eastern hophornbeam (*Ostrya virginiana*), and tulip poplar (*Liriondendron tulipifera*), while forests in the southern part of the region contain more southern magnolia (*Magnolia grandiflora*), water oak (*Quercus nigra*), and Spanish moss (*Tillandsia usneoides*). The cool ravines contain some higher gradient streams and areas of gravel substrate, creating distinct aquatic habitats.

Severe erosion has occurred in many parts of 74a, particularly when the soils lack adequate vegetative cover.

B. Threats and Historic Resource Loss

It is estimated that Tennessee has lost over 1 million acres of wetlands over the last century (USGS, WSP#2425). The largest single cause of impact to those wetlands was channelization and drainage for agricultural conversion. According to TDEC's Tennessee Wetlands Conservation Strategy, approximately 787,000 acres of wetlands remain in Tennessee, a 60% loss from historic acreage. Of today's existing wetland acres, 7% (54,811 acres) are considered impaired (TDEC, 1998). However, no mechanism exists to accurately measure the loss or gain of wetlands in Tennessee. Conversion for agricultural uses, transportation projects, and land development are a significant cause of impacts to wetlands.

A review of ARAP permits requiring mitigation for wetland impacts authorized by TDEC from 1999 to 2010 indicates that 67.29 acres of wetland impact were authorized within this service area during that time period.

Historic wetland resource locations can be examined by the locations of identified wetlands on the National Wetland Inventory (NWI) and those areas determined to have soils with hydric indicators by the NRCS **(Figure 75)**. An analysis of these areas within the service area indicates that these areas were predominant throughout the service area in low-gradient, frequently-inundated areas such old river channels, oxbows, or shallow sloughs, or seasonally inundated floodplain.

Current land use trends include urbanization around previously developed areas, with a predominant agricultural footprint throughout much of the service area.

C. Current Resource Conditions

Historically, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. Although agricultural conversions are decreasing, and some marginal cropland is being abandoned and allowed to revert to a more natural state, urban conversions and transportation construction impacts continue and likely will contribute to future impacts.

TDEC's assessment of the chemical, physical, and biological parameters of the Mississippi River watershed resulted in placing portions of six streams (including portions of the mainstem of the Mississippi River) on the 303(d) list of waterbodies impaired to the extent that they are not meeting the uses designated to those waters **(Figure 75)**. The most common reasons for classification are siltation, habitat loss and contamination with PCB's, metals and other substances. The sources of these are largely from agricultural sources and from dredging contaminated sediments.

D. Aquatic Resource Goals and Objectives

The overall objective of the Program within the service area is to achieve ecological success on a watershed basis by restoring, replacing, enhancing, creating and preserving wetland types and functions, that are appropriate to the service area, to compensate for lost functions due to activities authorized by §404 and/or §401 of the Clean Water Act and/or §10 of the rivers and Harbors Act of 1899 within the service area. All restoration goals are subject to change based upon watershed and §10, §404, and §401 permitting needs.

The specific aquatic resource goals and objectives are to:

1.) Restore prior-converted farmlands, enhance functionally deficient wetlands, or create wetlands with an emphasis on forested bottomland wetlands, flow through depressions, old oxbows and sloughs, and seasonally inundated floodplain flats;

2.) Restore and enhance impaired and enhanced wetland riparian corridors within the service area;

3.) Restore, enhance, or create upland buffers adjacent to wetlands and wetland riparian corridors;

4.) Preserve significant wetland resources and habitat within the service area.

Restoration of converted wetlands will be the primary goal for wetland impacts within the service area. Geographic Information System (GIS) analysis of the service area will be utilized to indicate suitable locations for project sites given a variety of factors, including, but not limited to hydric soil indicators, landscape position, land use practices, and hydrology sources. The initial goal of the ILF program in this service area is to restore 10 acres of wetlands, and enhance 5 acres of existing wetlands within 10 years of Program initiation.

E. Prioritization Strategy

Effective site selection at a landscape and watershed scale will help increase the success and quality of aquatic resource restoration, establishment, and enhancement projects. TWF will consider many factors in choosing ecologically suitable sites, including:

- Hydrological conditions, soil characteristics, and other physical and chemical characteristics,
- Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions,
- Compatibility with adjacent land uses and watershed management plans,

- Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species,
- Ability of the project to address sources of impairment in 303(d) listed drainages,
- Likelihood of success: Funded projects must demonstrate a high likelihood of success through a sound wetland restoration, creation and/or enhancement concept. The water source for the site should be reliable. Threats from invasive species or vandalism should be low or manageable. The project will be evaluated for its ability to result in successful and sustainable net gain of wetland acreage and/or function, with limited maintenance. Restoration projects will receive priority due to the higher lift in function that can be achieved, and the higher success rate of these types of projects,
- Multiple objectives: The project will be evaluated for its ability to address multiple functions and services such as improvement of fish and wildlife habitat, support for rare species, flood attenuation, water quality improvement, and recreation or education values. The project should target native plant community diversity and natural processes. Greater functional gains will be given more preference,
- Supports regional conservation initiatives and is compatible with the surrounding landscape: Projects should be located where they pose minimal conflicts with adjacent land uses and where they meet regional conservation priorities, address limiting factors identified in watershed assessments, provide habitat corridors, and/ or add to the effectiveness of nearby protected natural areas.
- Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

F. Explanation of Preservation Goals

Preservation of existing wetlands that support a significant population of rare plant or animal species, or that are a rare wetland type may be proposed to generate credits. Credits may also be proposed for preservation or improvements of riparian areas, buffers and uplands if the resources in these areas are essential to maintain the ecological viability of a water of the U.S. Credits generated for preservation and buffers will be determined on a case-by-case basis through negotiation between TWF and the Corps, in consultation with the IRT.

Preservation may be used when all of the following five criteria are met:

1.) The resources to be preserved provide important physical, chemical, or biological functions for the watershed

2.) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available

3.) Preservation is determined by the district engineer to be appropriate and practicable

4.) The resources are under threat of destruction or adverse modifications

5.) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

G. Public & Private Stakeholder Involvement

As the Program sponsor, TWF will optimize compensatory mitigation efforts under the Program by working closely with interested agencies, other organizations, and private entities. At a minimum, information will be shared via the public notice period for the prospectus, and may include public or private meetings or other forums. In addition, TWF will continue to work closely with other conservation entities, public and private organizations, agencies, and landowners to identify wetland mitigation opportunities and develop mitigation plans and methods for inclusion in the ILF instrument following IRT review and Corps approval. Methods for assessing aquatic resource functions pre- and post-project implementation will be coordinated with ongoing efforts by TDEC and the Corps with input from the IRT and other interested parties. This will allow Program efforts to dovetail with ongoing inventory and monitoring efforts.

TWF will incorporate program projects and initiatives into promotional materials and will highlight program accomplishments at conferences, meetings, and other forums where TWF regularly interacts with stakeholders.

H. Long-Term Protection and Management

TWF has several legal mechanisms to ensure the ILF Program compensatory mitigation project properties will be protected in perpetuity:

- TWF can execute and hold a conservation easement or record a deed restriction on certain properties with willing public or private landowners.
- TWF can retain ownership of a property obtained through fee-simple purchase.
- TWF can donate a property acquired through fee-simple purchase to an appropriate public agency with deed restrictions (per 2008 Mitigation Rule 33 CFR 332.7(a)).
- TWF can donate a conservation easement to an appropriate land conservation organization.

Under the Program, the management plan or terms of the protection mechanism would describe the conservation values and permitted/prohibited uses for each property. The protection mechanism will ensure that the there will be no development or land use changes on the property that would diminish the level of physical, chemical and biological ecosystem functions that each project site provides to the watershed. All protection documents must be approved by the appropriate Corps District Office of Counsel. On all properties where TWF holds an easement, TWF would perform annual stewardship monitoring with onsite field observations, reporting, and enforcement actions, as appropriate. On properties owned by entities other than TWF, those entities will retain responsibility for the maintenance of the site after the Corps, in consultation with the IRT, has determined that the project site has met all of its success criteria.

I. Periodic Evaluation and Reporting

At a regular interval to be determined by the Corps, in consultation with the IRT, TWF will submit the necessary documentation evaluating the progress of the ILF Program in meeting the goals and objectives for this service area. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefits of all ILF project sites are performing to achieve the goals prescribed by the compensation planning framework. Periodic evaluation will also include site inspections of individual projects in the service area at the request of the Corps, in consultation with the IRT, in addition to regular monitoring of project sites.

The periodic evaluation will assess the effectiveness of the compensation planning framework for this service area to achieve the goals set forth for the ILF Program in Section II. The compensation planning framework and advanced credit allocation for this service area will be revised as necessary based upon changes within the service area, including but not limited to: natural disasters, land-use changes, development activity, permitting requirements, mitigation needs, environmental changes, ecological needs, and regulatory policy. If it is determined during the periodic evaluation that the compensation planning framework requires revision to address the program goals and objectives in Section II, then TWF will submit the requested changes to the Corps, who will distribute the correspondence to the IRT for review and approval.

XIII. EXECUTION

Execution of this Tennessee Wildlife Federation Wetland In-Lieu Fee Program Instrument by the U.S. Army Corps of Engineers Nashville District, U.S. Army Corps of Engineers Memphis District, and Tennessee Department of Environment and Conservation, in consultation with the sponsor, the Tennessee Wildlife Federation, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the Tennessee Wildlife Resources Agency, and other appropriate agencies and the implementation of its terms evidences that the Corps of Engineers has afforded all cooperating parties an opportunity to comment on the undertaking and its effect on the aquatic resources in Tennessee and that the Corps of Engineers has taken into account the comments provided by the IRT on the identified aquatic resources in order to complete this Program Instrument.

This ILF Instrument will become valid on the later date of the signature of the Sponsor, the representative of the Corps, or the representative of TDEC. Any of the IRT members may terminate their participation upon written notification to all signatory parties without invalidating this Instrument. Participation of the IRT member seeking termination will end 30 days after written notification.

XIV. REFERENCES

Compensatory Mitigation for Losses of Aquatic Resources; Final Rule, 73 Fed. Reg. 19,593, 19,594 (Apr. 10, 2008) (to be codified at 33 C.F.R. pts. 325 and 332).

Dahl, Thomas E. 1990. Wetlands losses in the United States 1780's to 1980's. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center Online. Retrieved February 2011

Environmental Law Institute. December 2009. In-Lieu Fee Mitigation: Model Instrument Language and Resources

Tennessee Department of Environment and Conservation. October 1998. Tennessee Wetlands Conservation Strategy.

Tennessee Department of Environment and Conservation. June 2009. Prospectus for a Statewide In-Lieu-Fee Program.

Tennessee Department of Environment and Conservation. April 2008. 2008 305(b) Report, The Status of Water Quality in Tennessee.

Tennessee Department of Environment and Conservation. April 2002. Emory River Watershed (06010208) of the Tennessee River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. April 2002. Harpeth River Watershed (05130204) of the Cumberland River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. April 2002. Nonconnah Creek Watershed (08010211) of the Mississippi River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. April 2002. Ocoee River Watershed (0602003) of the Tennessee River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. April 2002. South Fork Forked Deer River Watershed (08010205) of the Tennessee River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. April 2002. Stones River Watershed (0602003) of the Cumberland River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. April 2002. Watauga River Watershed (06010103) of the Tennessee River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. April 2002. Watts Bar Watershed (06010201) of the Tennessee River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2003. Caney Fork River Watershed (05130108) of the Cumberland River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2003. Forked Deer River Watershed (05130108) of the Mississippi River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2003. Fort Loudoun Lake Watershed (06010201) of the Tennessee River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2003. Loosahatchie River Watershed (08010209) of the Mississippi River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2003. Lower Elk River Watershed (06030004) of the Tennessee River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2003. North Fork Forked Deer River Watershed (08010204) of the Mississippi River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2003. Pickwick Lake Watershed (0603005) of the Tennessee River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2003. South Fork Holston Watershed (06010102) of the Tennessee River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2003. Wheeler Lake Watershed (06030002) of the Tennessee River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. November 2003. Collins River Watershed (05130107) of the Cumberland River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. November 2003. Hiwassee River Watershed (06020002) of the Tennessee River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. November 2003. Upper Elk River Watershed (06030003) of the Tennessee River Basin: Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2005. East Fork Clark's River Watershed (06040006) of the Tennessee River Basin: Watershed Water Quality Management.

Tennessee Department of Environment and Conservation. October 2005. Tennessee Western Valley (KY Lake) Watershed (06040005) of the Tennessee River Basin: Watershed Water Quality Management.

Tennessee Department of Environment and Conservation. October 2005. Upper Duck River Watershed (06040002) of the Tennessee River Basin: Watershed Water Quality Management.

Tennessee Department of Environment and Conservation. November 2005. Buffalo River Watershed (06040004) of the Tennessee River Basin: Watershed Water Quality Management.

Tennessee Department of Environment and Conservation. November 2005. Lower Clinch River Watershed (06010207) of the Tennessee River Basin: Watershed Water Quality Management.

Tennessee Department of Environment and Conservation. November 2005. Lower Duck River Watershed (06040003) of the Tennessee River Basin: Watershed Water Quality Management.

Tennessee Department of Environment and Conservation. November 2005. Lower Tennessee River Watershed (06020001) of the Tennessee River Basin: Watershed Water Quality Management.

Tennessee Department of Environment and Conservation. November 2005. Wolf River Watershed (08010210) of the Mississippi River Basin: Watershed Water Quality Management.

Tennessee Department of Environment and Conservation. December 2005. Tennessee Western Valley (Beech River) Watershed (06040001) of the Tennessee River Basin: Watershed Water Quality Management.

Tennessee Department of Environment and Conservation. January 2006. Little Tennessee River Watershed (06010204) of the Tennessee River Basin: Watershed Water Quality Management.

Tennessee Department of Environment and Conservation. January 2006. North Fork Holston River Watershed (06010101) of the Tennessee River Basin: Watershed Water Quality Management.

Tennessee Department of Environment and Conservation. January 2006. South Fork Holston River Watershed (06010102) of the Tennessee River Basin: Watershed Water Quality Management.

Tennessee Department of Environment and Conservation. October 2007. Barren River Watershed (05110002) of the Ohio River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2007. Clear Fork (05130101) of the Cumberland River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2007. Cordell Hull Lake Watershed (05130106) of the Cumberland River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2007. Holston River Watershed (06010104) of the Tennessee River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2007. Lower Hatchie River Watershed (08010208) of the Mississippi River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2007. Lower Tennessee River Watershed-Group 4 (06020001) of the Tennessee River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2007. Obey River Watershed (05130105) of the Cumberland River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2007. Old Hickory Lake Watershed (05130201) of the Cumberland River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2007. Powell River Watershed (06010206) of the Tennessee River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2007. Red River Watershed (05130206) of the Cumberland River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2007. South Fork Cumberland River Watershed (05130104) of the Cumberland River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2007. Upper Clinch River Watershed (06010205) of the Tennessee River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2007. Upper Cumberland River Watershed (05130103) of the Cumberland River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2007. Upper Hatchie River Watershed (08010207) of the Tennessee River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2008. Lake Barkley Watershed (05130205) of the Cumberland River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2008. Cheatham Lake Watershed (05130202) of the Cumberland River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2008. Guntersivlle Lake Watershed (06030001) of the Tennessee River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2008. Lower French Broad River Watershed (06010107) of the Tennessee River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2008. Mississippi River Watershed (08010100) of the Mississippi River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2008. Nolichucky River Watershed (06010108) of the Tennessee River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2008. North Fork Obion River Watershed (08010202) of the Mississippi River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2008. Nolichucky River Watershed (06010108) of the Tennessee River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2008. Pigeon River Watershed (06010106) of the Tennessee River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2008. Sequatchie River Watershed (06020004) of the Tennessee River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2008. Nolichucky River Watershed (06010108) of the Tennessee River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2008. South Fork Obion River Watershed (08010203) of the Mississippi River Basin: Watershed Water Quality Management Plan.

Tennessee Department of Environment and Conservation. October 2008. Upper French Broad River Watershed (06010105) of the Tennessee River Basin: Watershed Water Quality Management Plan.

Tennessee's Wetland Conservation Strategy, Third Edition. Governor's Interagency Wetlands Committee and Its Technical Working Group, OCTOBER 1998.

Tennessee Wildlife Resources Foundation. 2002. TWRF, LLC *"In Lieu Fee" Stream Mitigation Program Memorandum of Agreement*. Signatories: Tennessee Department of Environment and Conservation, U.S. Army Corps of Engineers Memphis District, U.S. Army Corps of Engineers Nashville District, Tennessee Valley Authority, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, Tennessee Wildlife Resources Agency, and Tennessee Wildlife Resources Foundation, LLC.

U.S. Geological Survey. "Hydrologic Unit Maps." http://water.usgs.gov/GIS/huc.html. (Last visited August 2010.)

U.S. Geological Survey. Water Supply Paper #2425, National Water Summary on Wetland Resources. STATE SUMMARY HIGHLIGHT. Retrieved March 2011.

APPENDIX A
Draft Fee Schedule

FEE SCHEDULE

The fee schedule for credit sales is based on the cost of current and projected representative projects plus requirements included in the Instrument. The fee will be rounded up to the nearest five dollars. The fee will be based upon the expected costs which include:

- ☐ Administration
- ☐ Legal fees
- ☐ Land costs
- ☐ Design/Planning
- ☐ Construction (includes labor, planting)
- ☐ Monitoring
- ☐ Adaptive Management (during project)
- ☐ Contingency for financial assurances
- ☐ Long Term Management

The fees will be subject to change as determined by the Sponsor. Changes in fees will not constitute a modification of the Instrument.

The methodology for determining credits and fees may change over time. Such changes will be determined by the Corps and TDEC in consultation with the IRT. Such changes will not constitute a modification of the Instrument.

The base fee for all Service Areas will be $25,000 per credit. The Sponsor may assess additional fees as determined necessary to ensure that viable and sufficient mitigation is developed within each service area. Such additional fees will be based upon, but not limited to, additional costs of developing a mitigation project incurred due to the size of an impact, location of the impacts, fluctuations in land acquisition costs within a particular service area, additional regulatory requirements (e.g., permit requirements that mitigation be completed within a specific portion of a given service area, extended monitoring requirements or site-specific details for long-term mitigation management).

All base and additional fees will be disclosed to the Corps and TDEC in the annual accounting report.

APPENDIX B
Draft Sample Credit Purchase Letter

TENNESSEE WILDLIFE FEDERATION
Conserving Our Wildlife & Natural Resources Since 1946

January 1, 2012

Mr. Marty Tyree
In-lieu Fee Program Coordinator
Regulatory Branch
Nashville District U.S. Army Corps of Engineers
3701 Bell Road
Nashville, TN 37214

Re: Acknowledgement of Wetland Credit Purchase
Tennessee Wildlife Federation Wetland In-Lieu Fee Program
USACE §404 permit no. XXXXXXXXX
TDEC §401 Water Quality Certification (ARAP) - NRS XX.XXX

Dear Mr. Tyree:

The Tennessee Wildlife Federation Wetland In-Lieu Fee Program (Program) acknowledges the remittance of $XX,XXX for the purchase, paid in full, of X.XX wetland credits from the Program for impacts to [*wetland type*] wetlands, as provided by the conditions of the referenced regulatory permits.

Please contact us at (615) 353-1133 if you need any further information.

Very truly yours,

Tennessee Wildlife Federation Wetland In-Lieu Fee Program

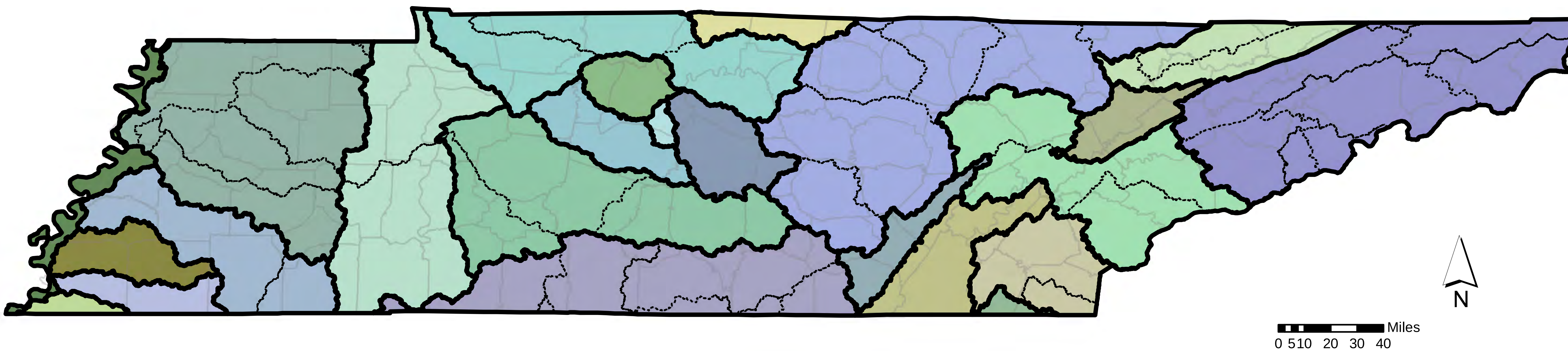
Michael Butler

Chief Executive Officer

Enc.

Cc: Mr. Mike Lee, TDEC
Permittee

Figure 1: Proposed Service Areas
TWF In Lieu Fee Program for Tennessee Wetlands



Legend
Service Areas

Barren River	French Broad - Holston Rivers	Mill Creek
Buffalo - Duck Rivers	Harpeth River	Mississippi River
Cheatham Lake	Hatchie River	Nonconnah Creek
Chickamauga	Hiwassee - Ocoee Rivers	Sequatchie Valley
Conasauga River	Loosahatchie River	Stones River
Elk River - Border Lakes	Lower Clinch River	Upper Cumberland
Emory River - Watts Barr Lake	Lower Cumberland	Upper Tennessee
Forked Deer - Obion Rivers	Lower Tennessee River	Wolf River

Figure 2: Proposed Service Areas
TDEC Wetland Impact Acres 2000 - 2009

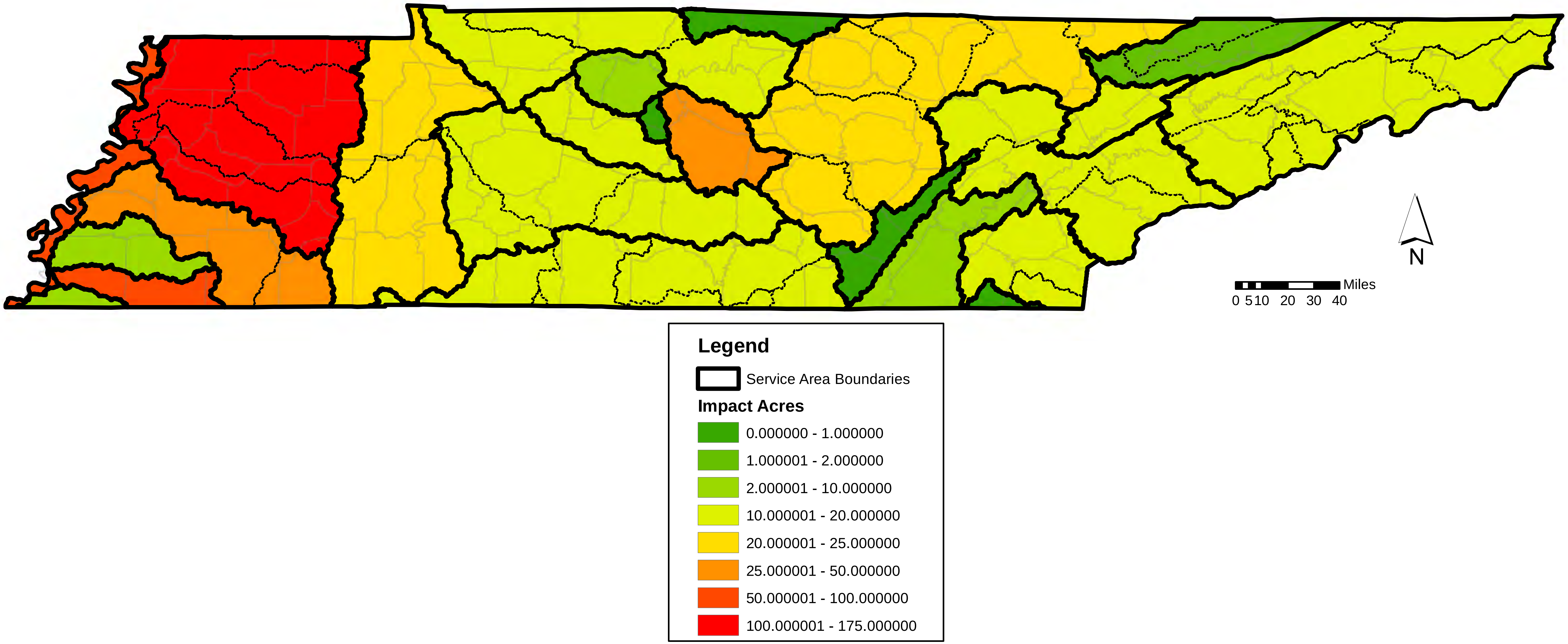


Figure 3: Proposed Service Areas
Percent of Service Area with Hydric Soils

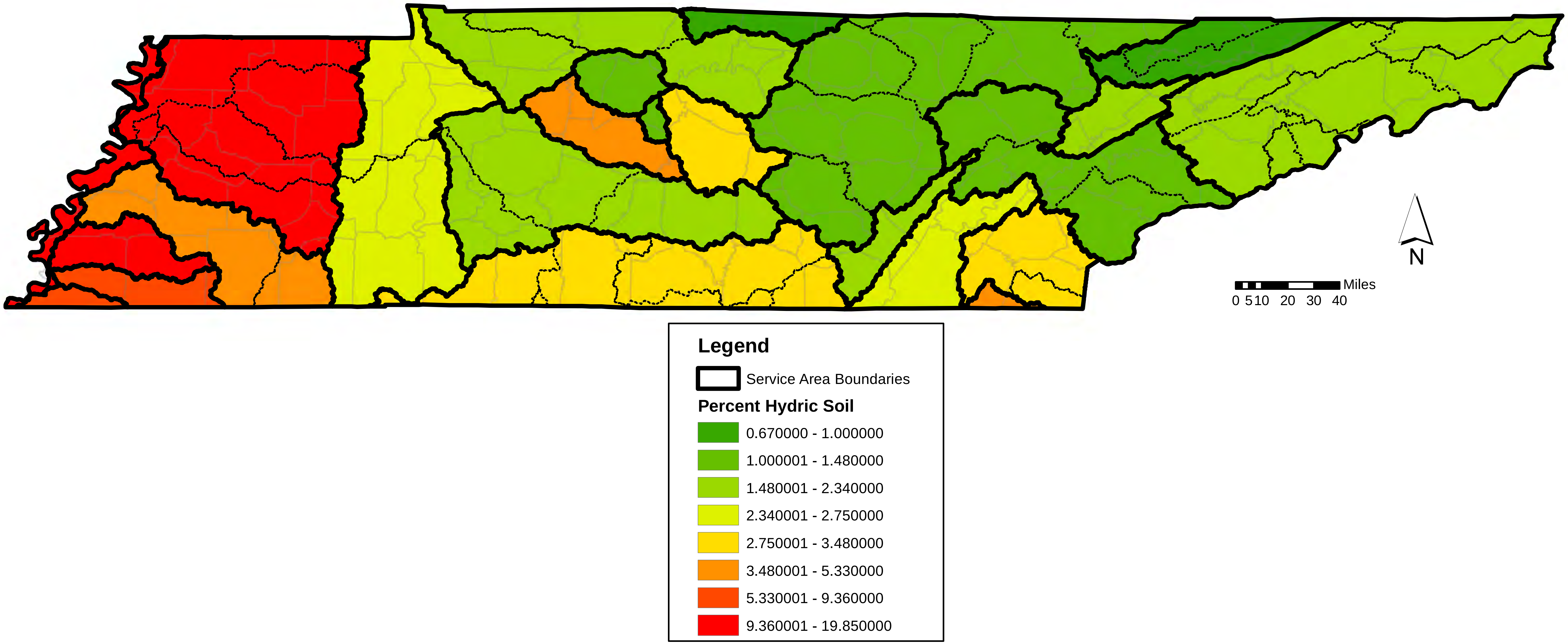
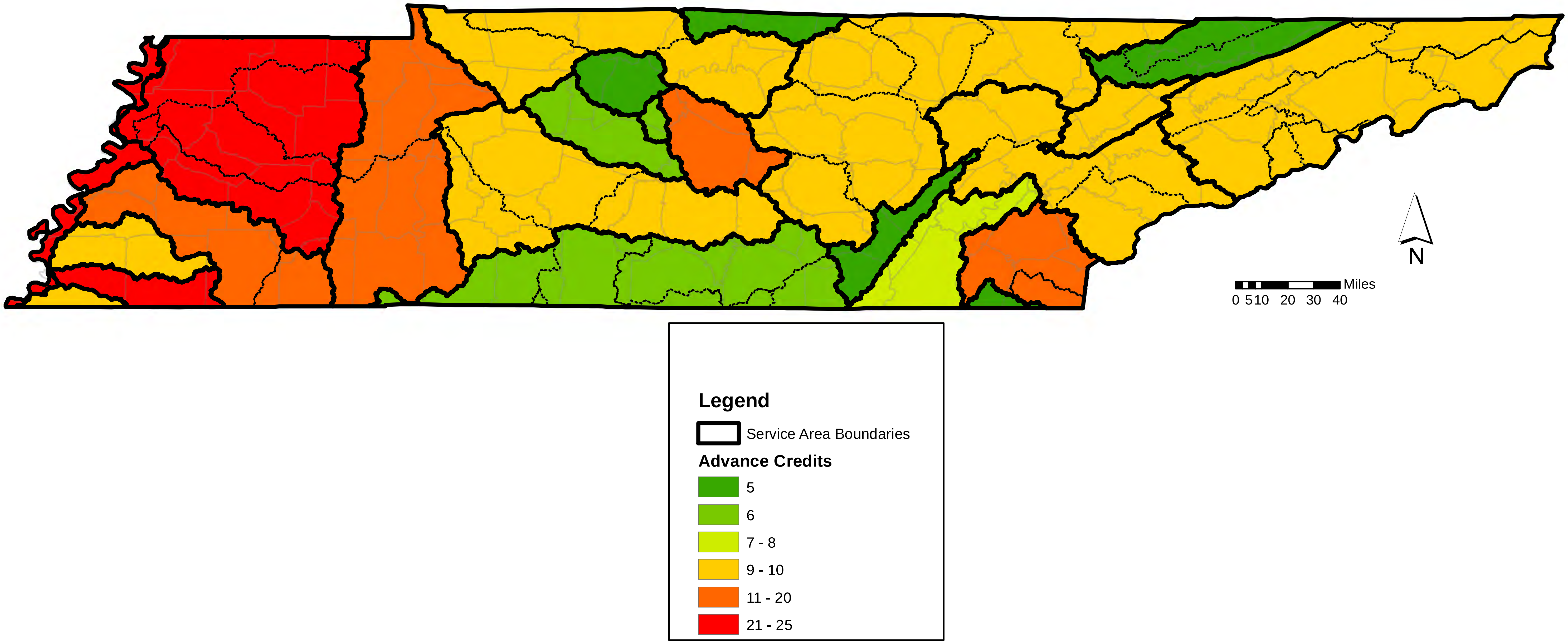


Figure 4: Proposed Service Areas
Advance Credits per Service Area



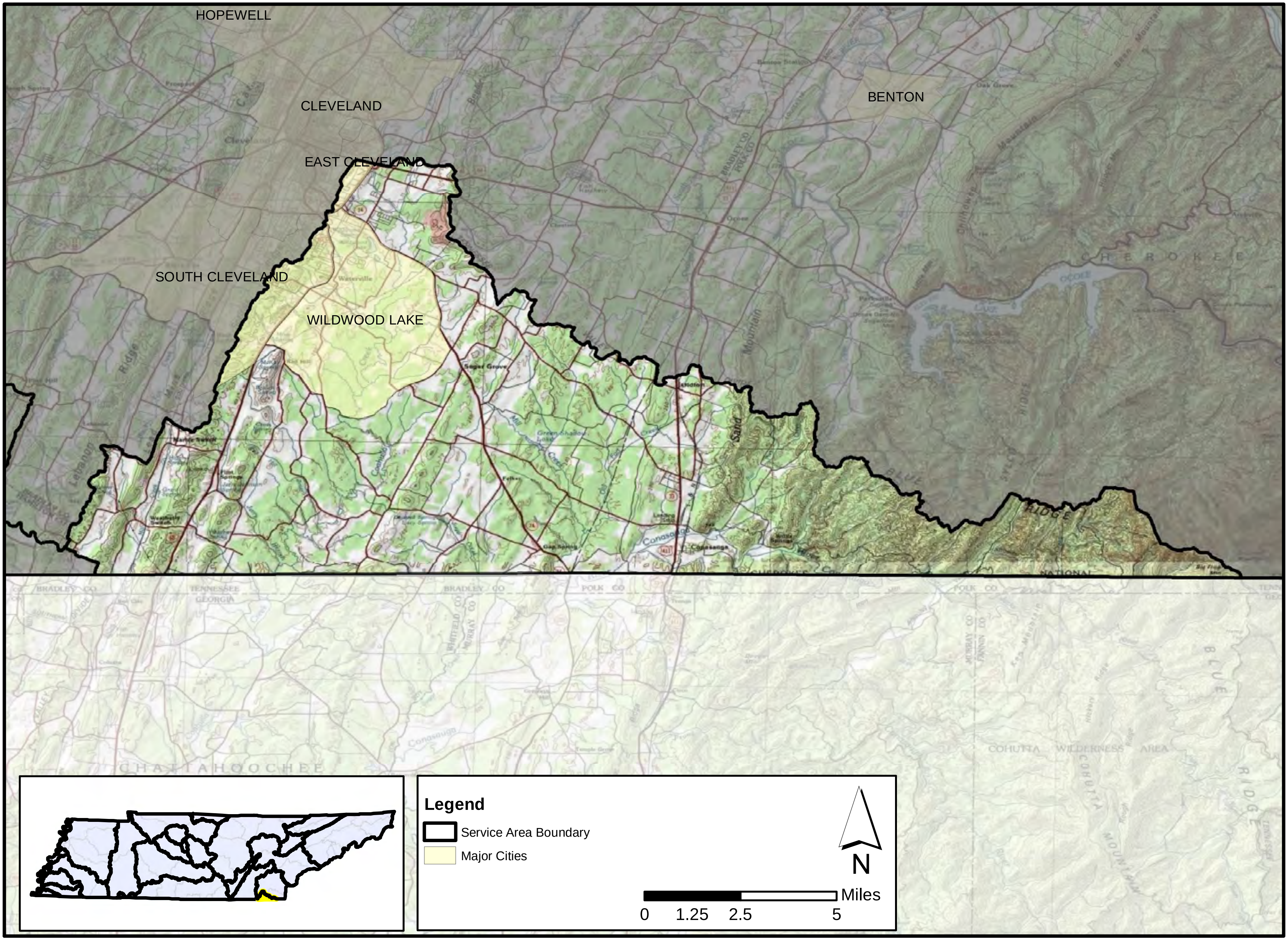


Figure 5: Conasauga Service Area Location

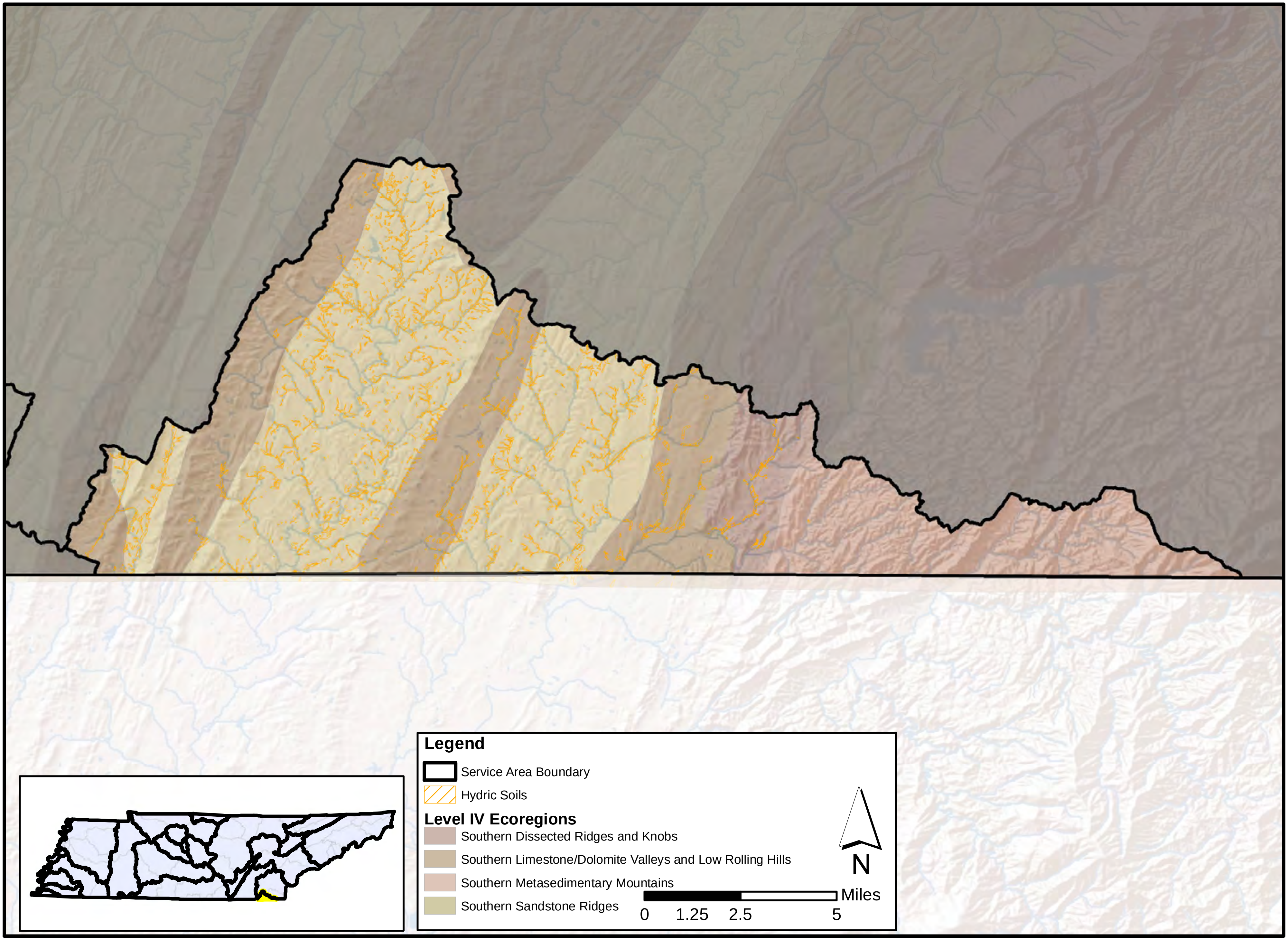


Figure 6: Conasauga Service Area Ecoregions and Hydric Soils

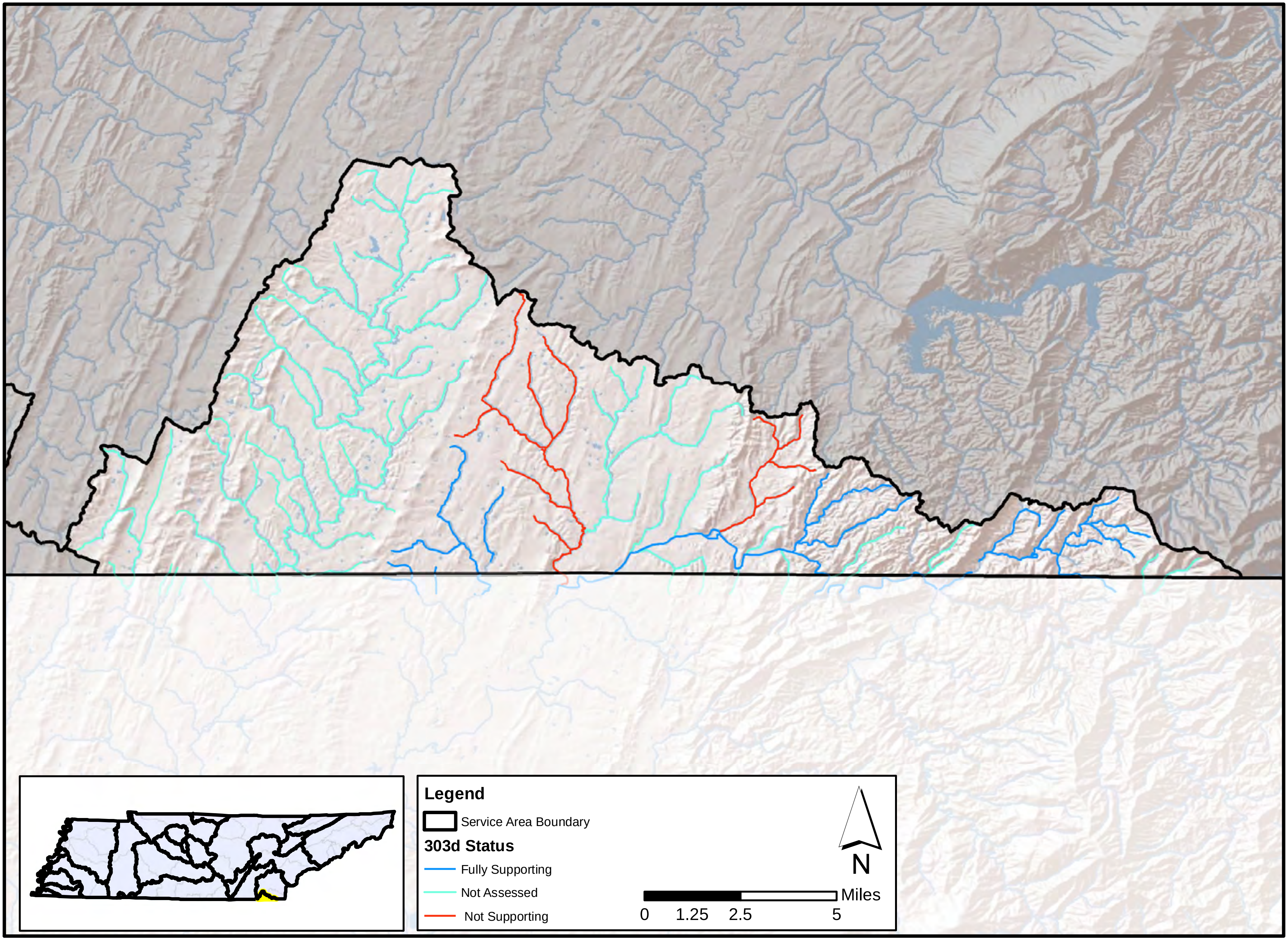


Figure 7: Conasauga Service Area 303(d) Streams

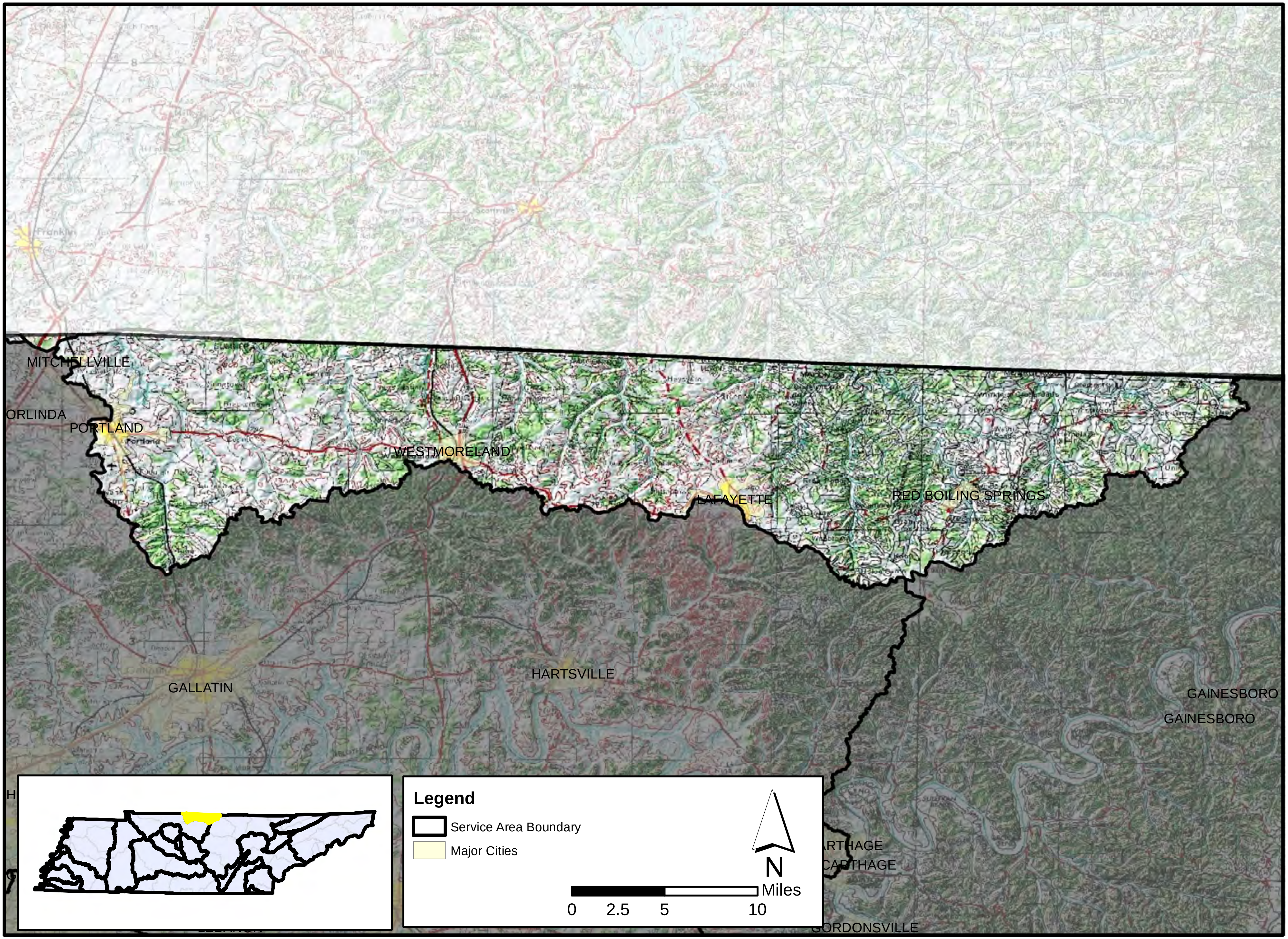


Figure 8: Barren River Service Area Location

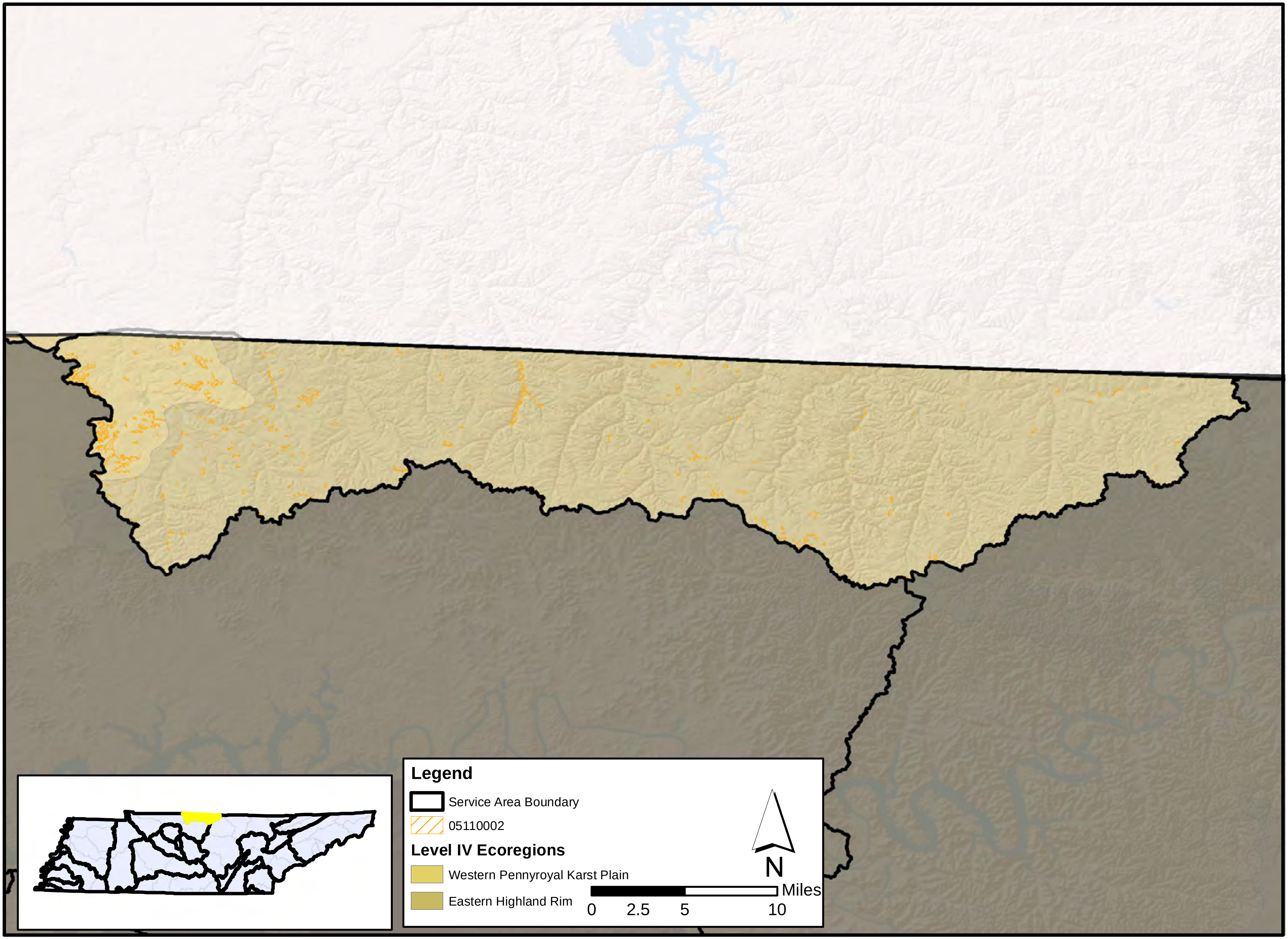


Figure 9: Barren River Service Area Ecoregions and Hydric Soils

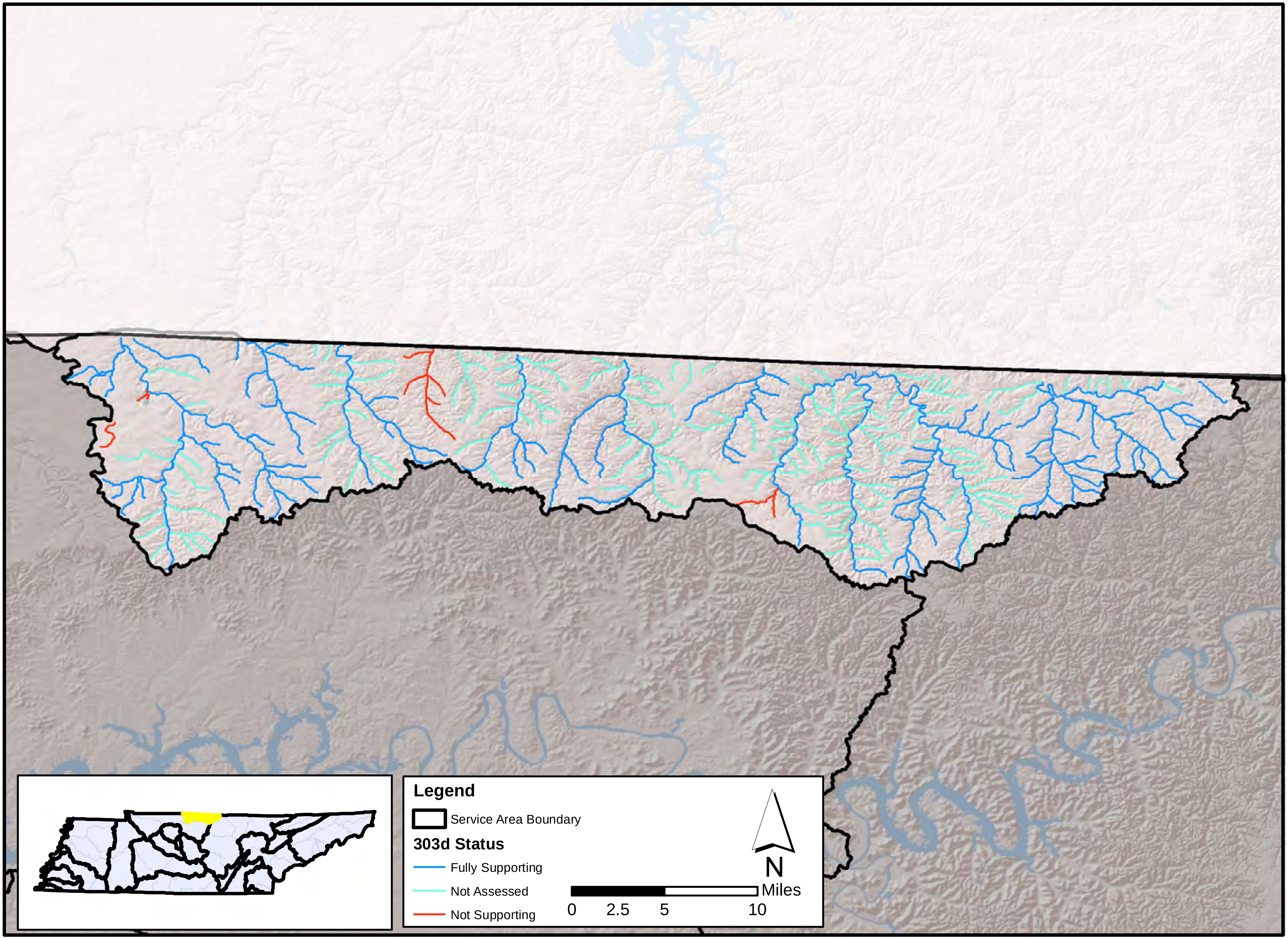


Figure 10: Barren River Service Area 303(d) Streams

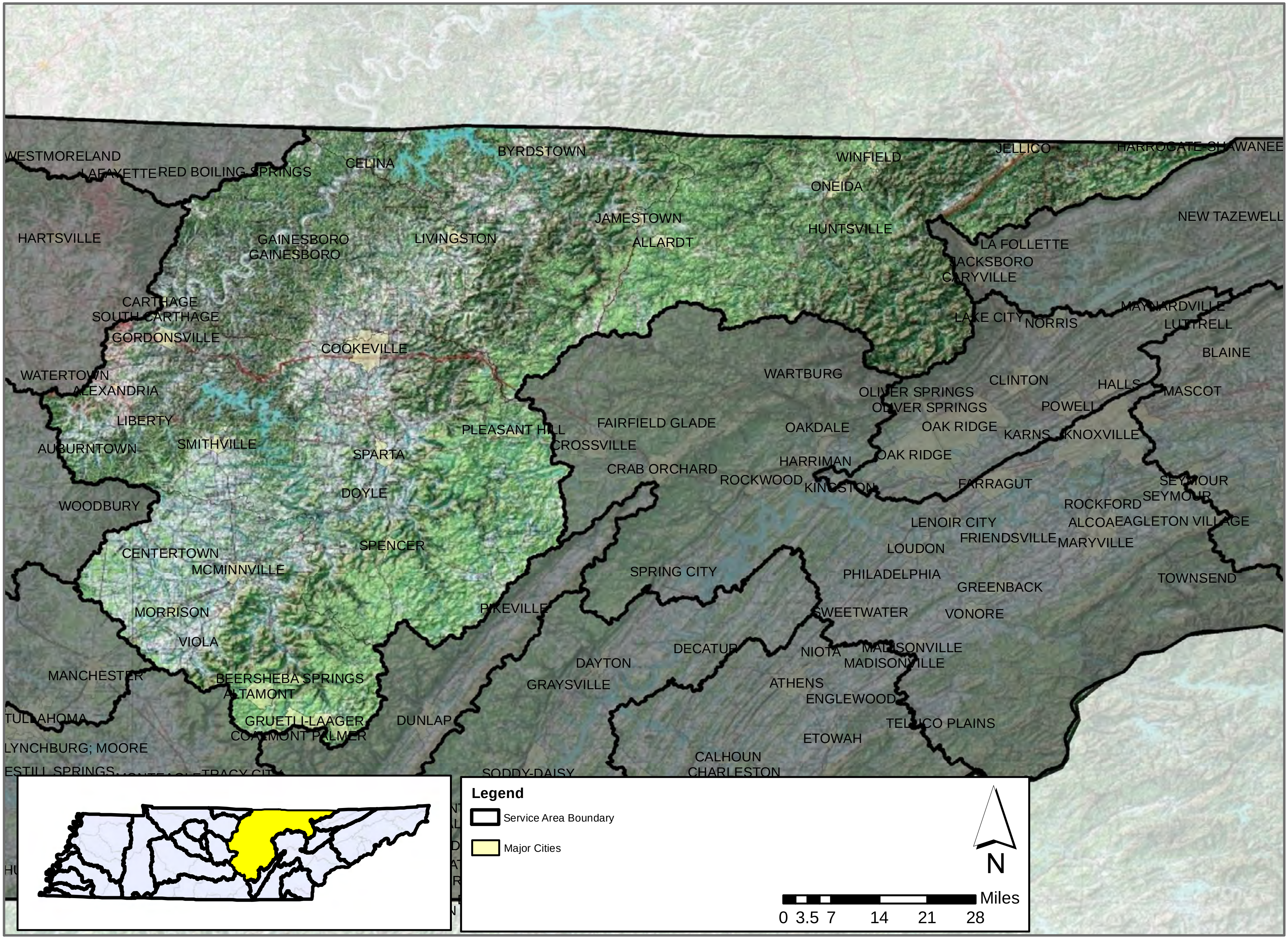


Figure 11: Upper Cumberland River Service Area Location

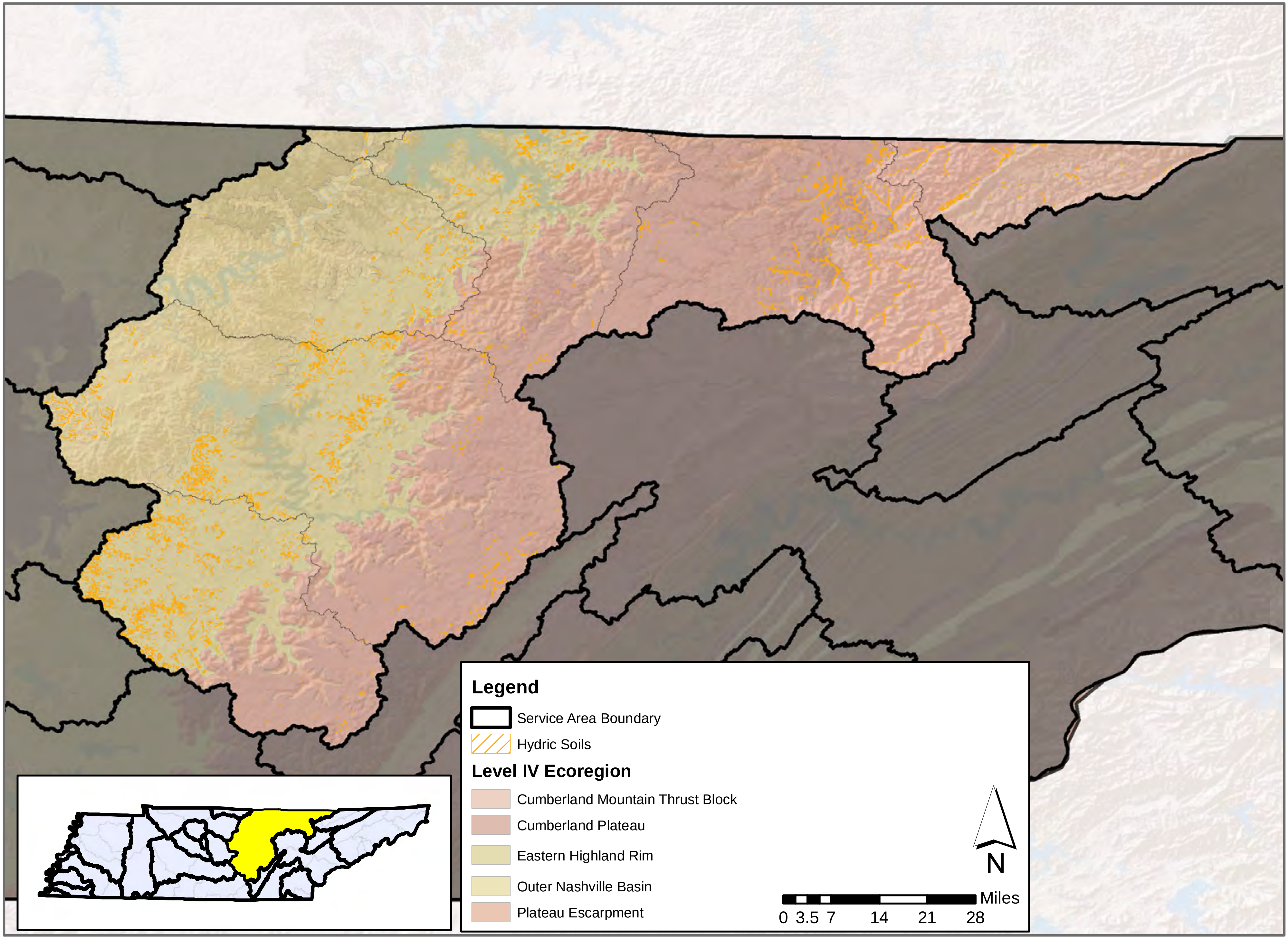


Figure 12: Upper Cumberland Service Area Ecoregions and Hydric Soils

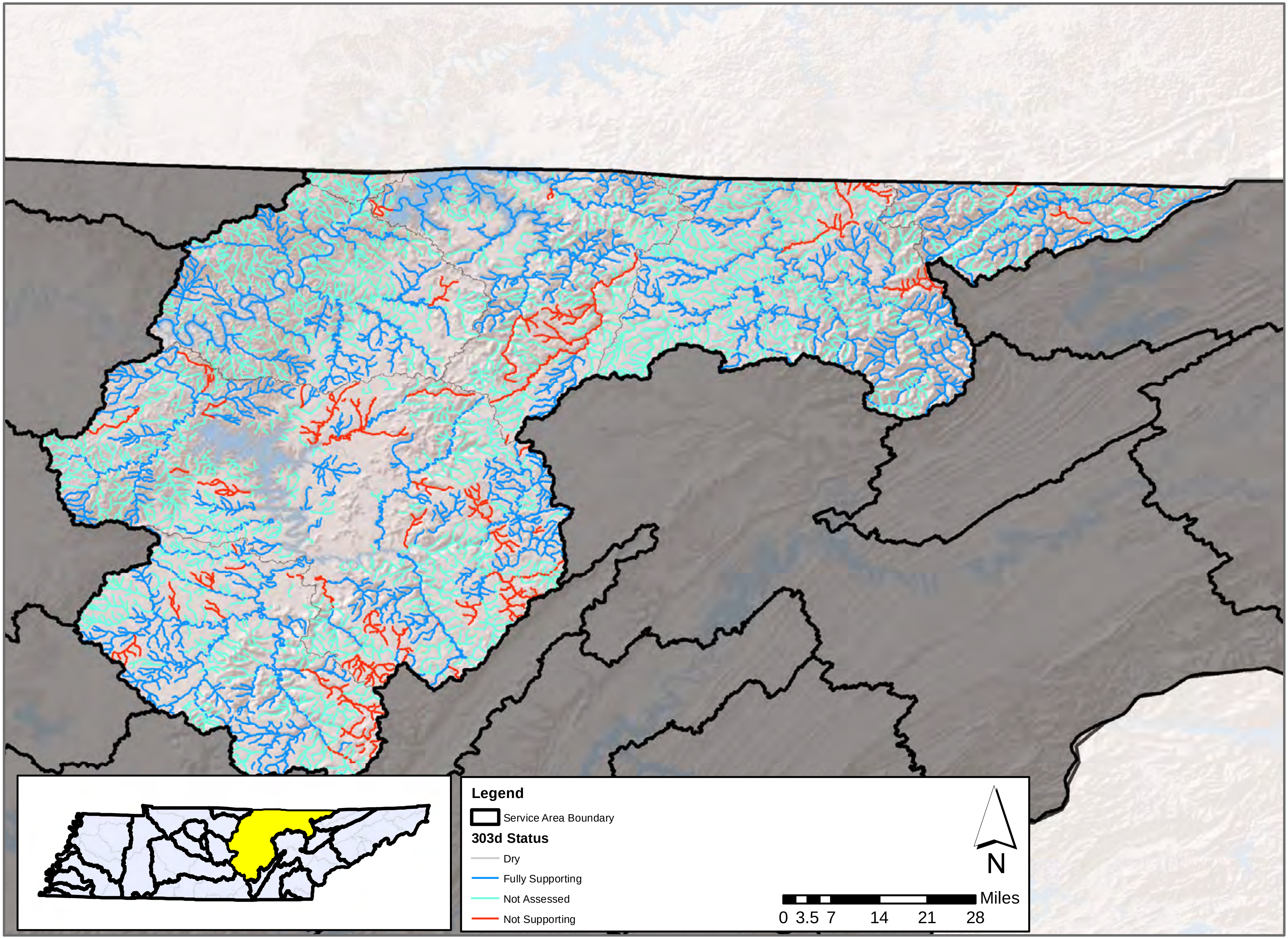


Figure 13: Upper Cumberland River Service Area 303(d) Streams

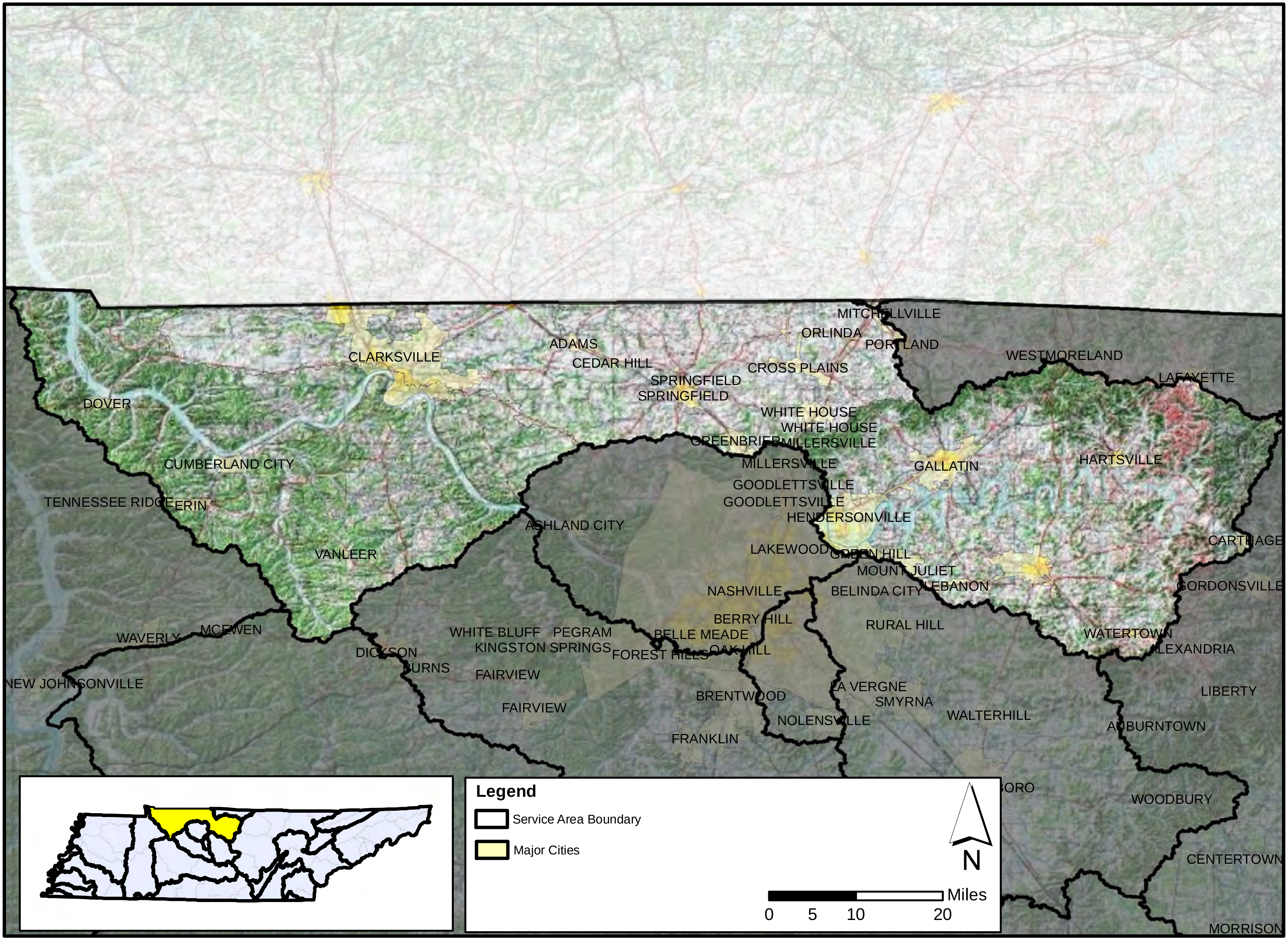


Figure 14: Lower Cumberland Service Area Location

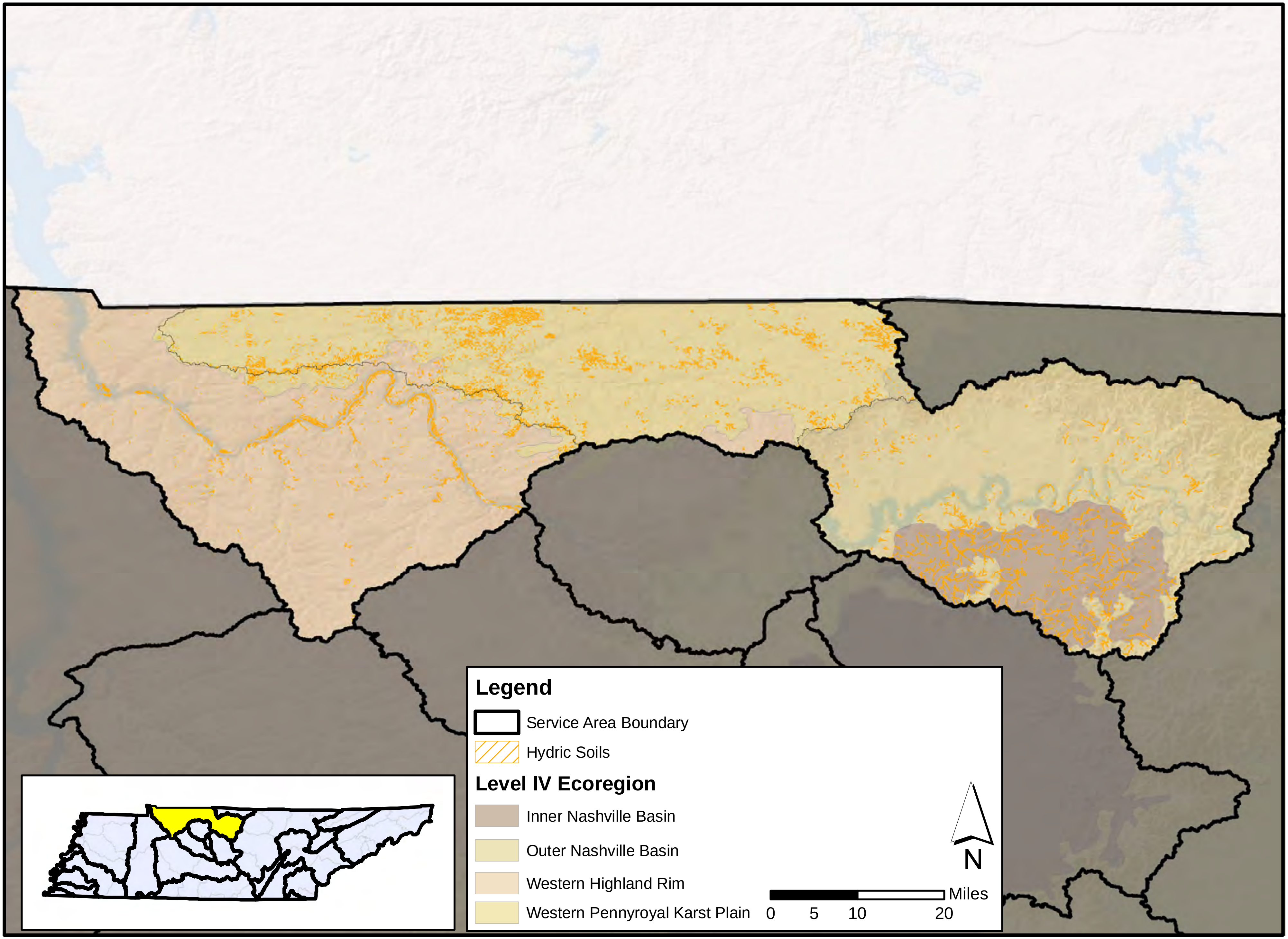


Figure 15: Lower Cumberland Serice Area Ecoregions and Hydric Soils

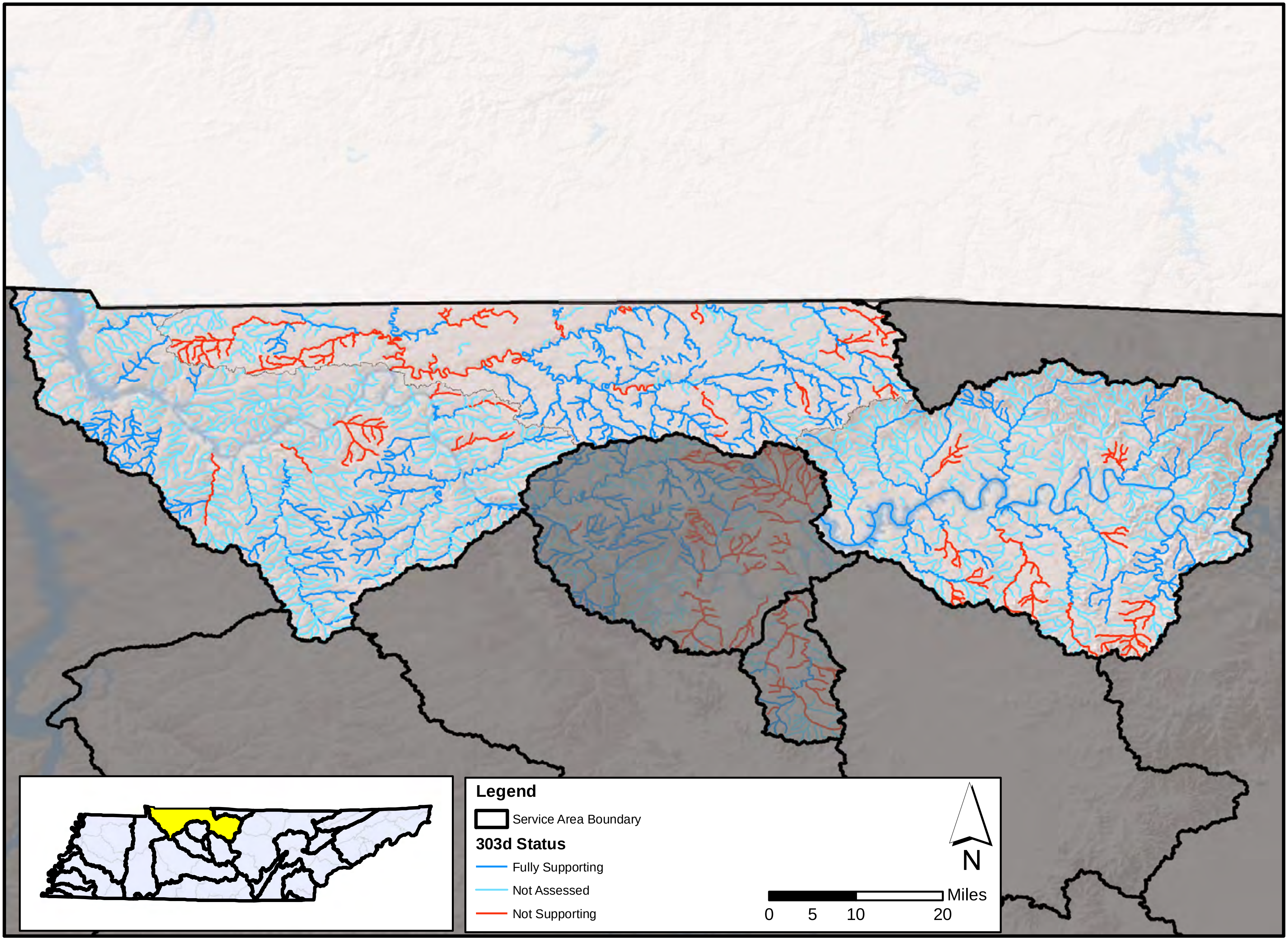


Figure 16: Lower Cumberland Service Area 303(d) Streams

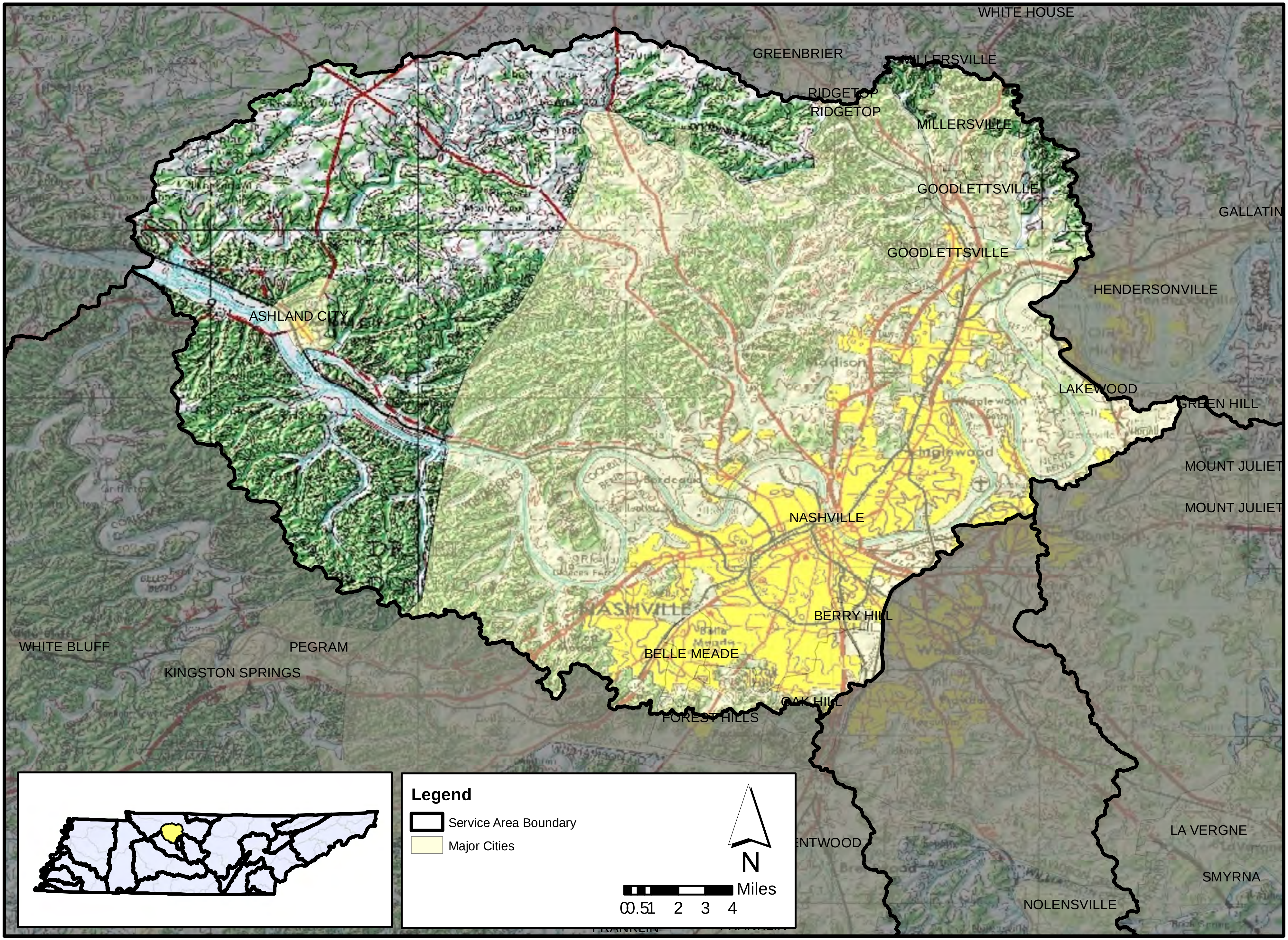


Figure 17: Cheatham Lake Service Area Location

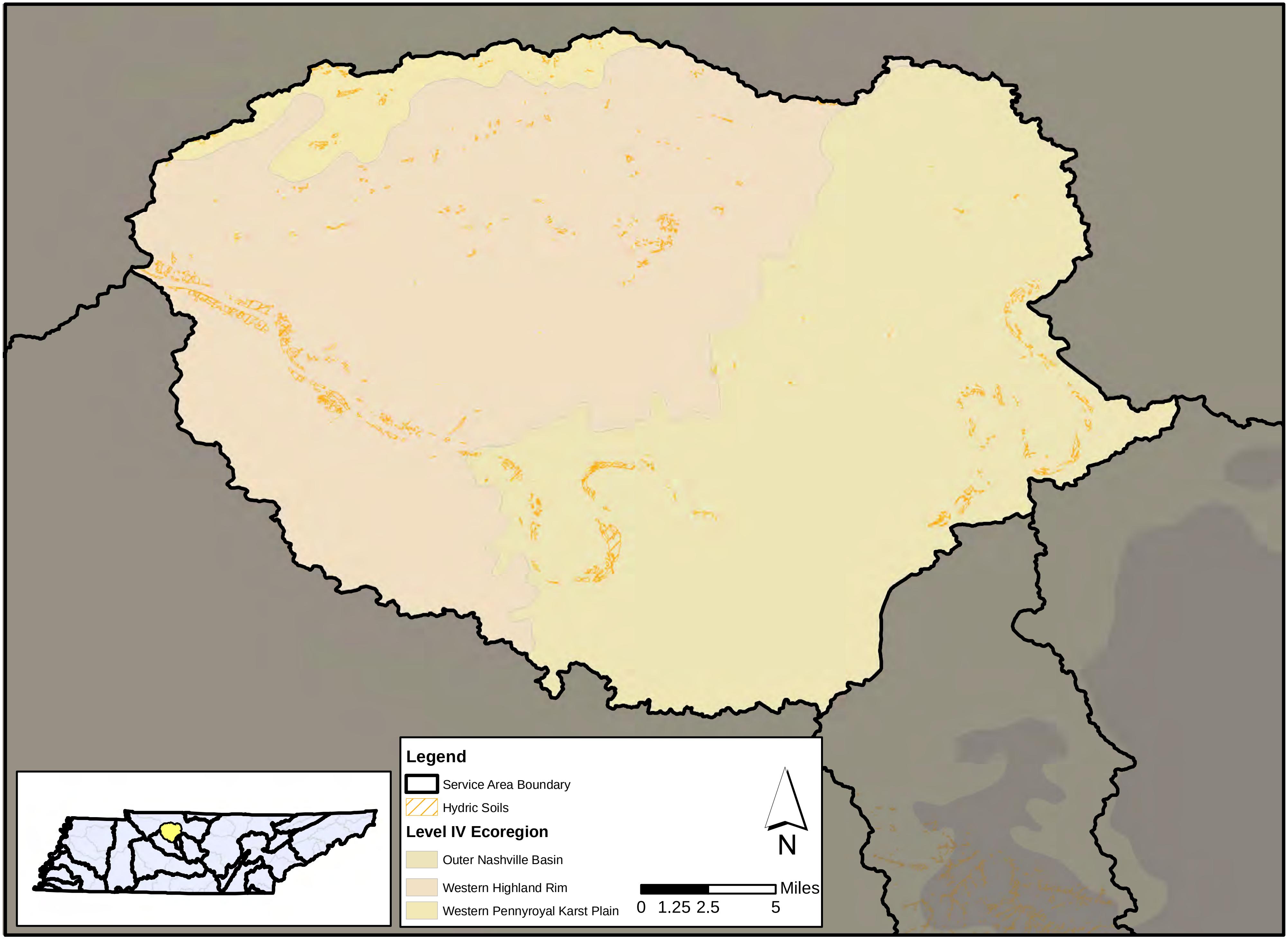


Figure 18: Cheatham Lake Service Area Ecoregions and Hydric Soils

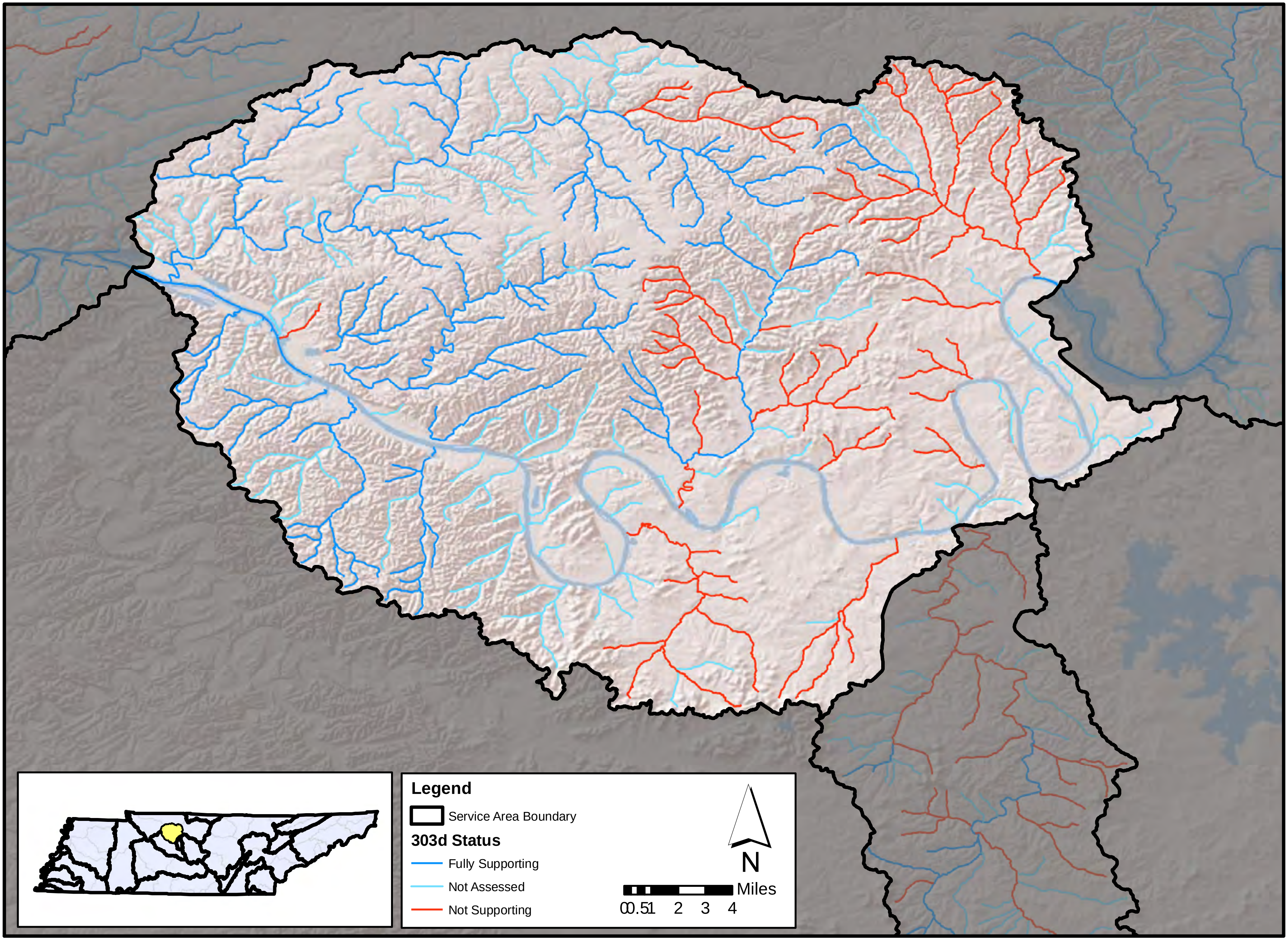


Figure 19: Cheatham Lake Service Area 303(d) Streams

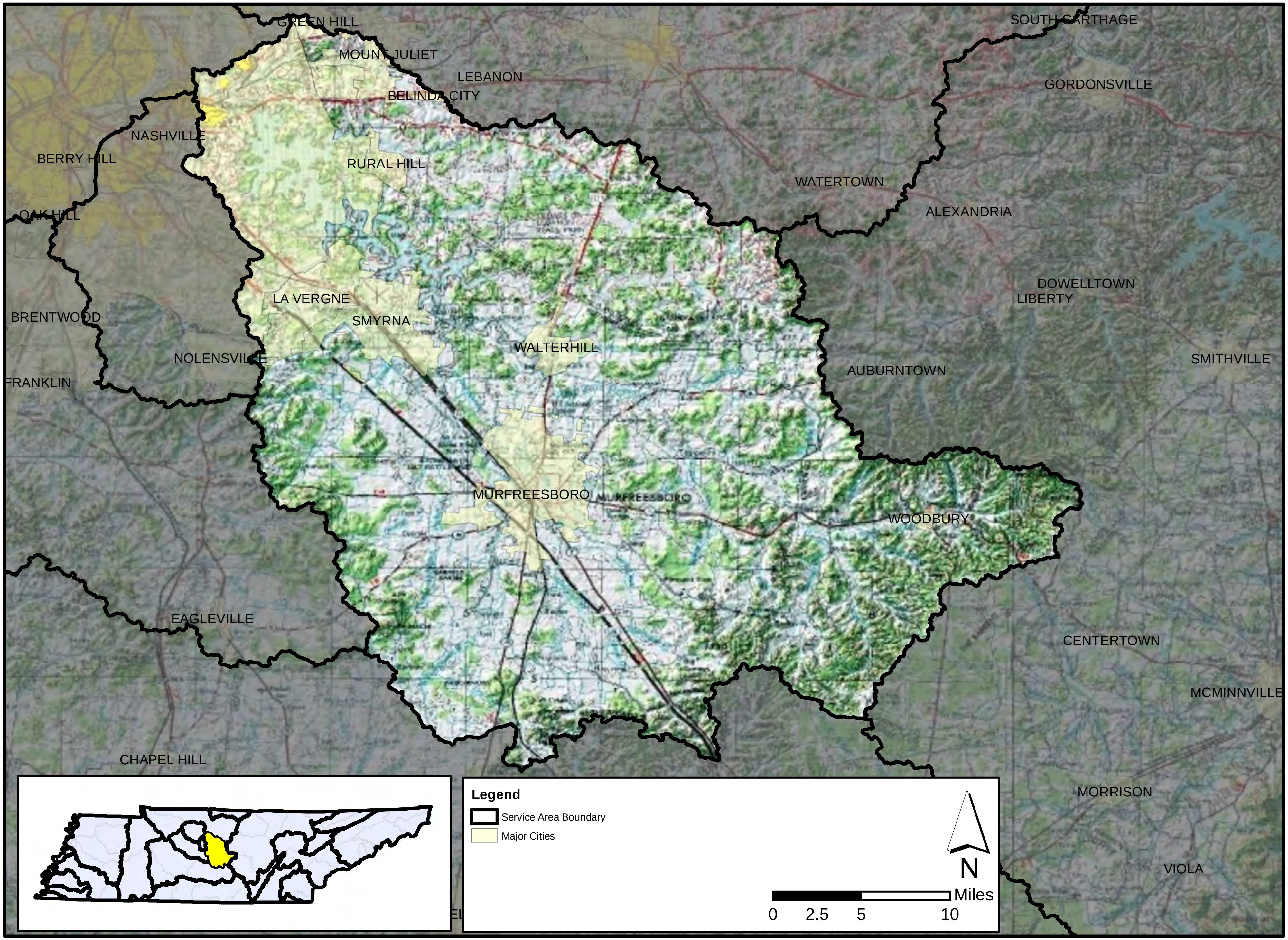


Figure 20: Stones River Service Area Location

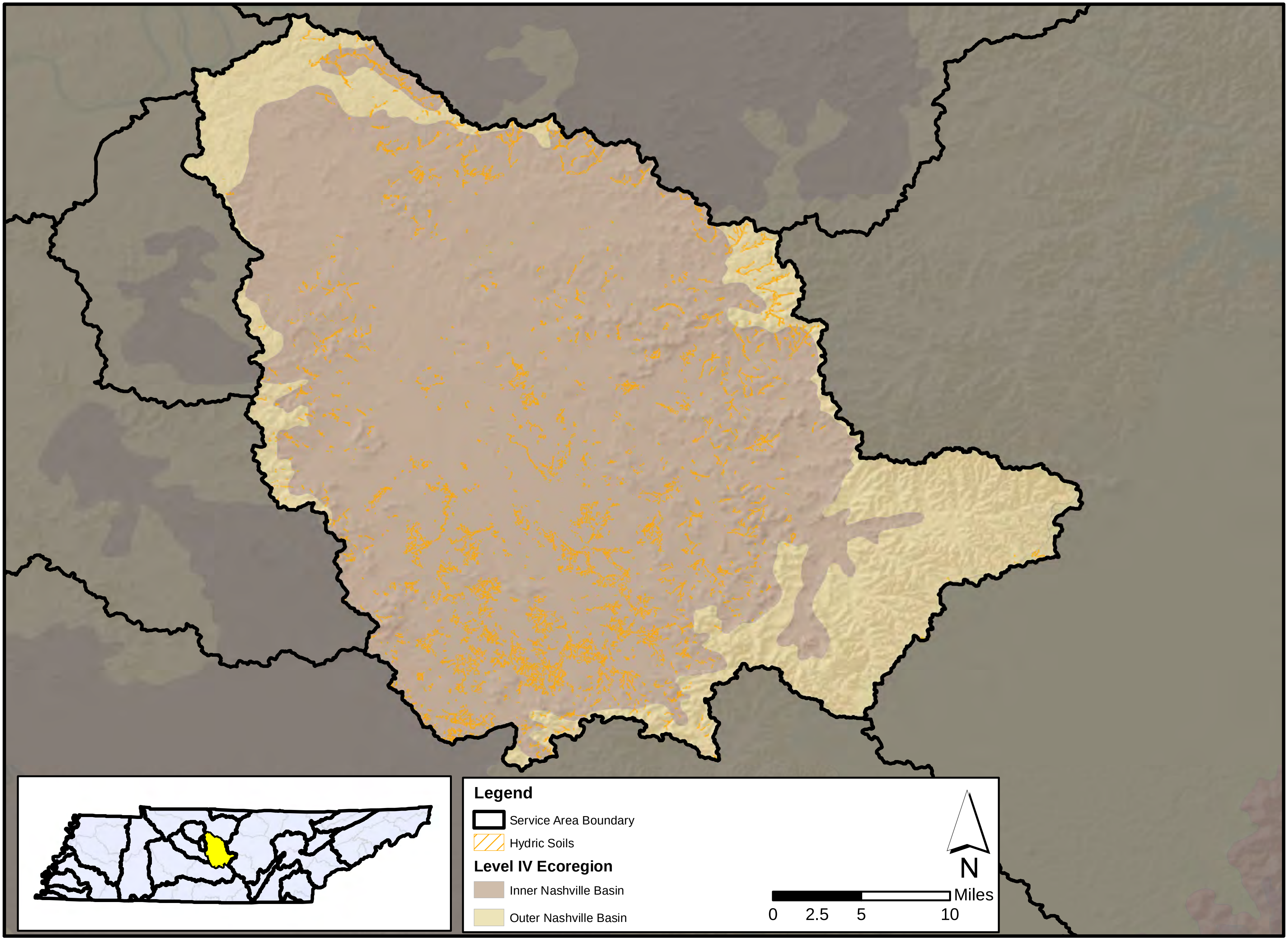


Figure 21: Stones River Service Area Ecoregions and Hydric Soils

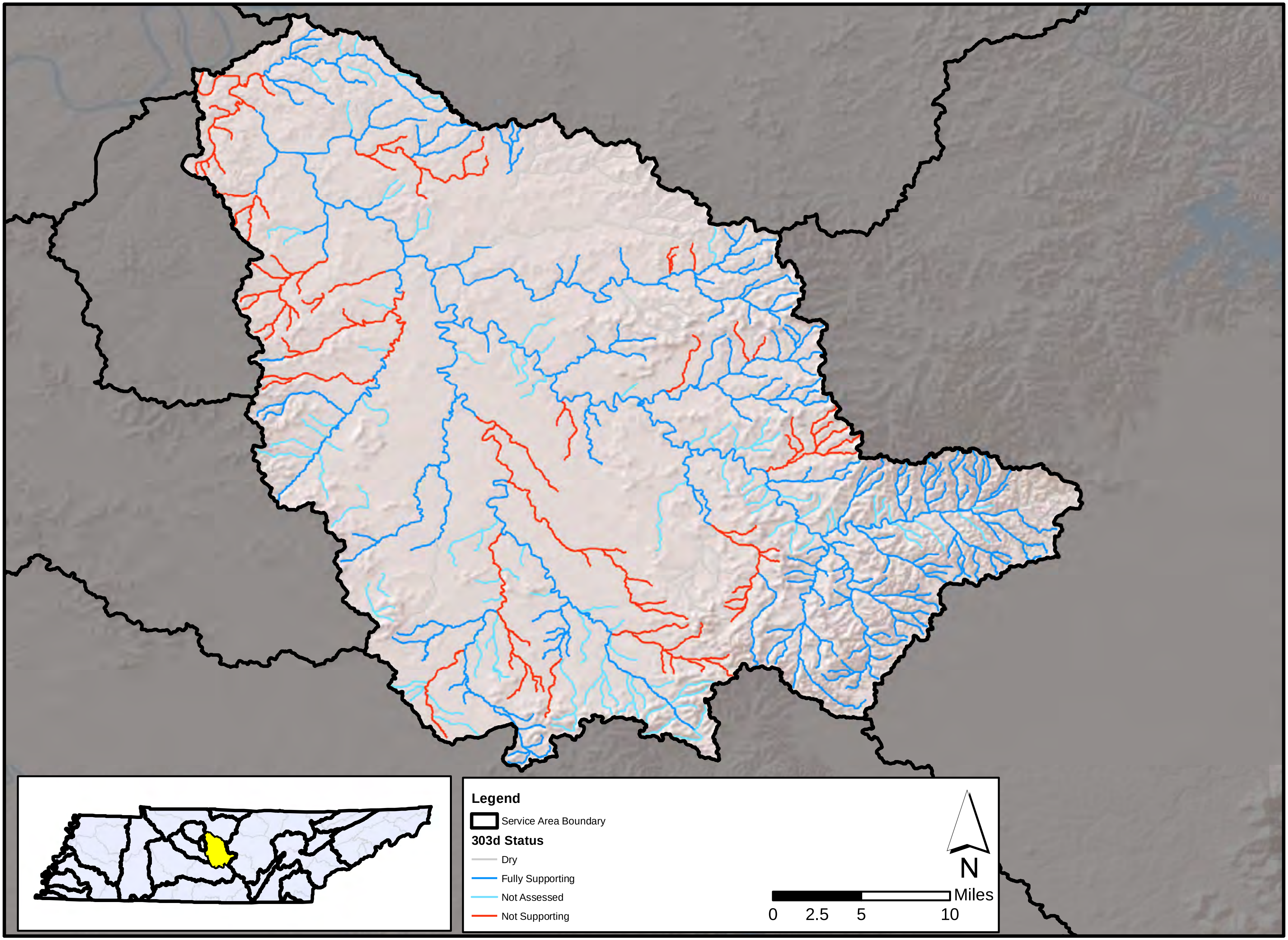


Figure 22: Stones River Service Area 303(d) Streams

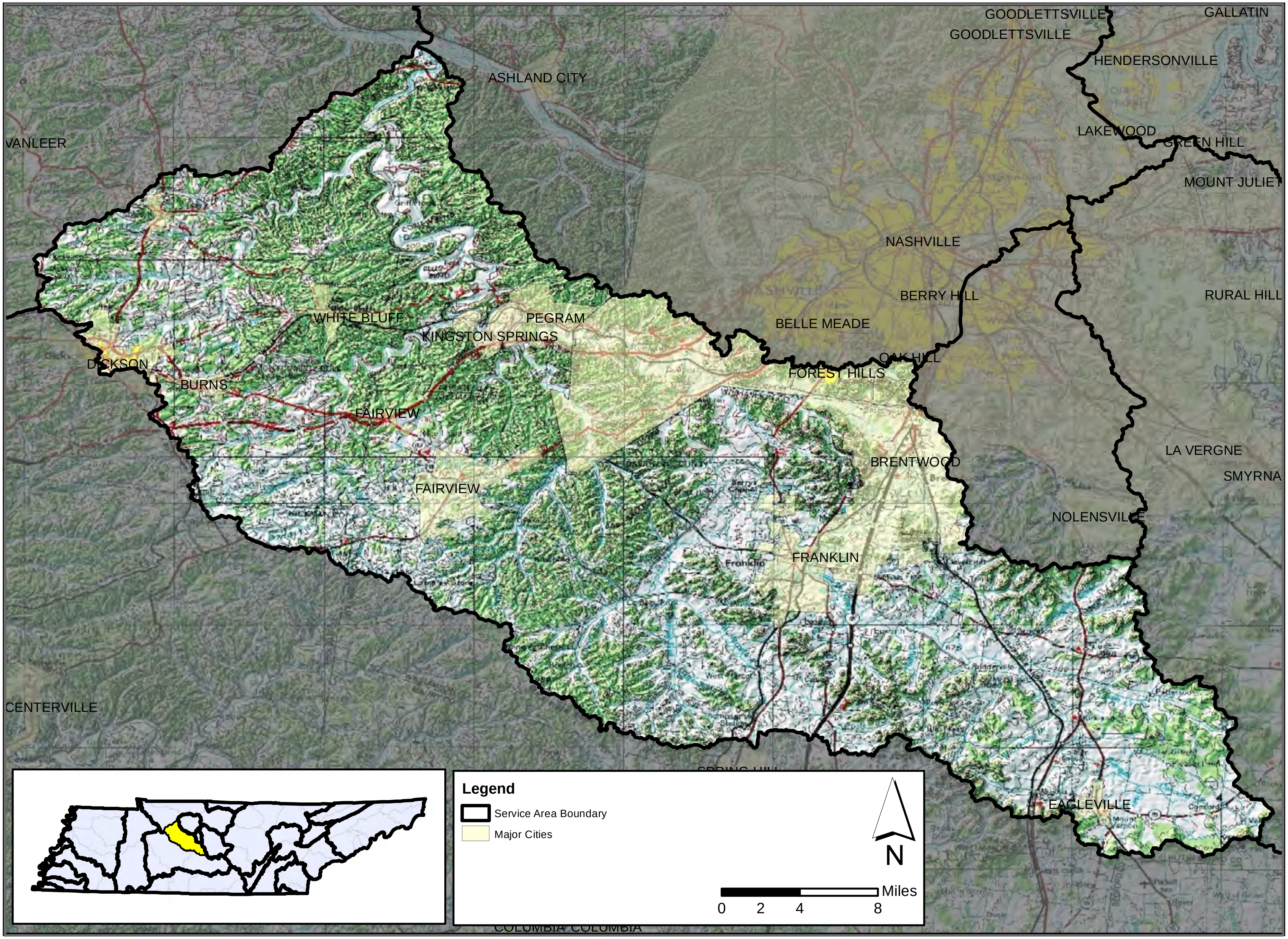


Figure 23: Harpeth River Service Area Location

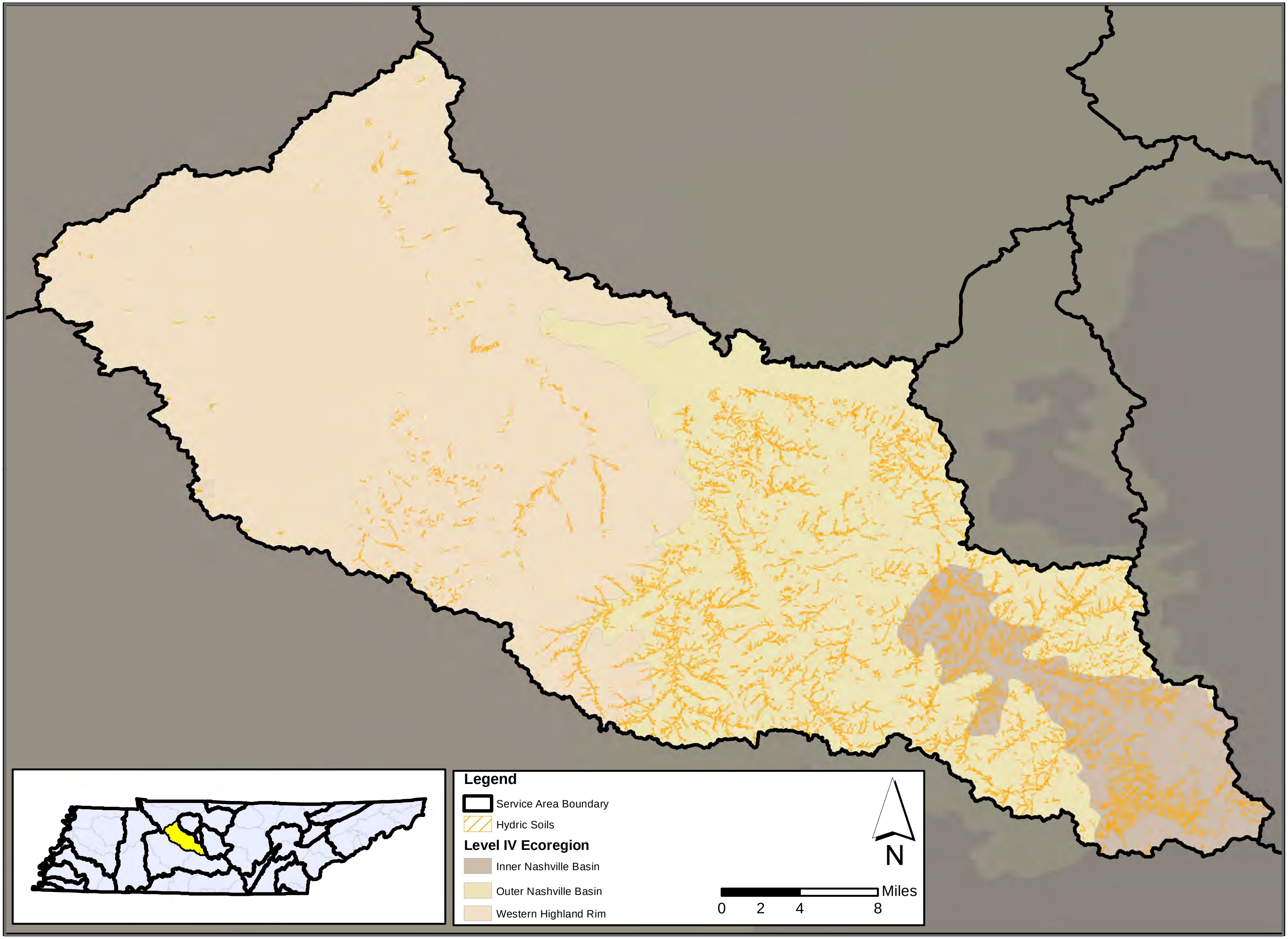


Figure 24: Harpeth River Service Area Ecoregion and Hydric Soils

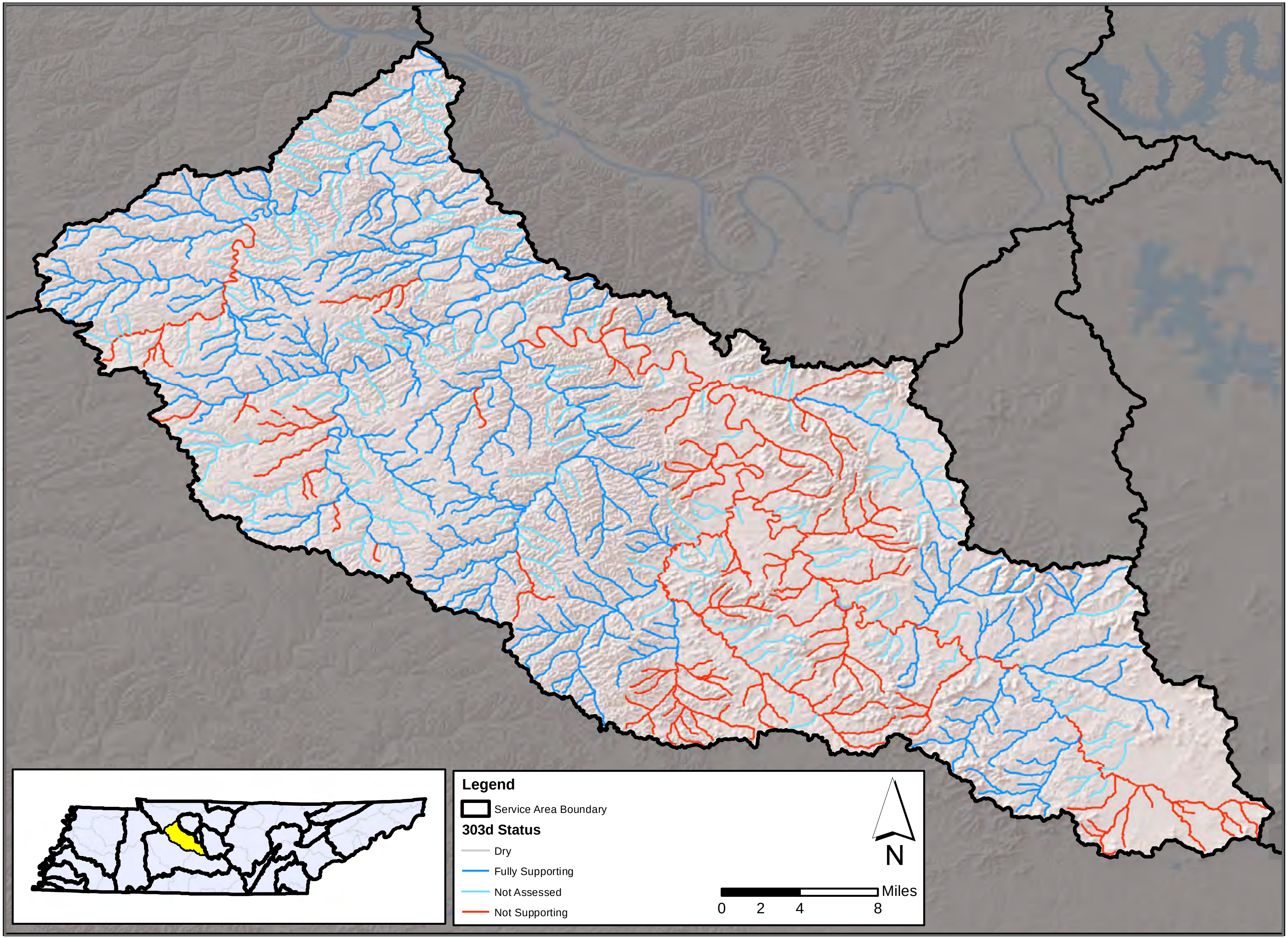


Figure 25: Harpeth River Service Area 303(d) Streams

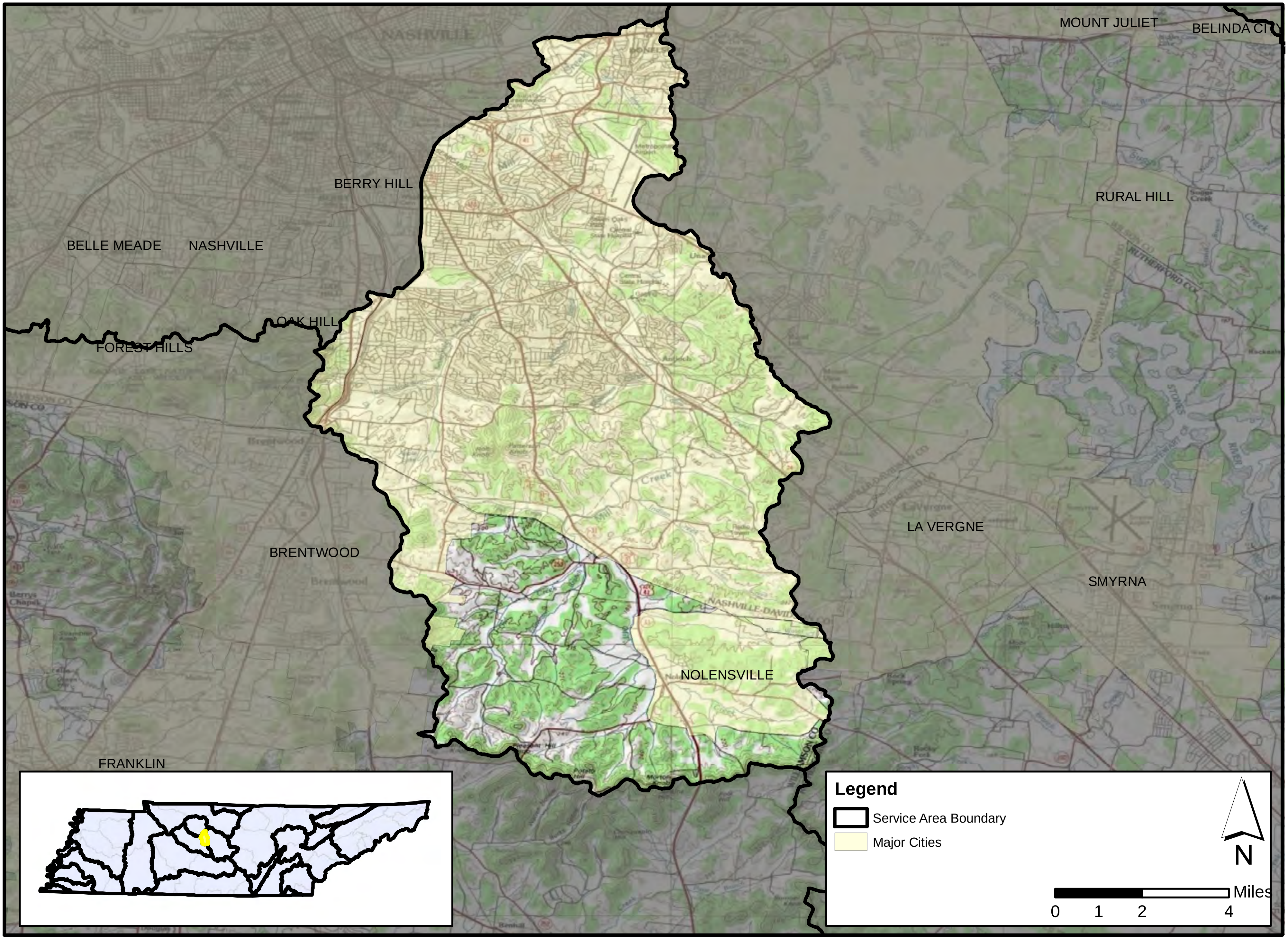


Figure 26: Mill Creek Service Area Location

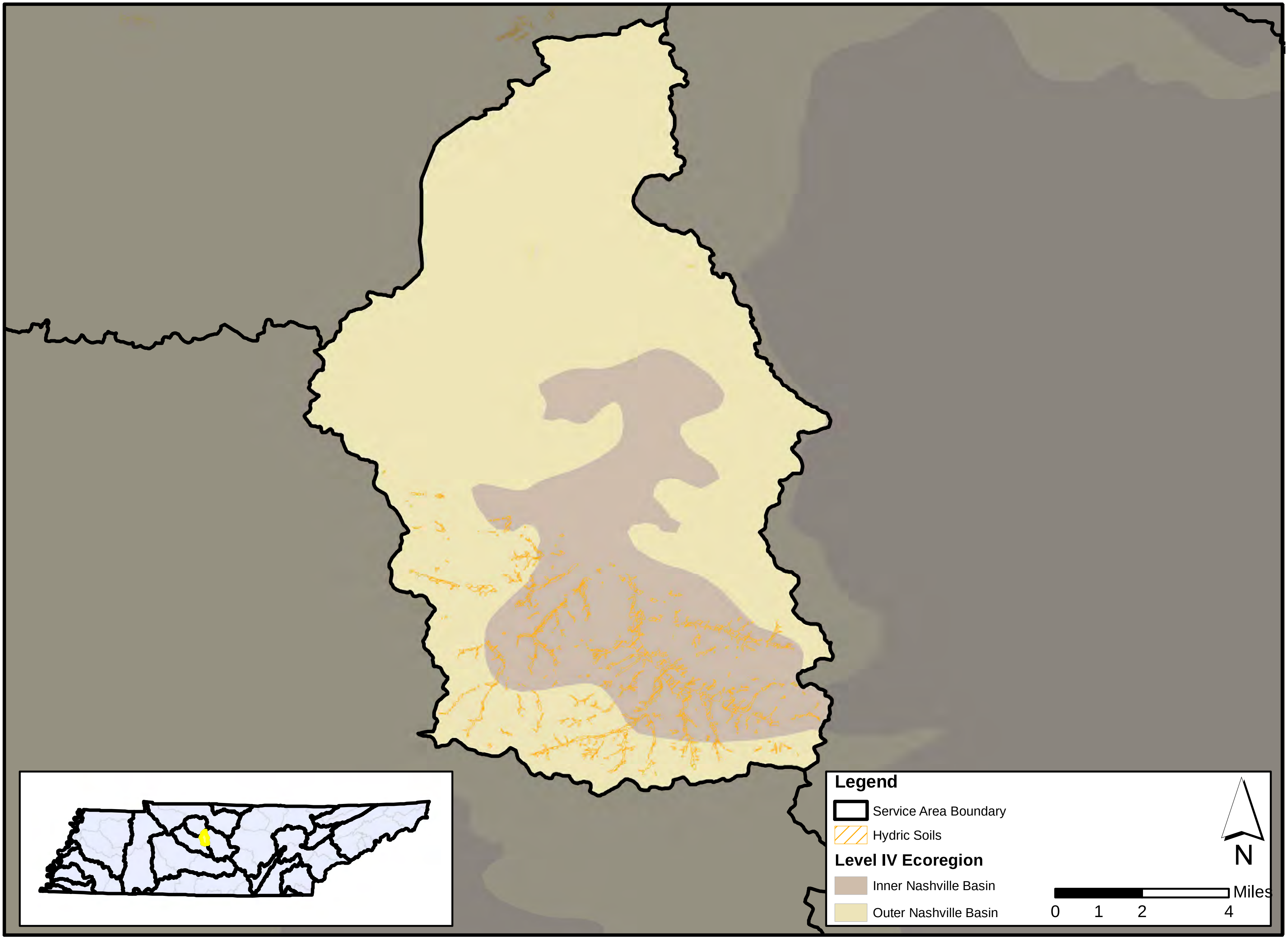


Figure 27: Mill Creek Service Area Ecoregions and Hydric Soils

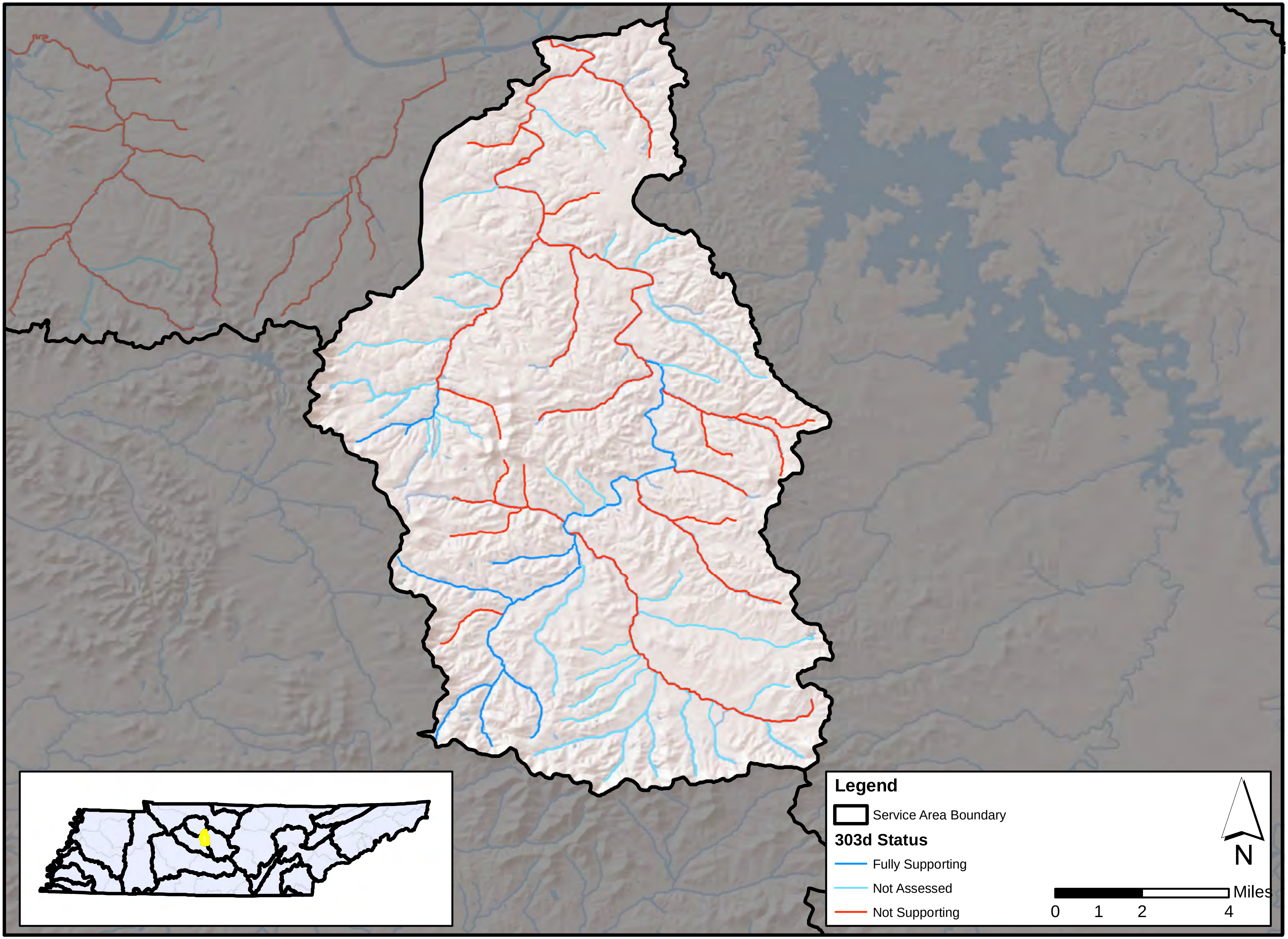


Figure 28: Mill Creek Service Area 303(d) Streams

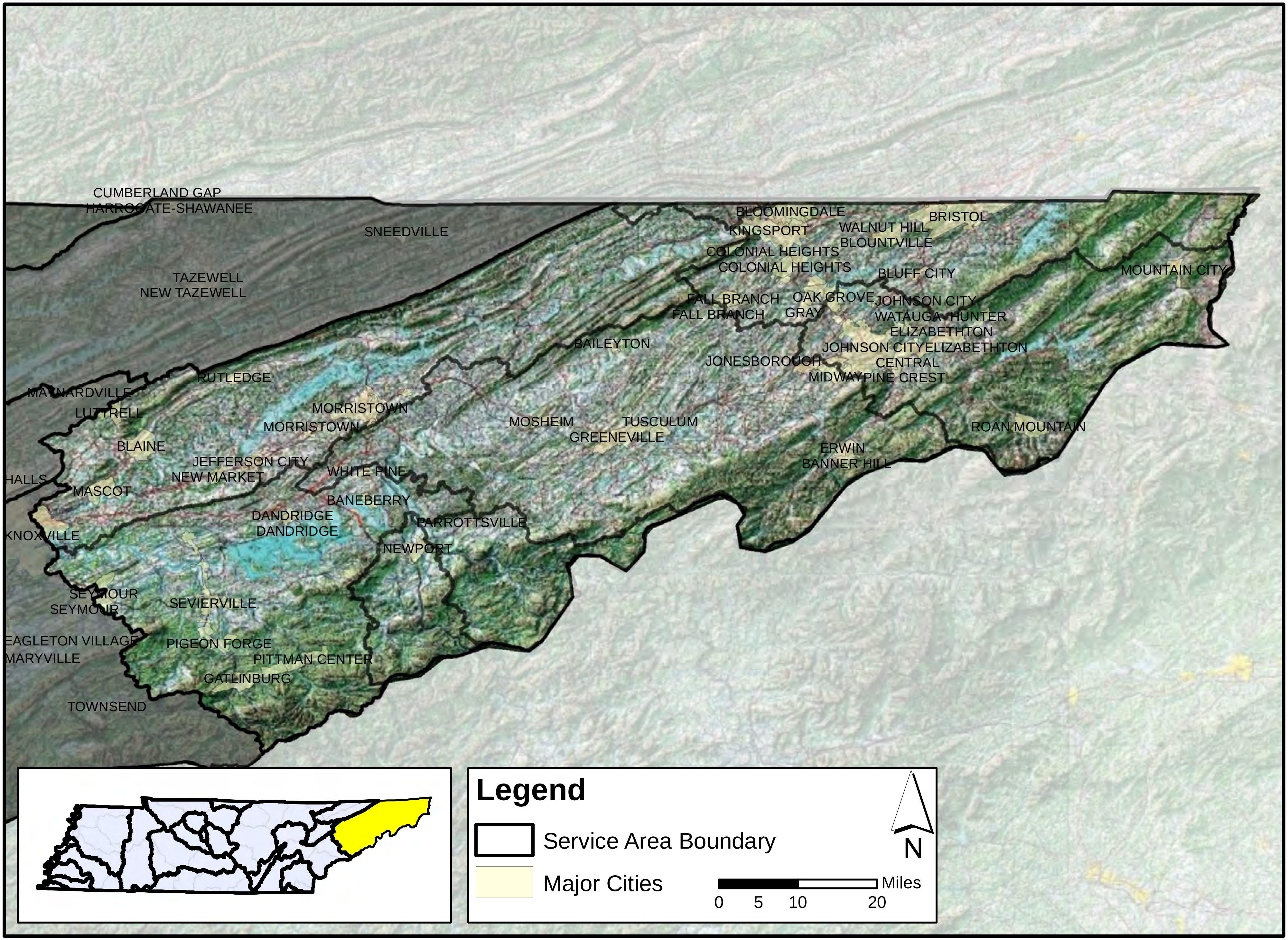


Figure 29: Holston / French Broad Service Area Location

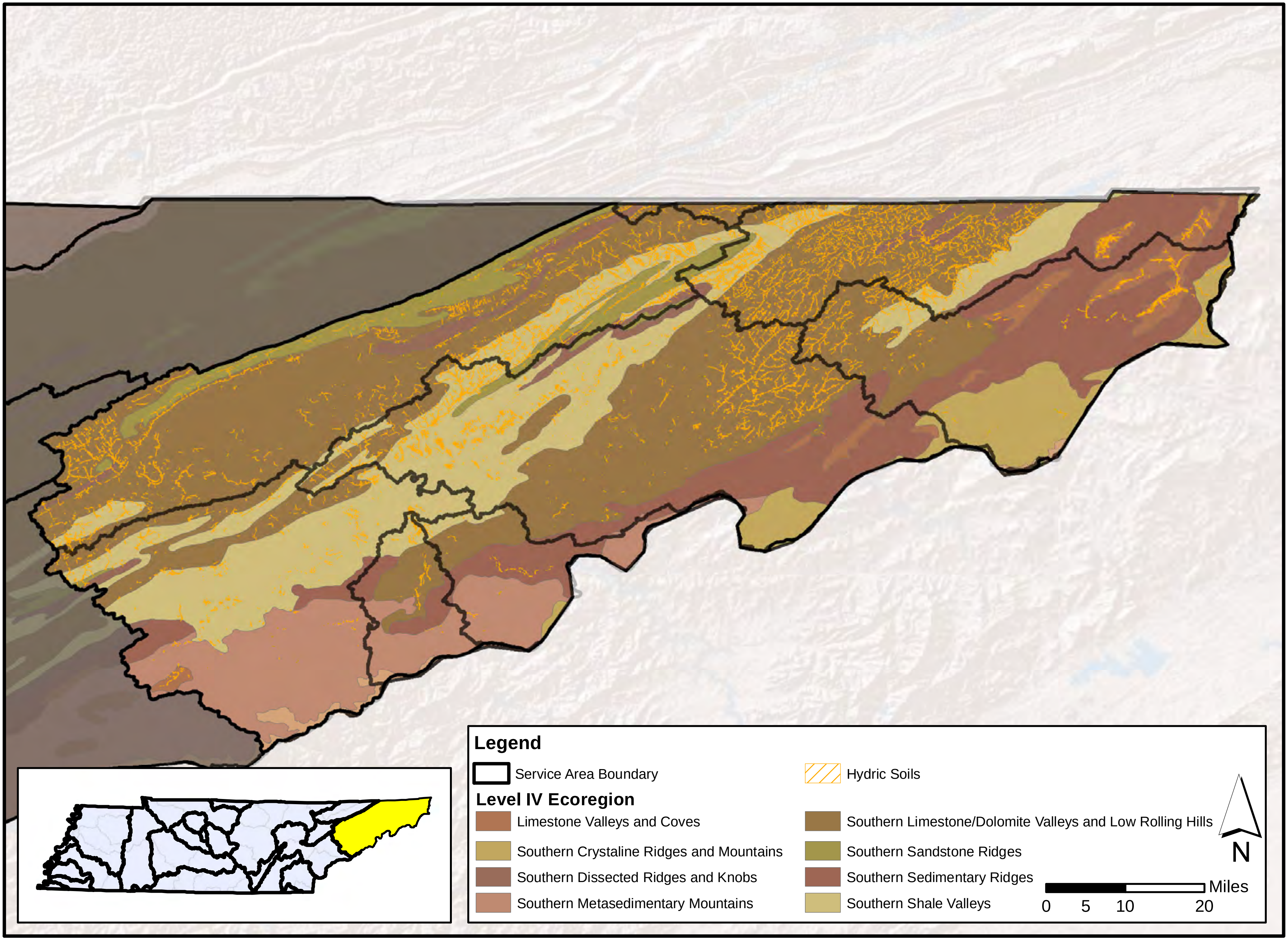


Figure 30: Holston / French Broad Service Area Ecoregions and Hydric Soils

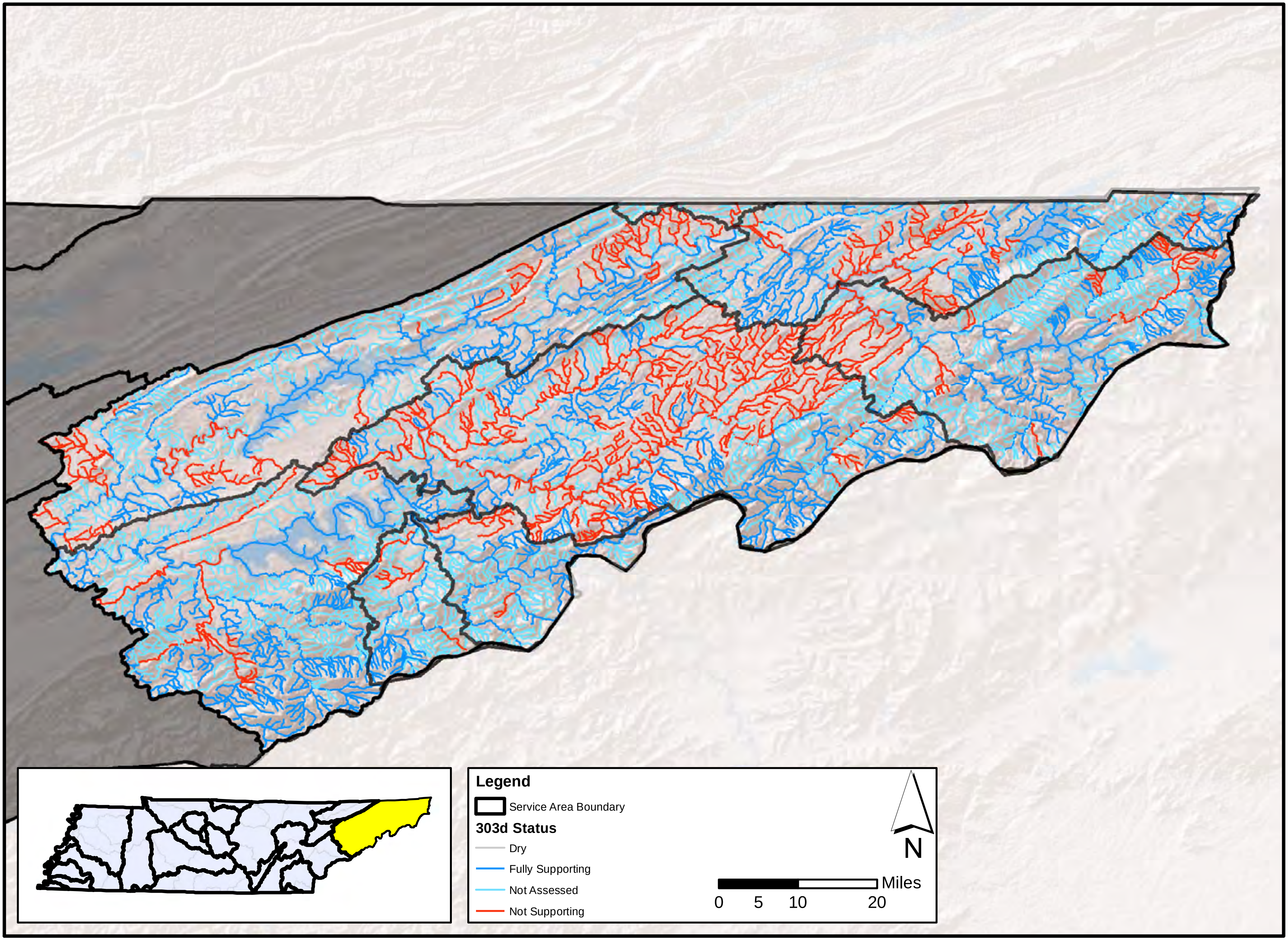


Figure 31: Holston / French Broad Service Area 303(d) Streams

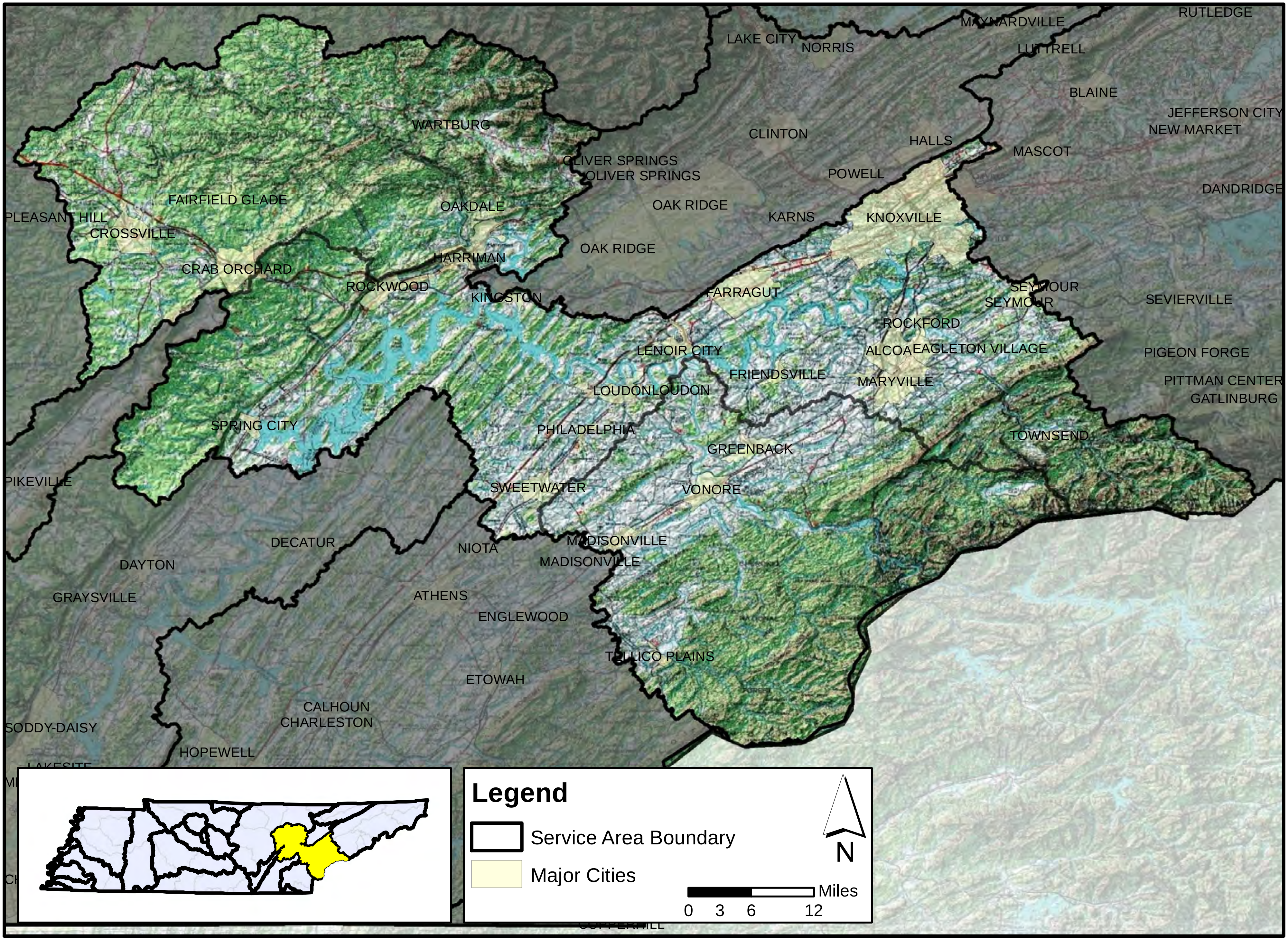


Figure 32: Emory River / Watts Barr Service Area Location

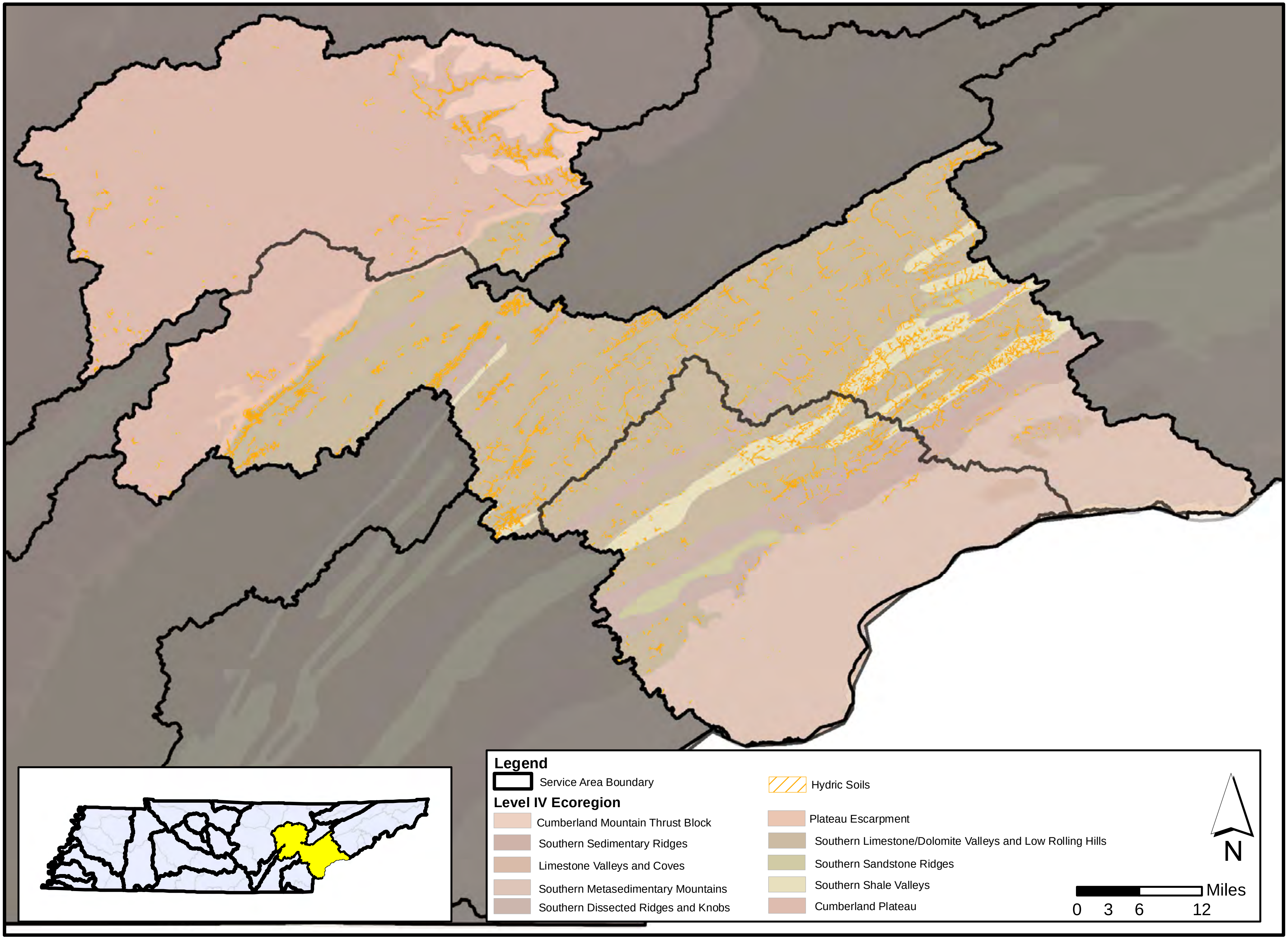


Figure 33: Emory River / Watts Barr Service Area Ecoregions and Hydric Soils

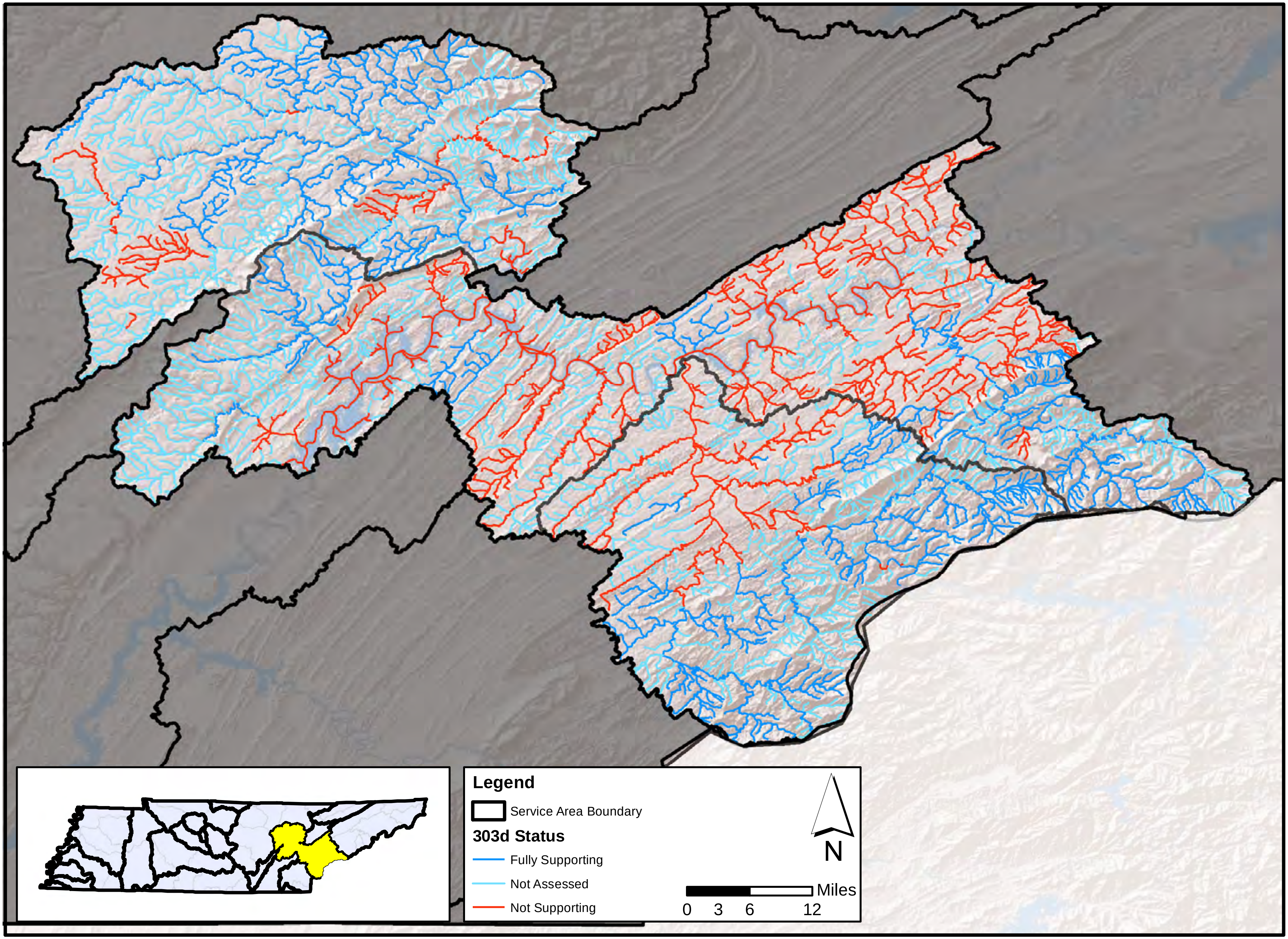


Figure 34: Emory River / Watts Barr Service Area 303(d) Streams

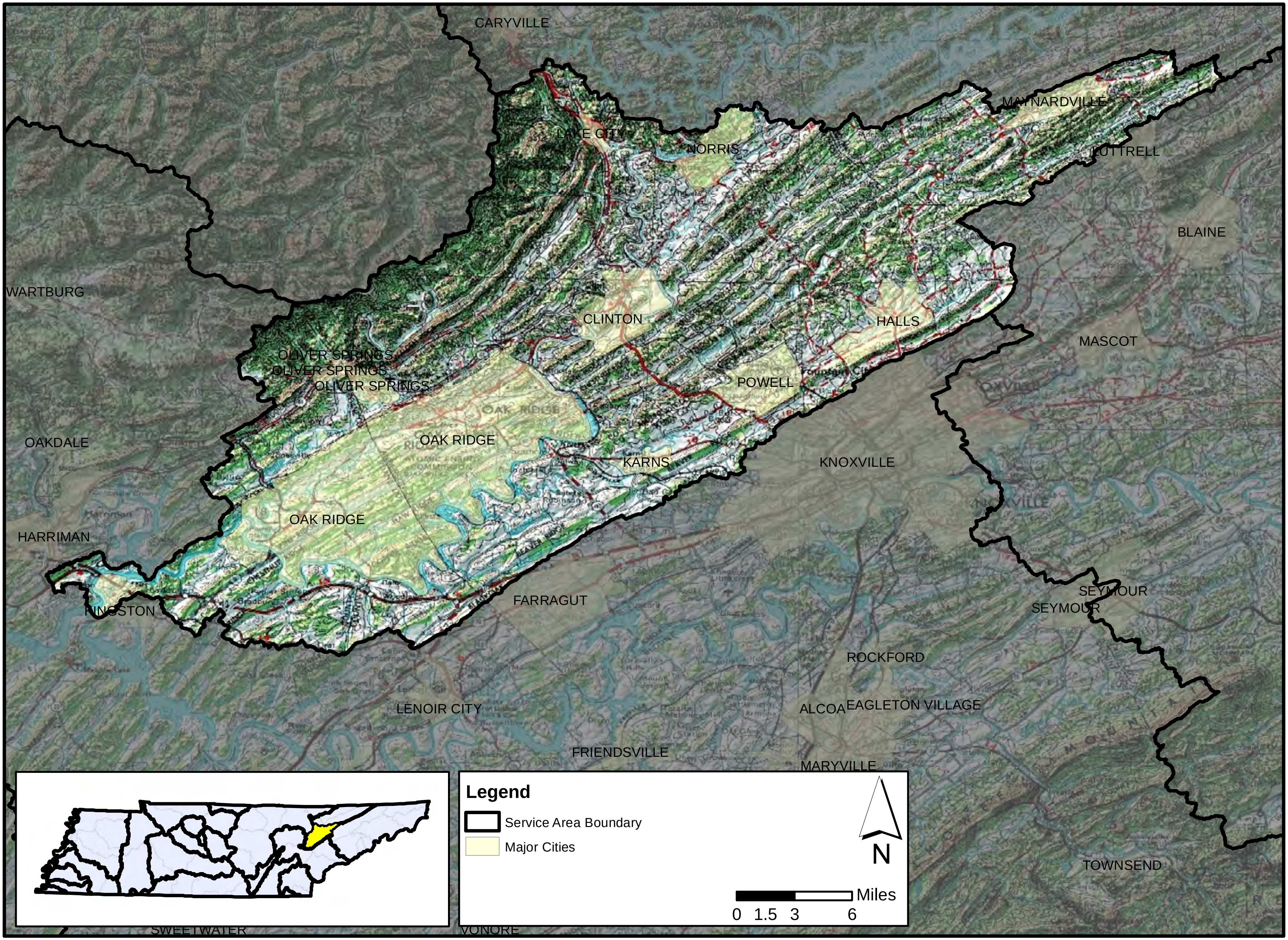


Figure 35: Lower Clinch Service Area Location

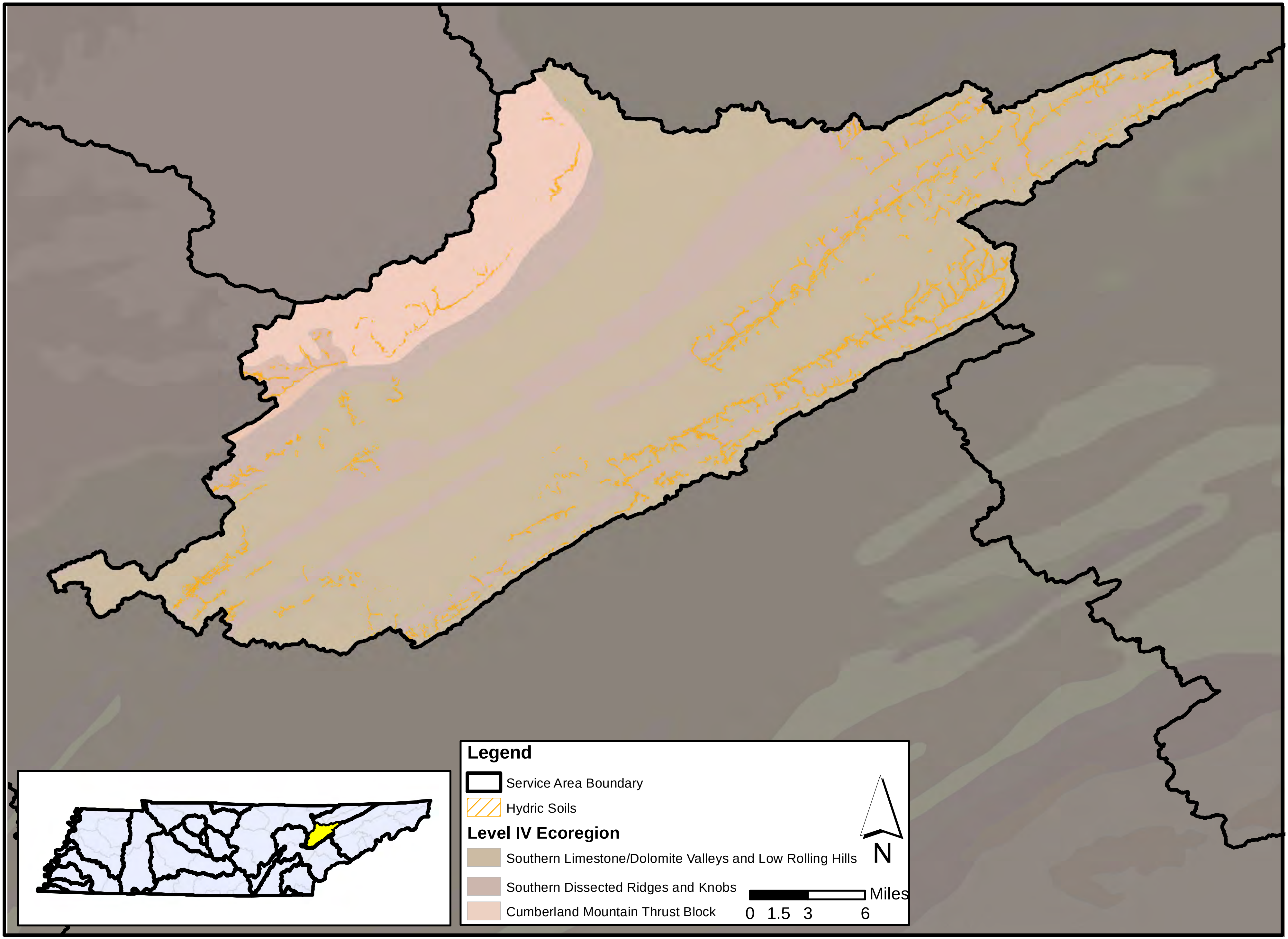


Figure 36: Lower Clinch Service Area Ecoregions and Hydric Soils

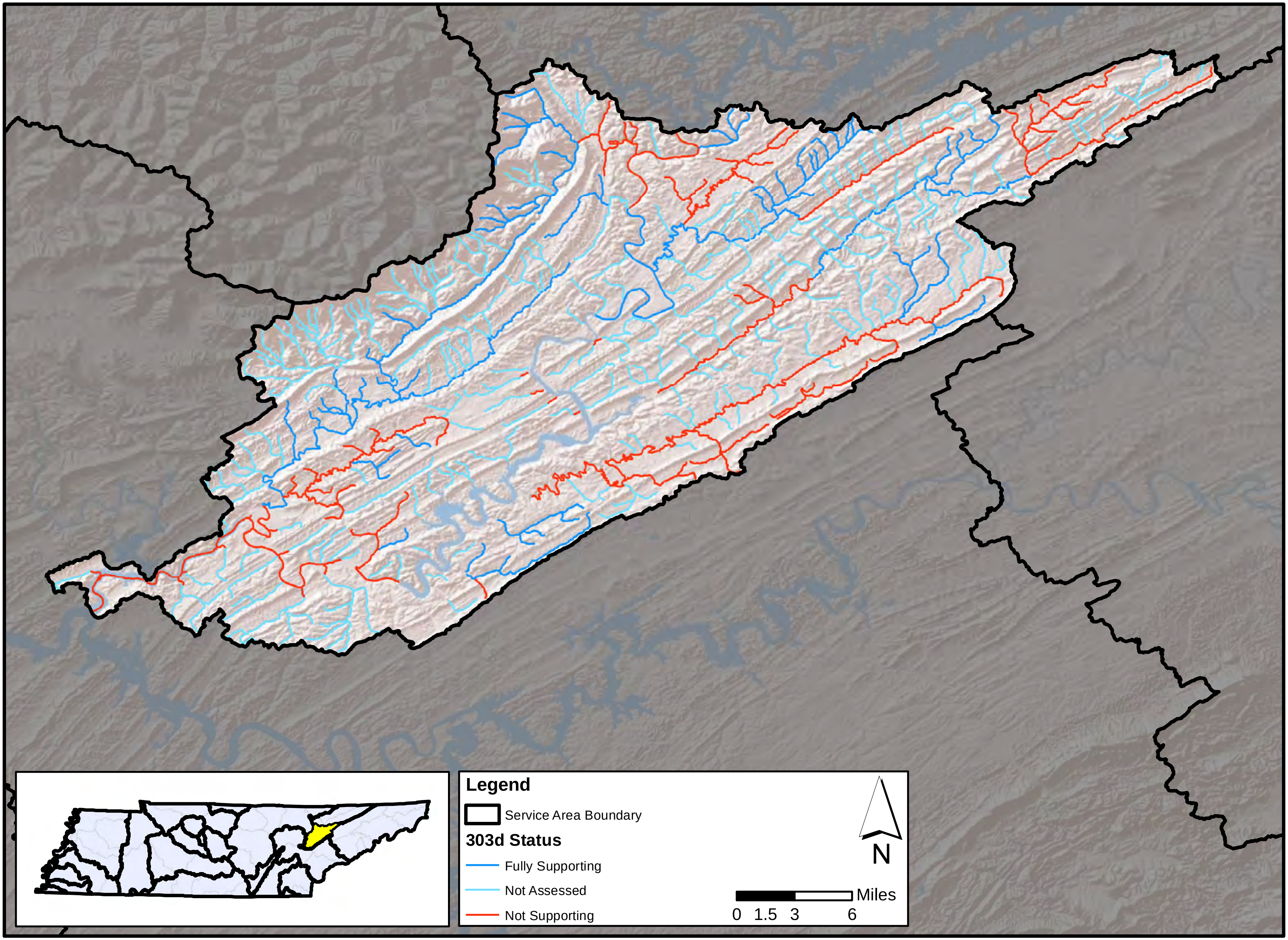


Figure 37: Lower Clinch Service Area 303(d) Streams

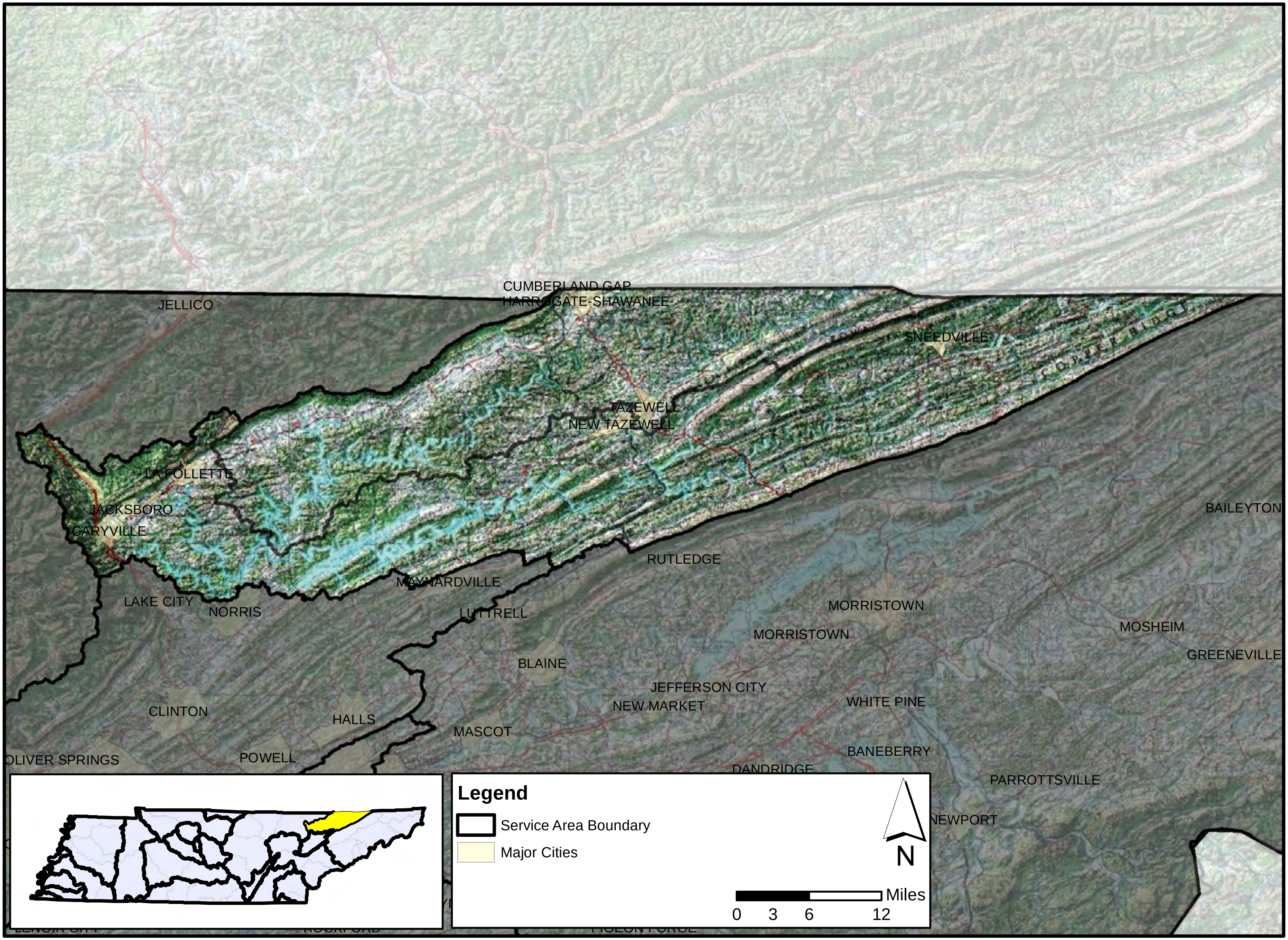


Figure 38: Upper Tennessee Service Area Location

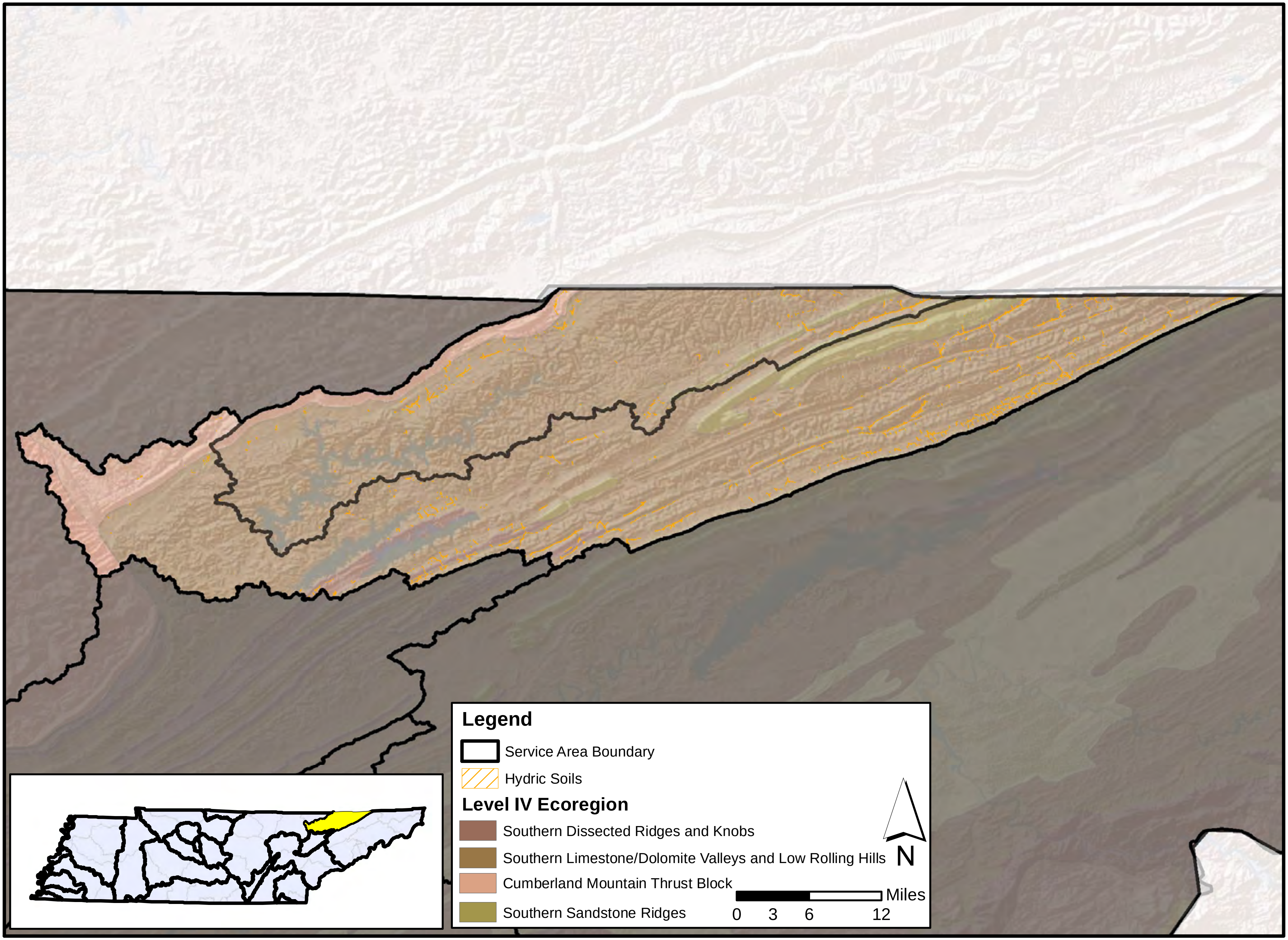


Figure 39: Upper Tennessee Service Area Ecoregions and Hydric Soils

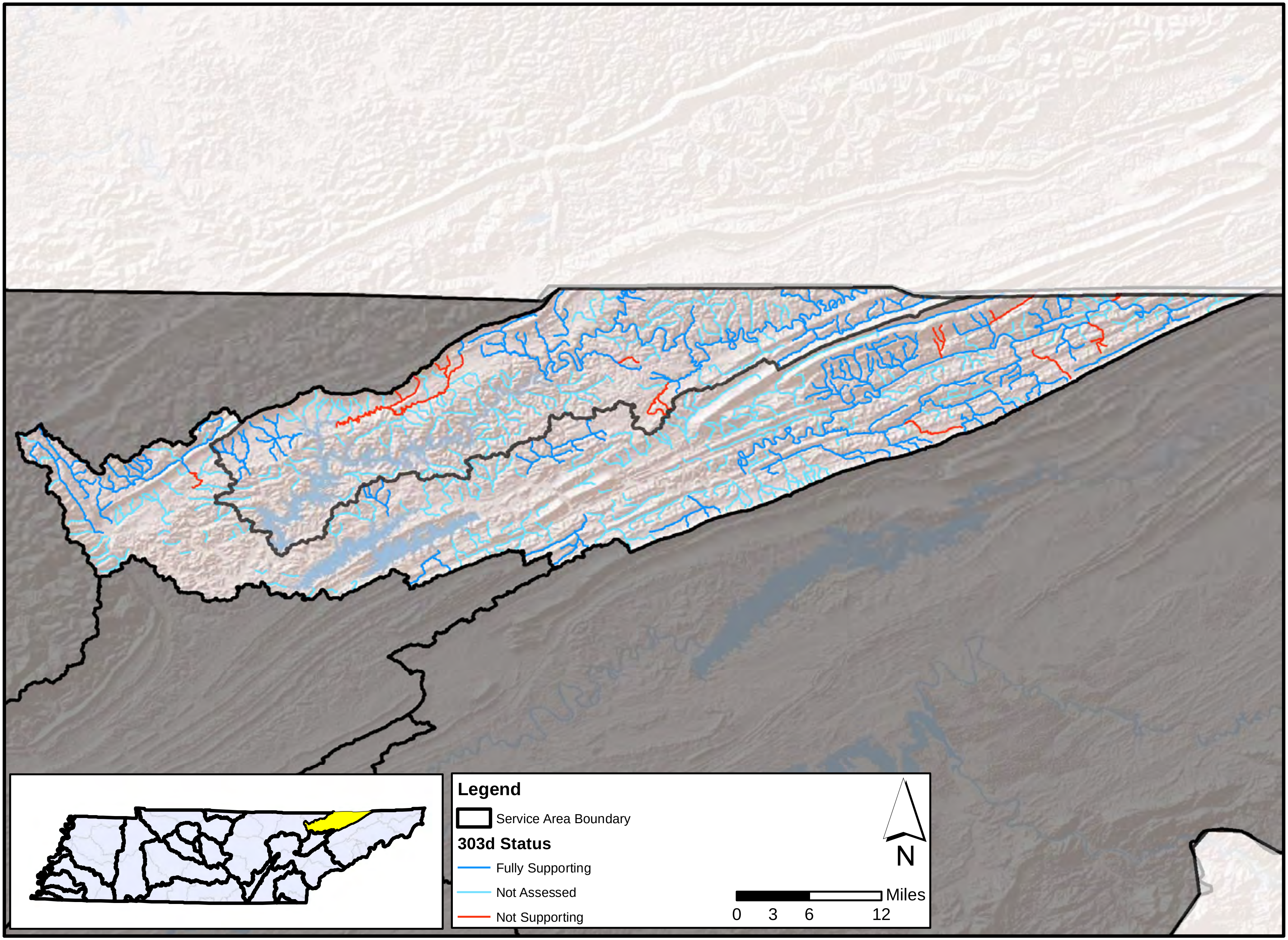


Figure 40: Upper Tennessee Service Area 303(d) Streams

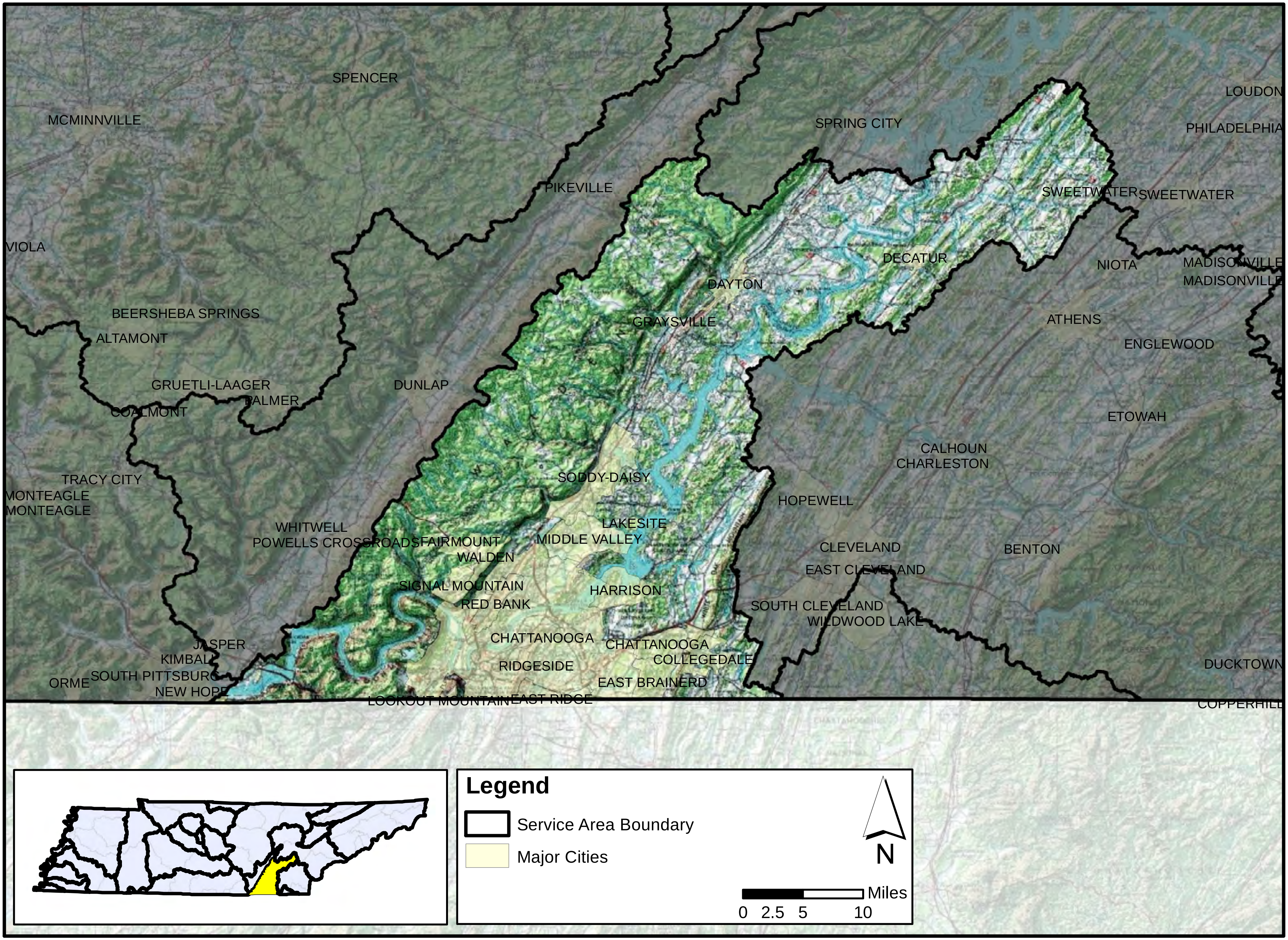


Figure 41: Chickamauga / Nickajack Service Area Location

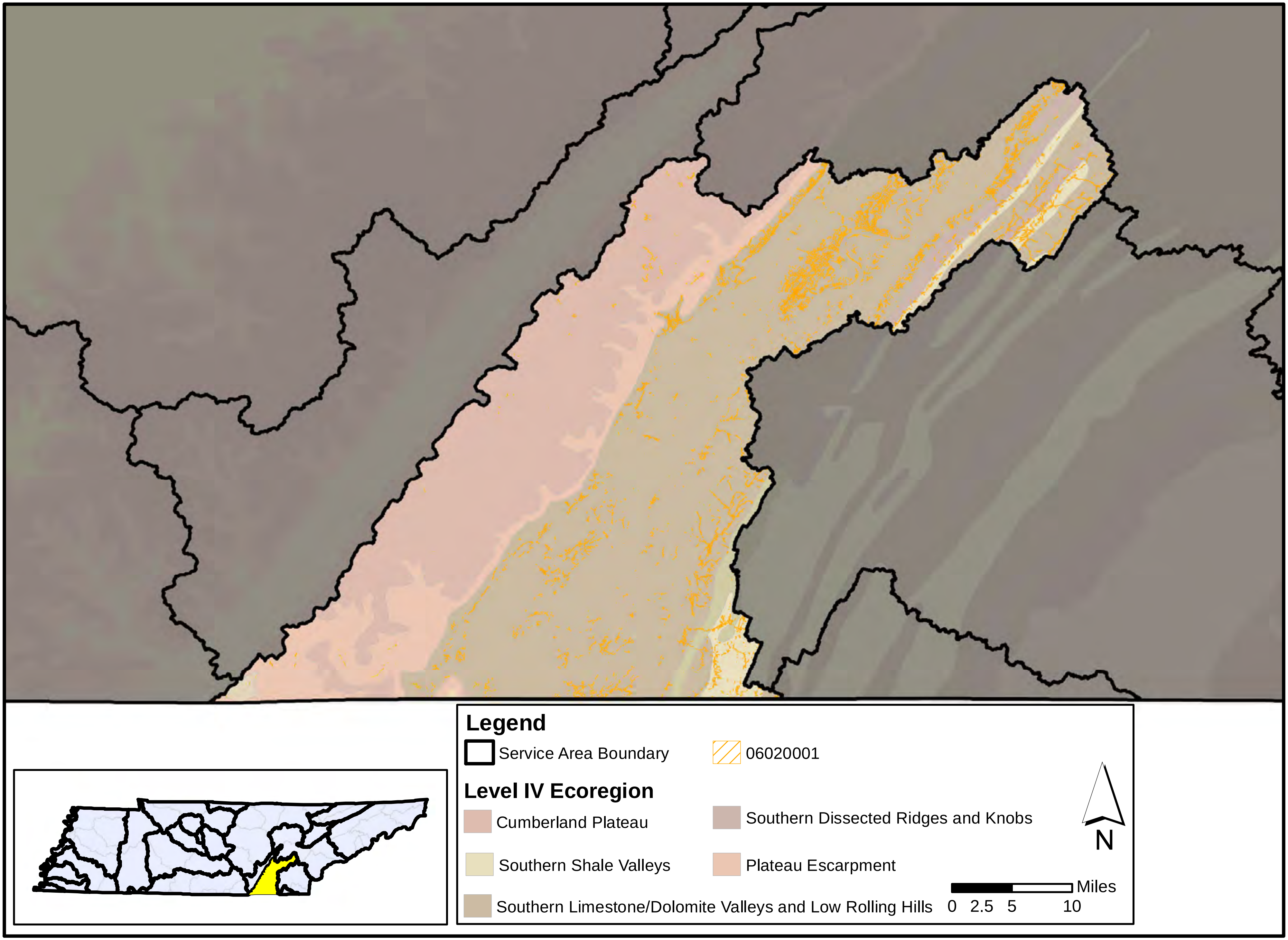


Figure 42: Chickamauga / Nickajack Service Area Ecoregions and Hydric Soils

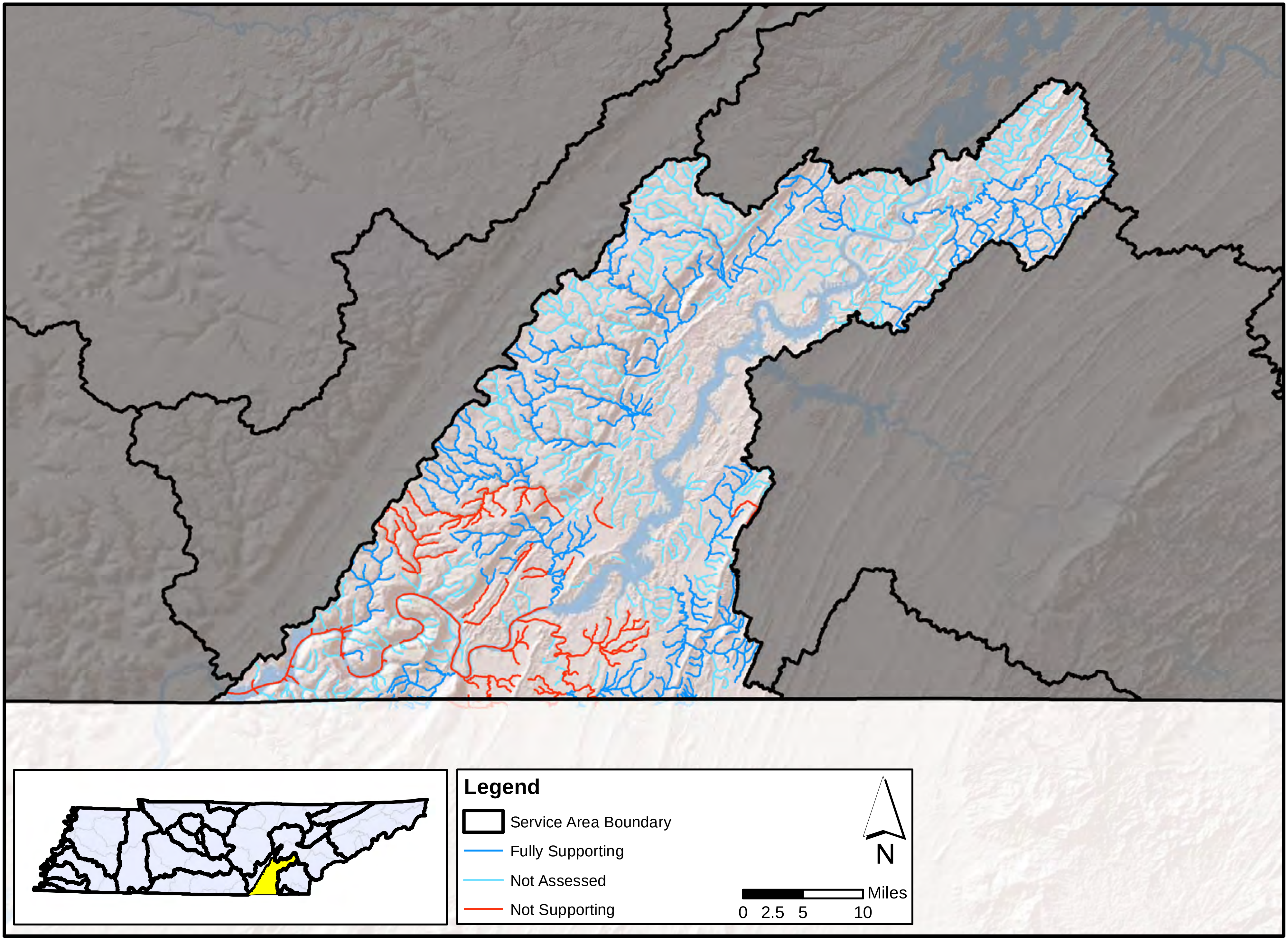


Figure 43: Chickamauga / Nickajack Service Area 303(d) Streams

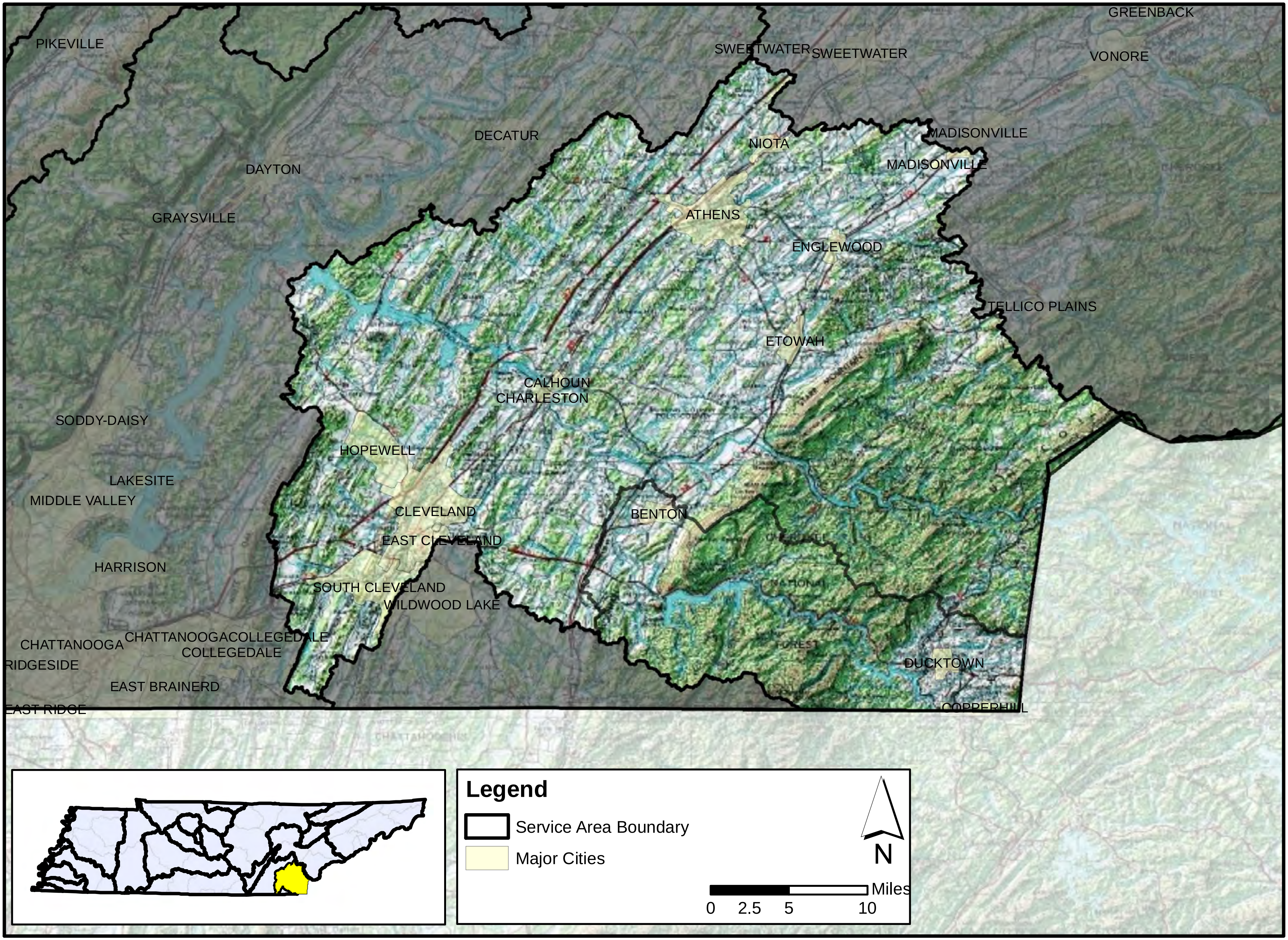


Figure 44: Hiwassee / Ocoee Service Area Location

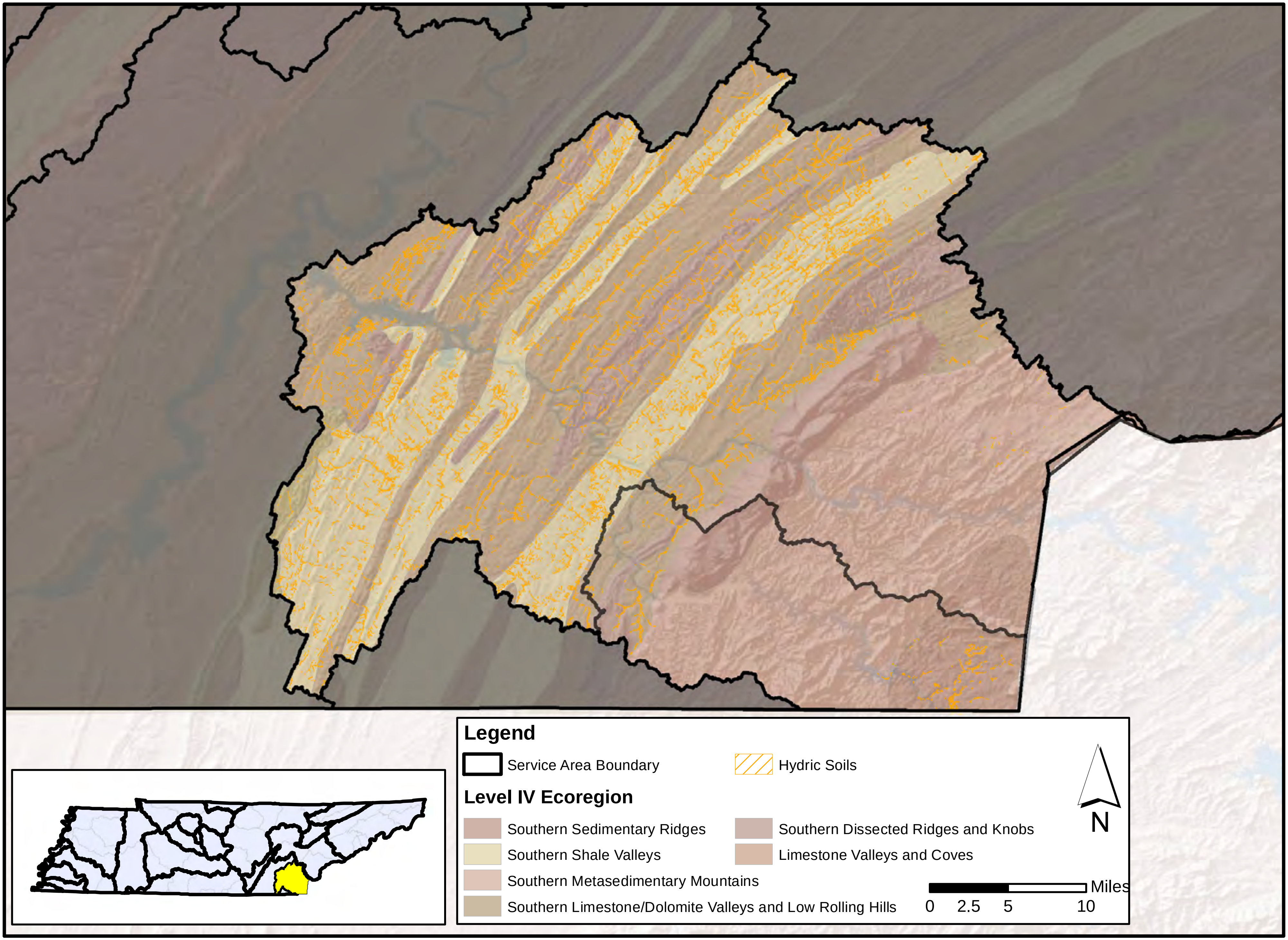


Figure 45: Hiwassee / Ocoee Service Area Ecoregions and Hydric Soils

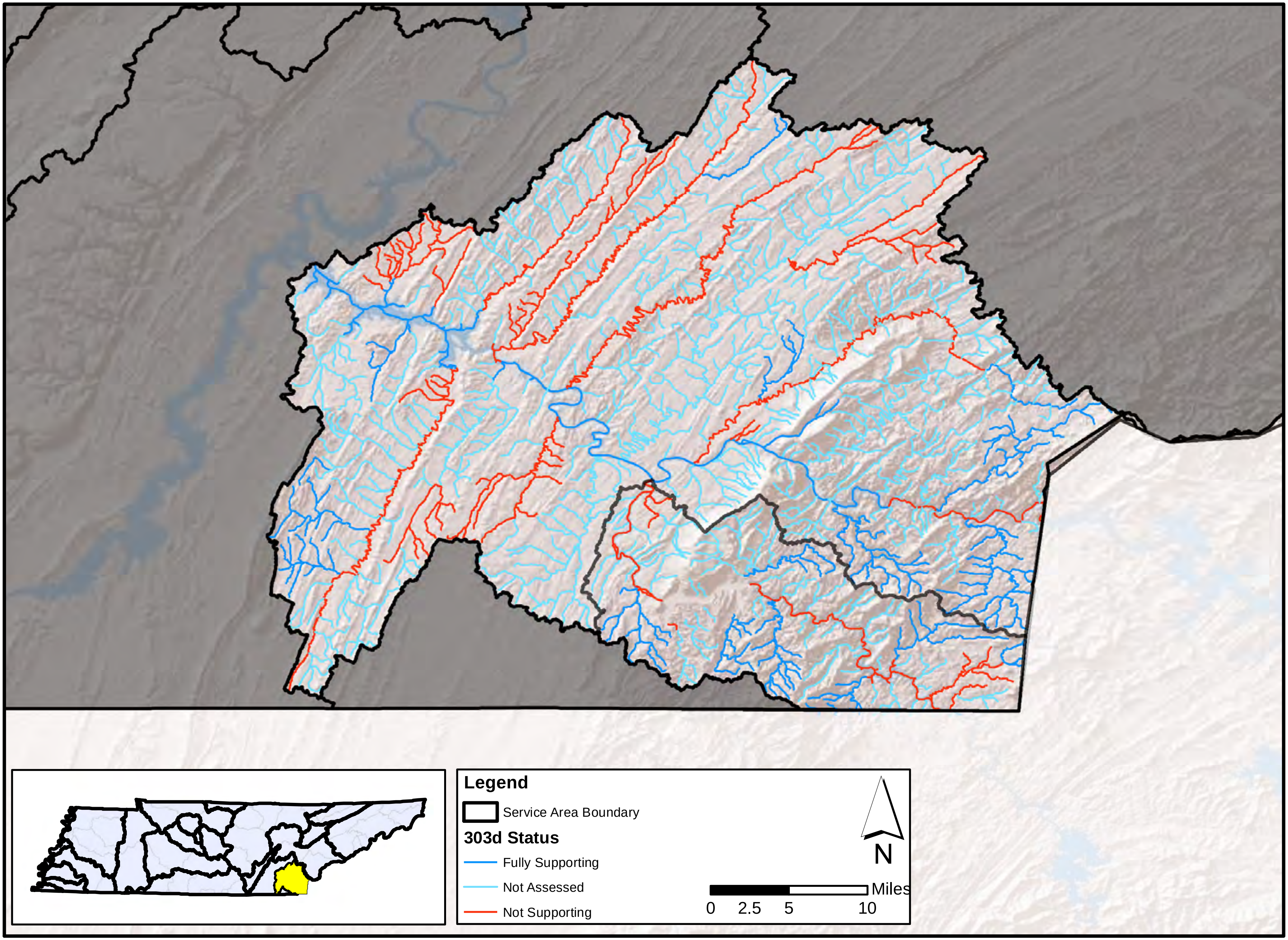


Figure 46: Hiwassee / Ocoee Service Area 303(d) Streams

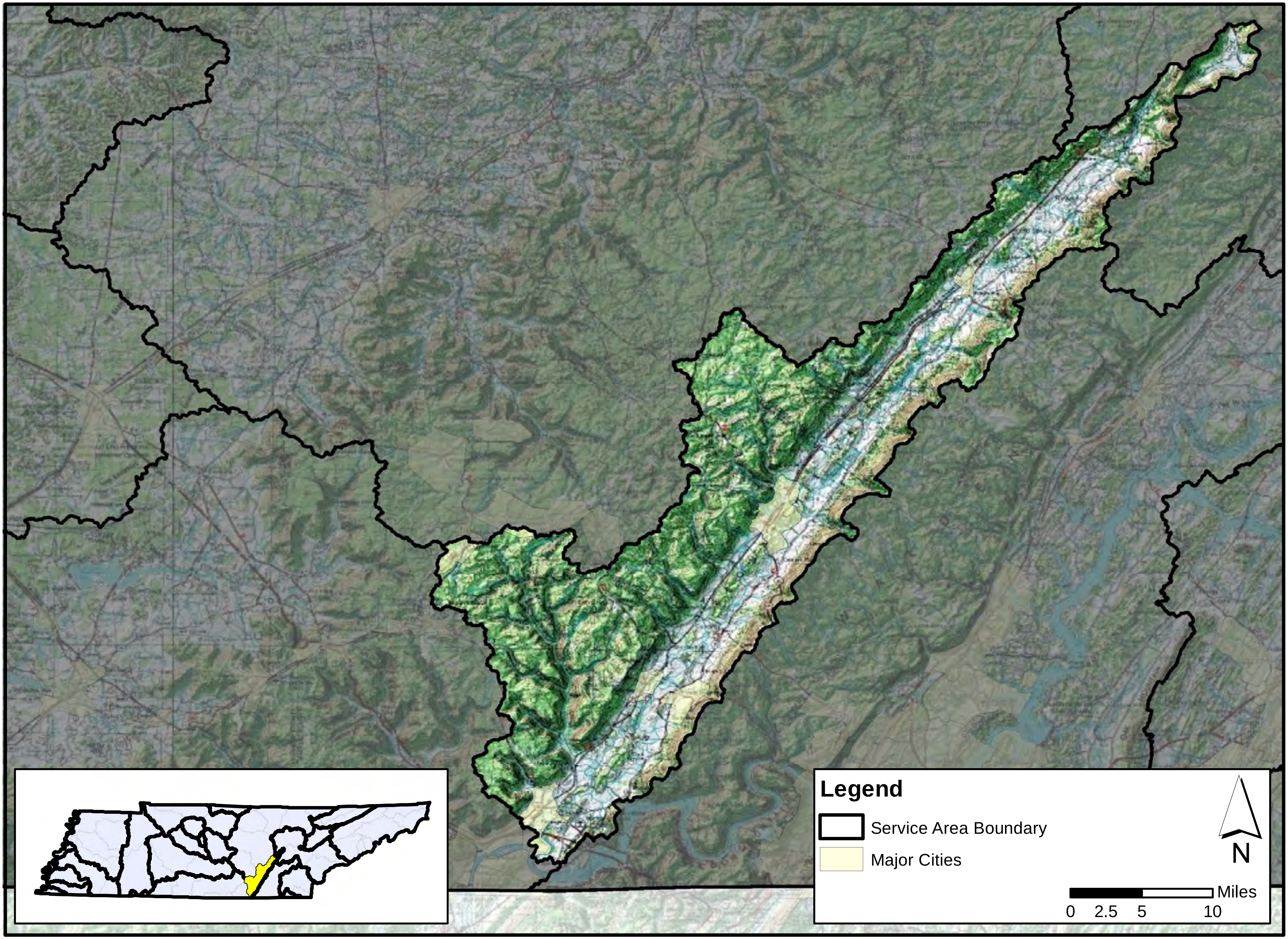


Figure 47: Sequatchie Service Area Location

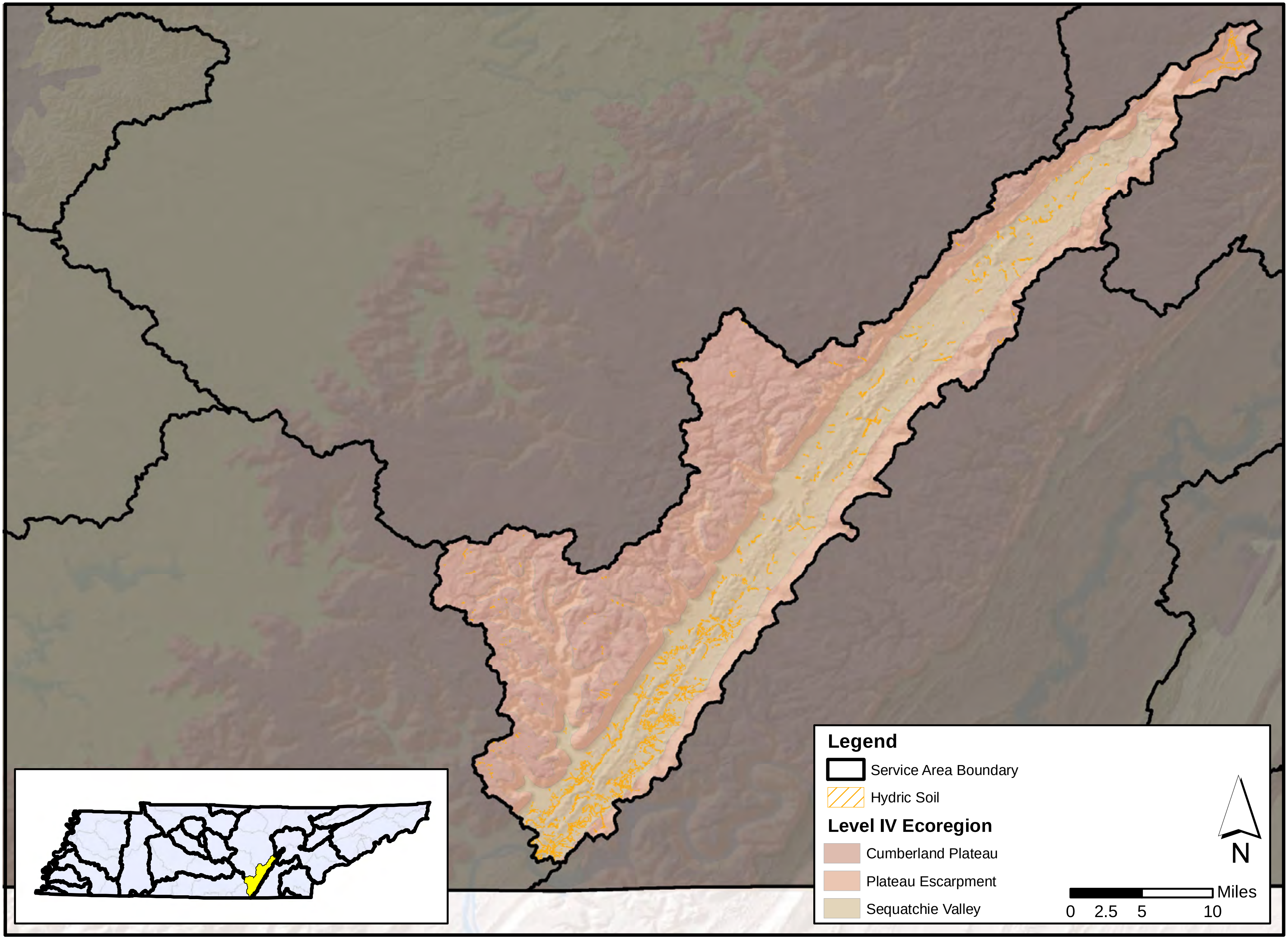


Figure 48: Sequatchie Service Area Ecoregions and Hydric Soils

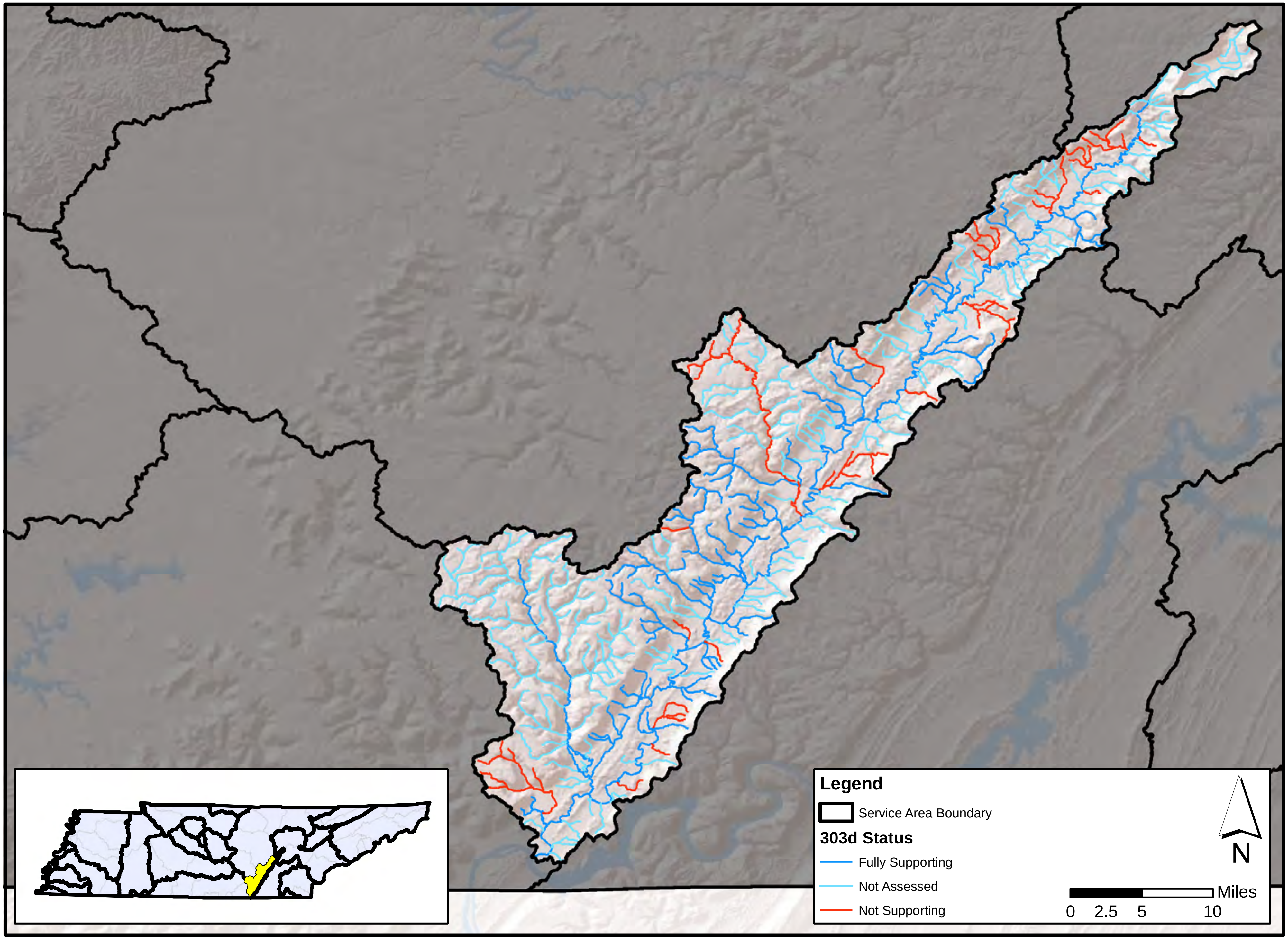


Figure 49: Sequatchie Service Area 303(d) Streams

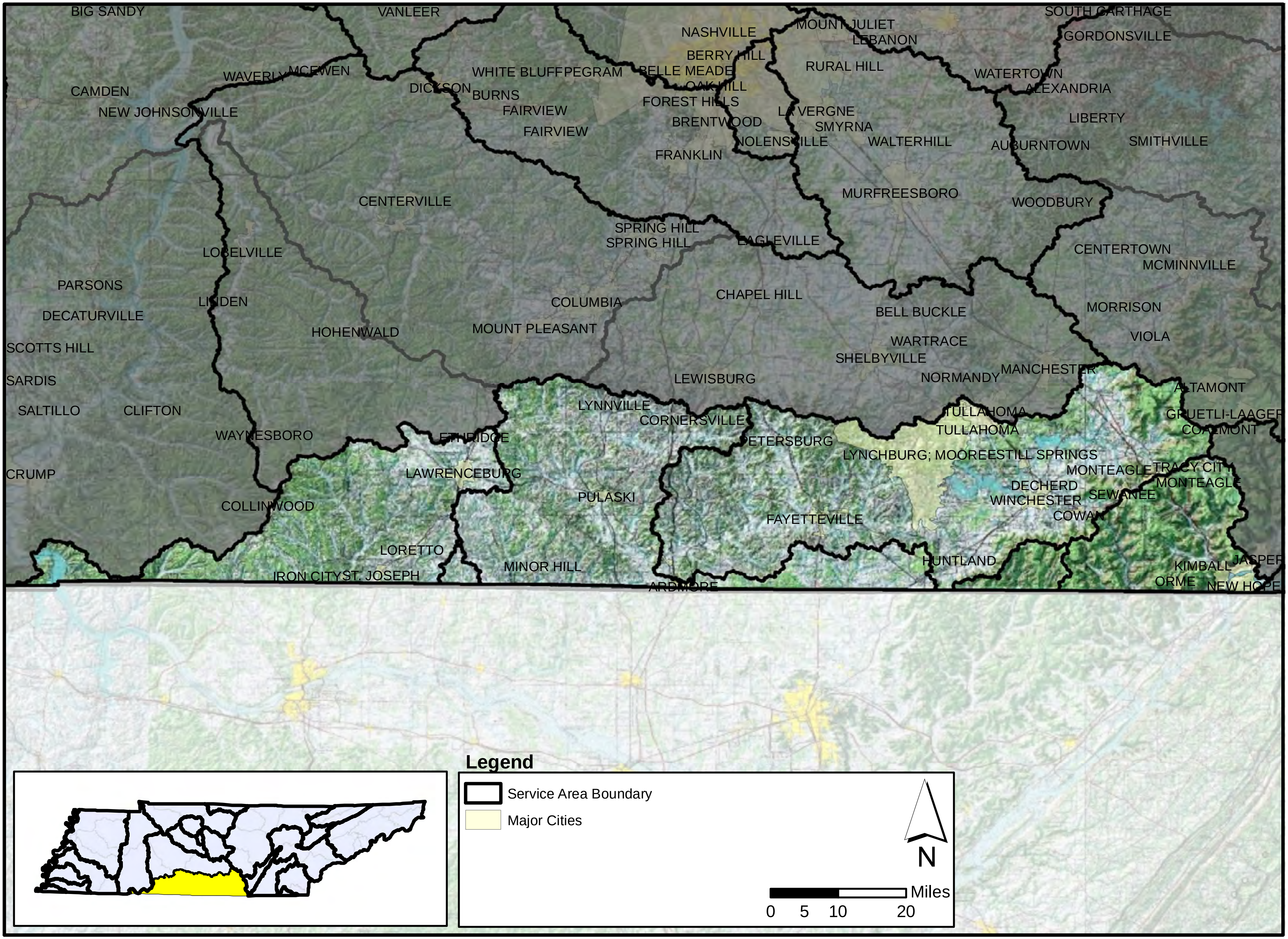


Figure 50: Elk River / Border Lakes Service Area Location

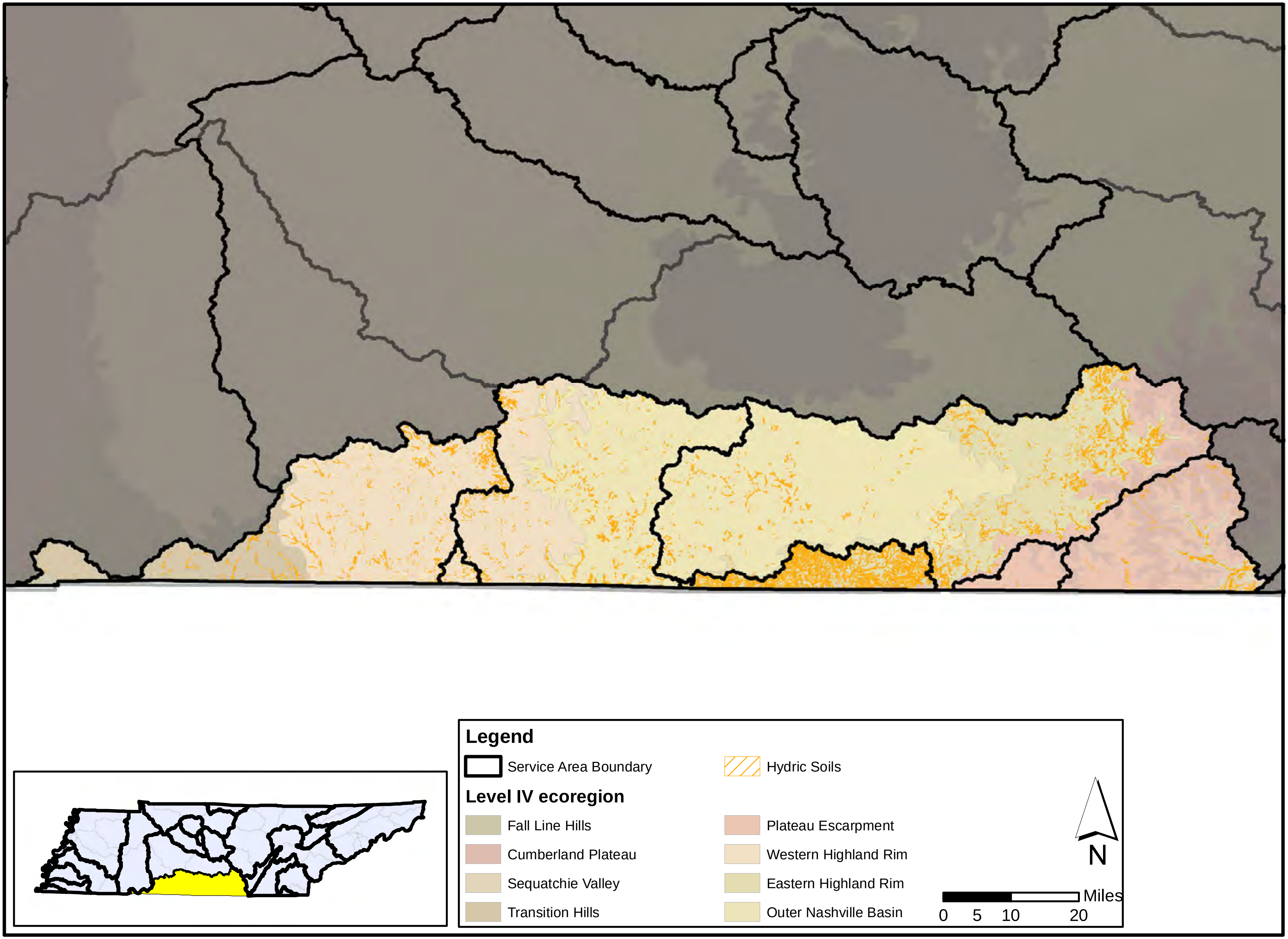


Figure 51: Elk River / Border Lakes Service Area Ecoregions and Hydric Soils

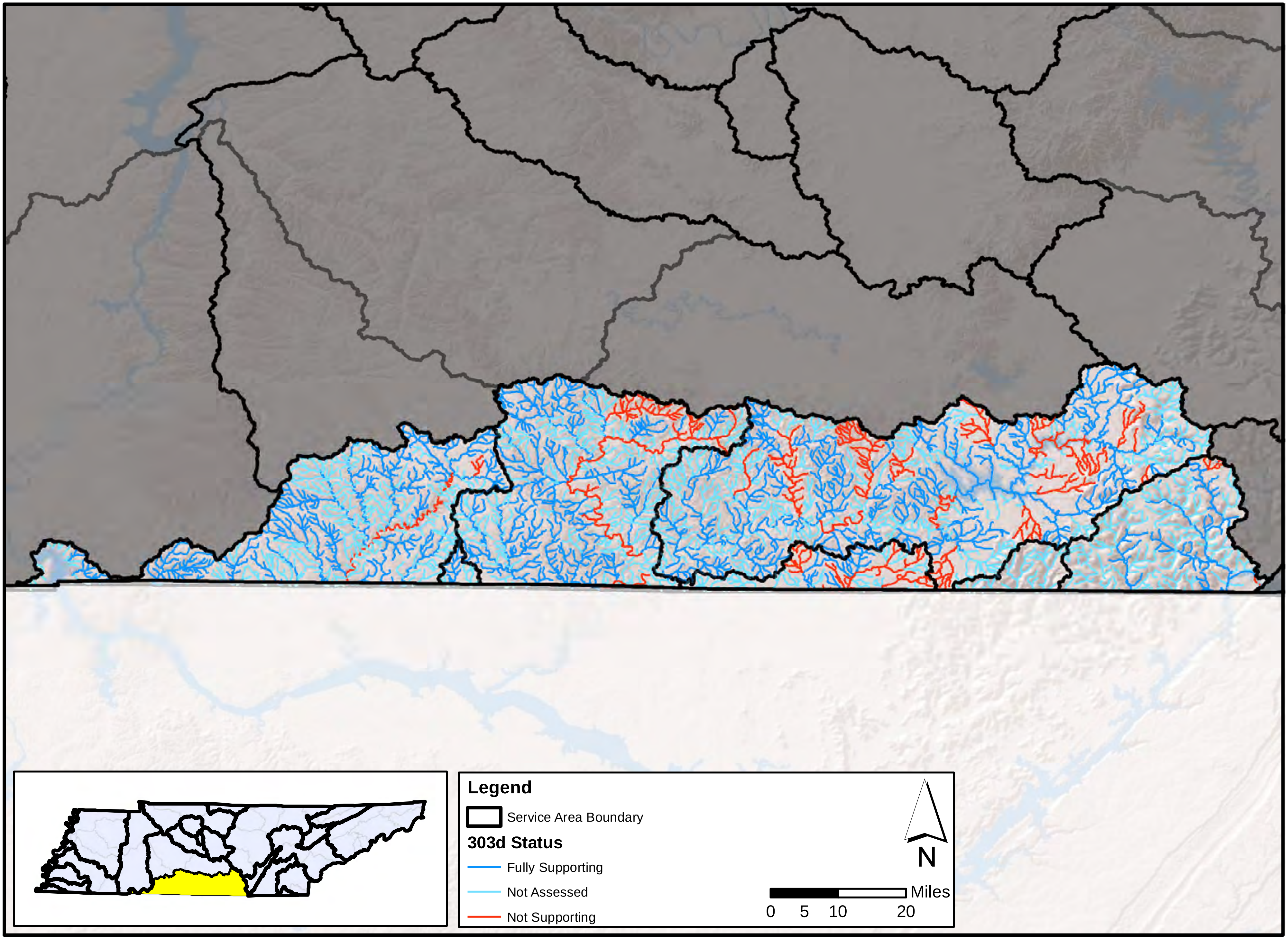


Figure 52: Elk River / Border Lakes Service Area 303(d) Streams

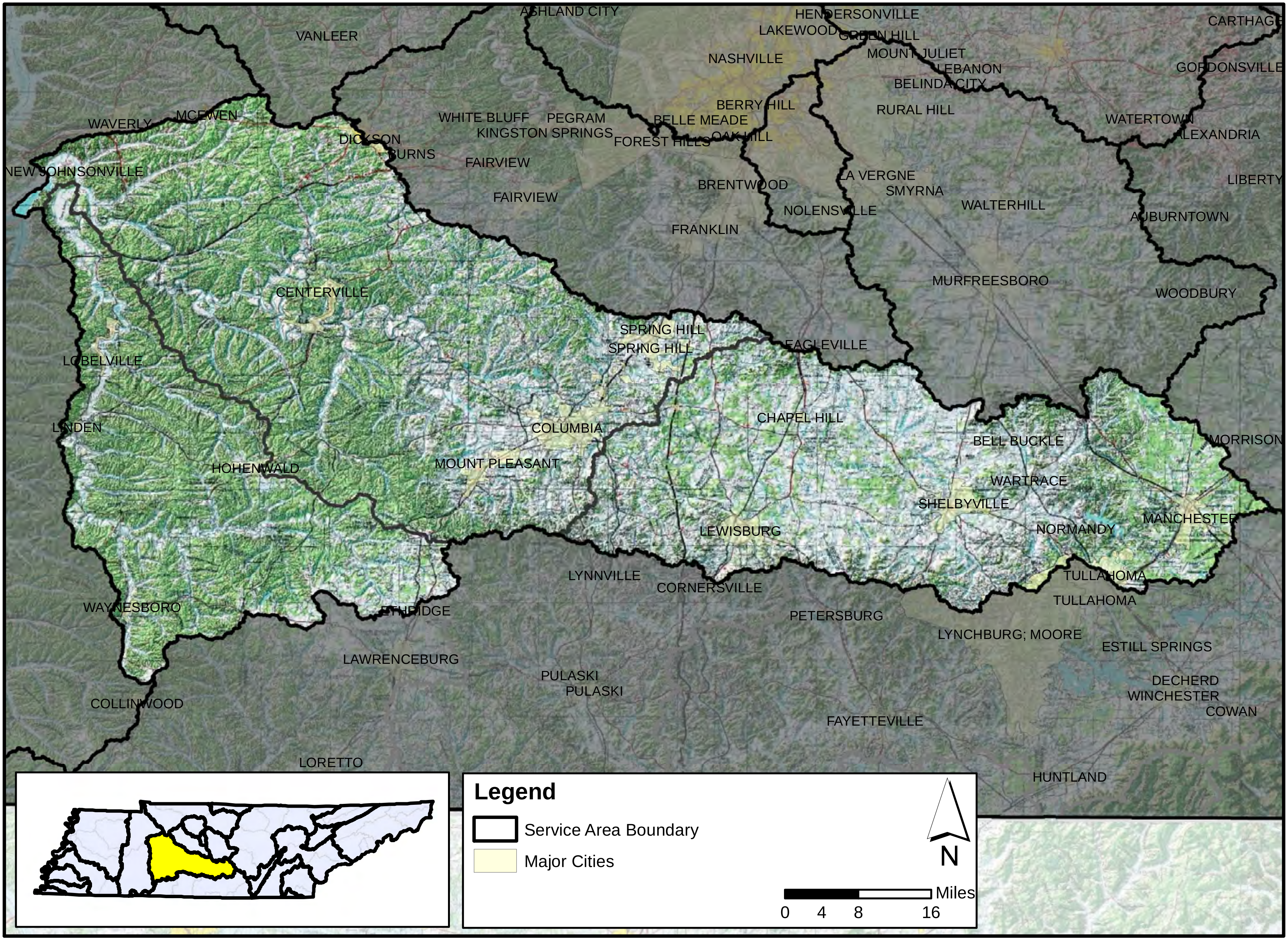


Figure 53: Buffalo / Duck Rivers Service Area Location

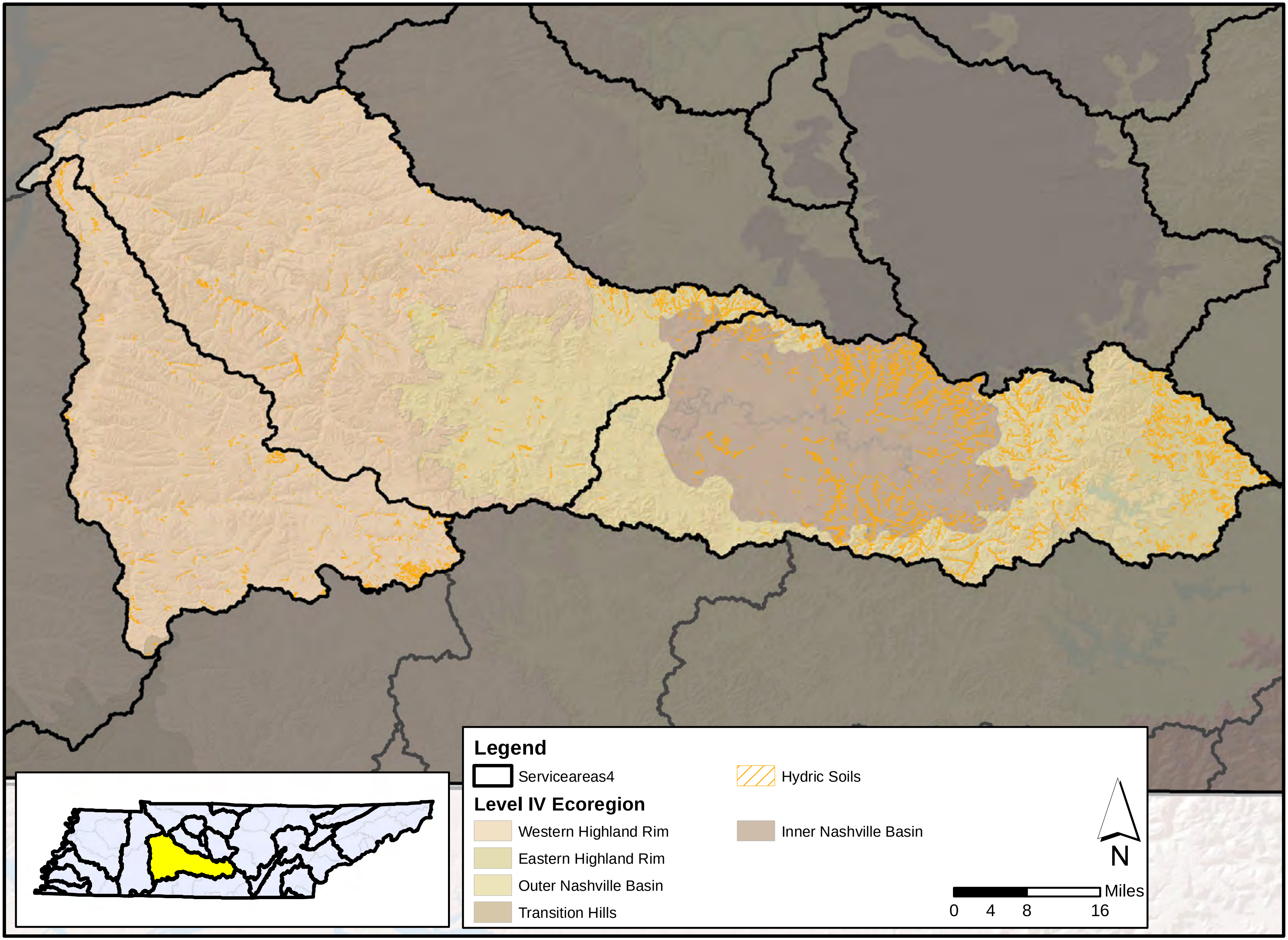


Figure 54: Buffalo / Duck Rivers Service Area Ecoregion and Hydric Soils

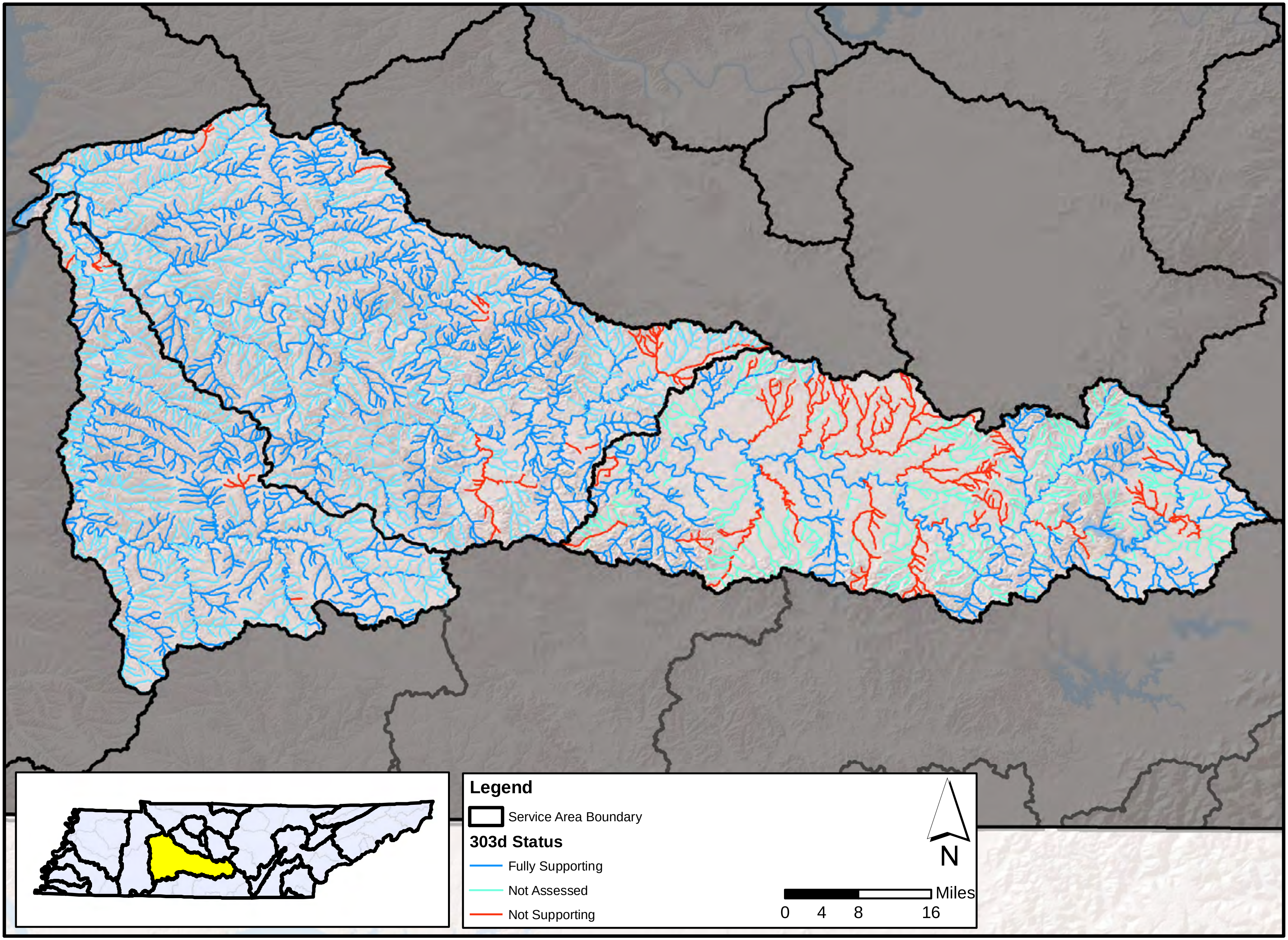


Figure 55: Buffalo / Duck Rivers Service Area 303(d) Streams

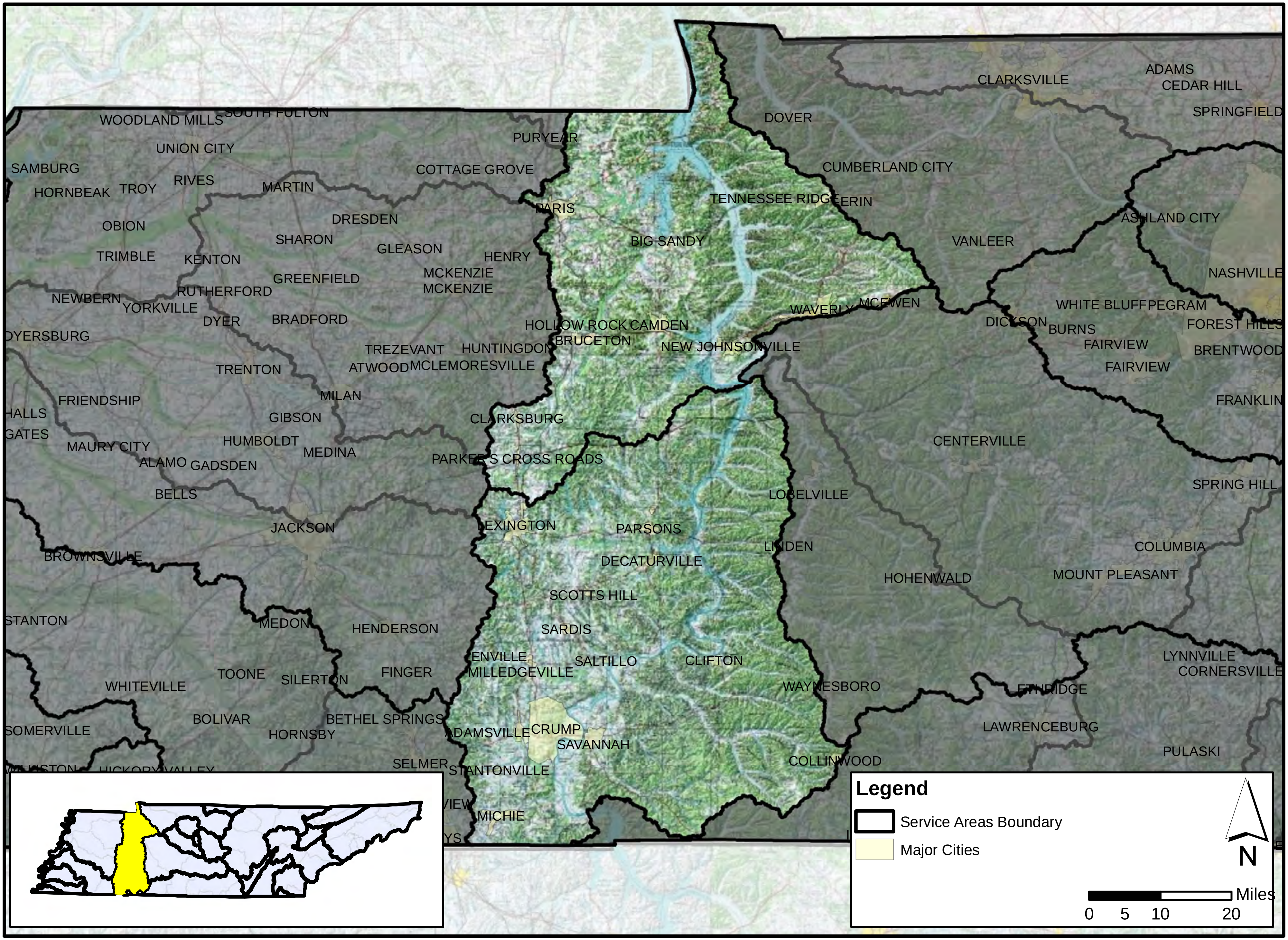


Figure 56: Lower Tennessee Service Area Location

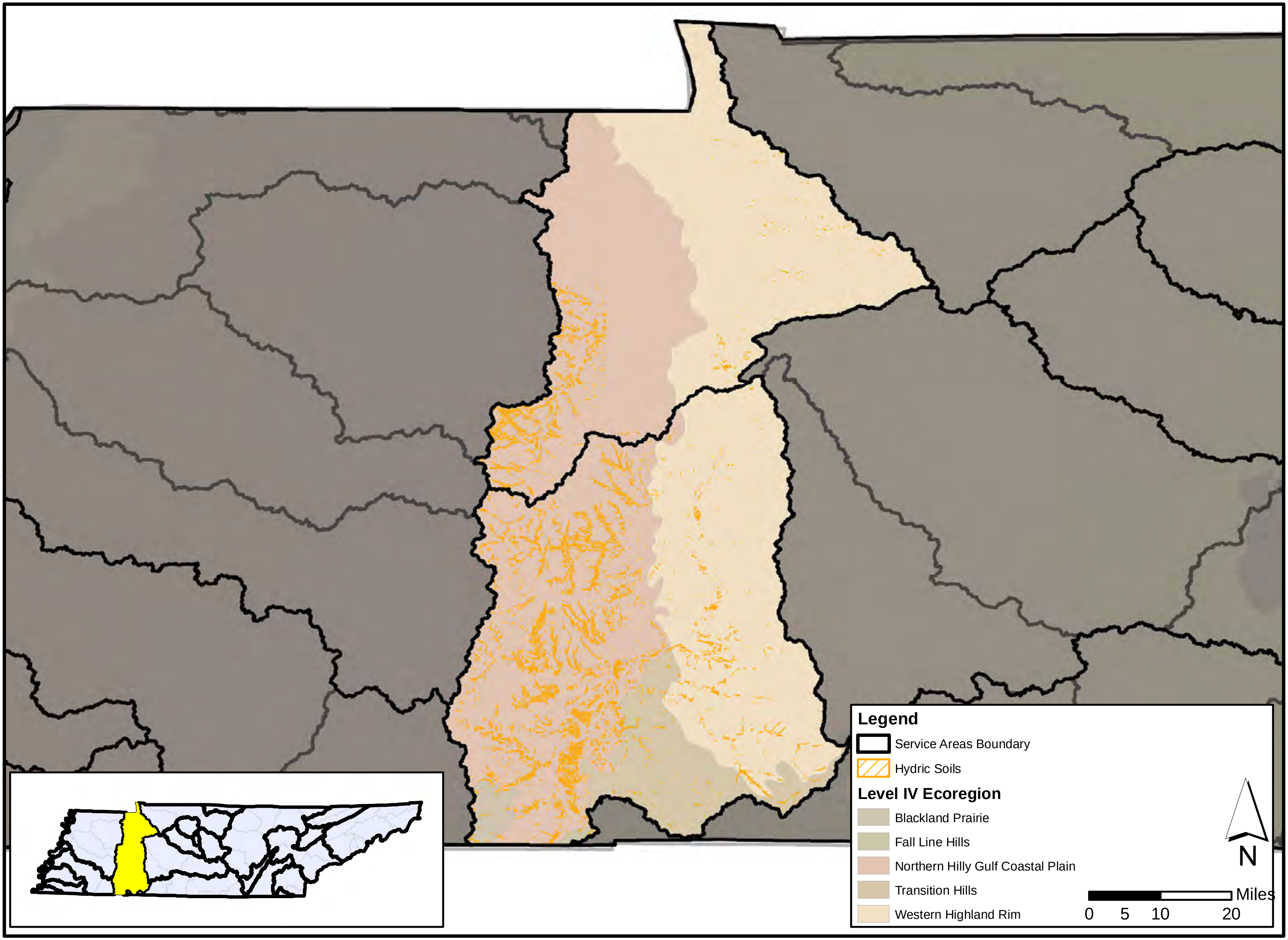


Figure 57: Lower Tennessee Service Area Ecoregions and Hydric Soils

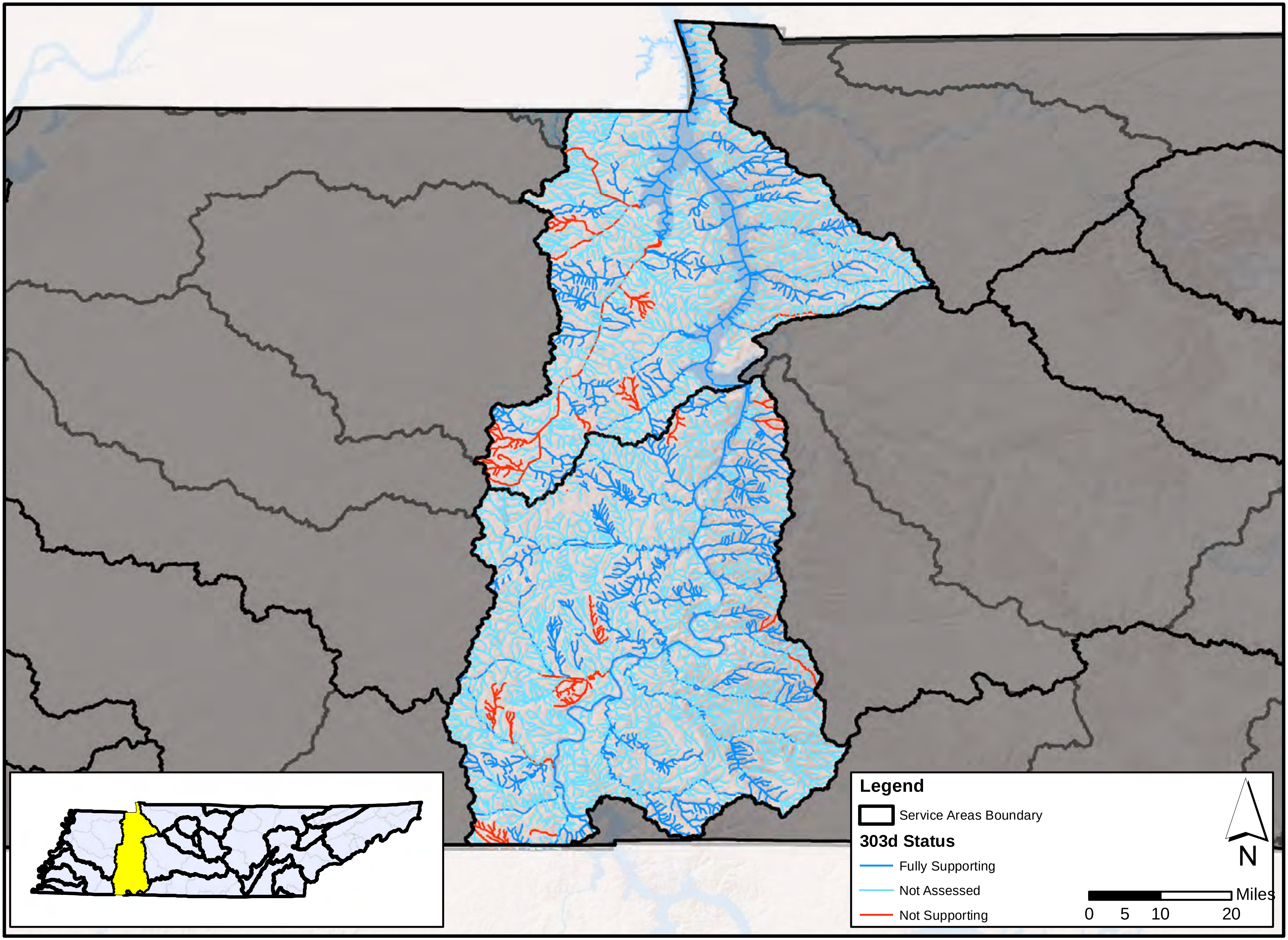


Figure 58: Lower Tennessee Service Area 303(d) Streams

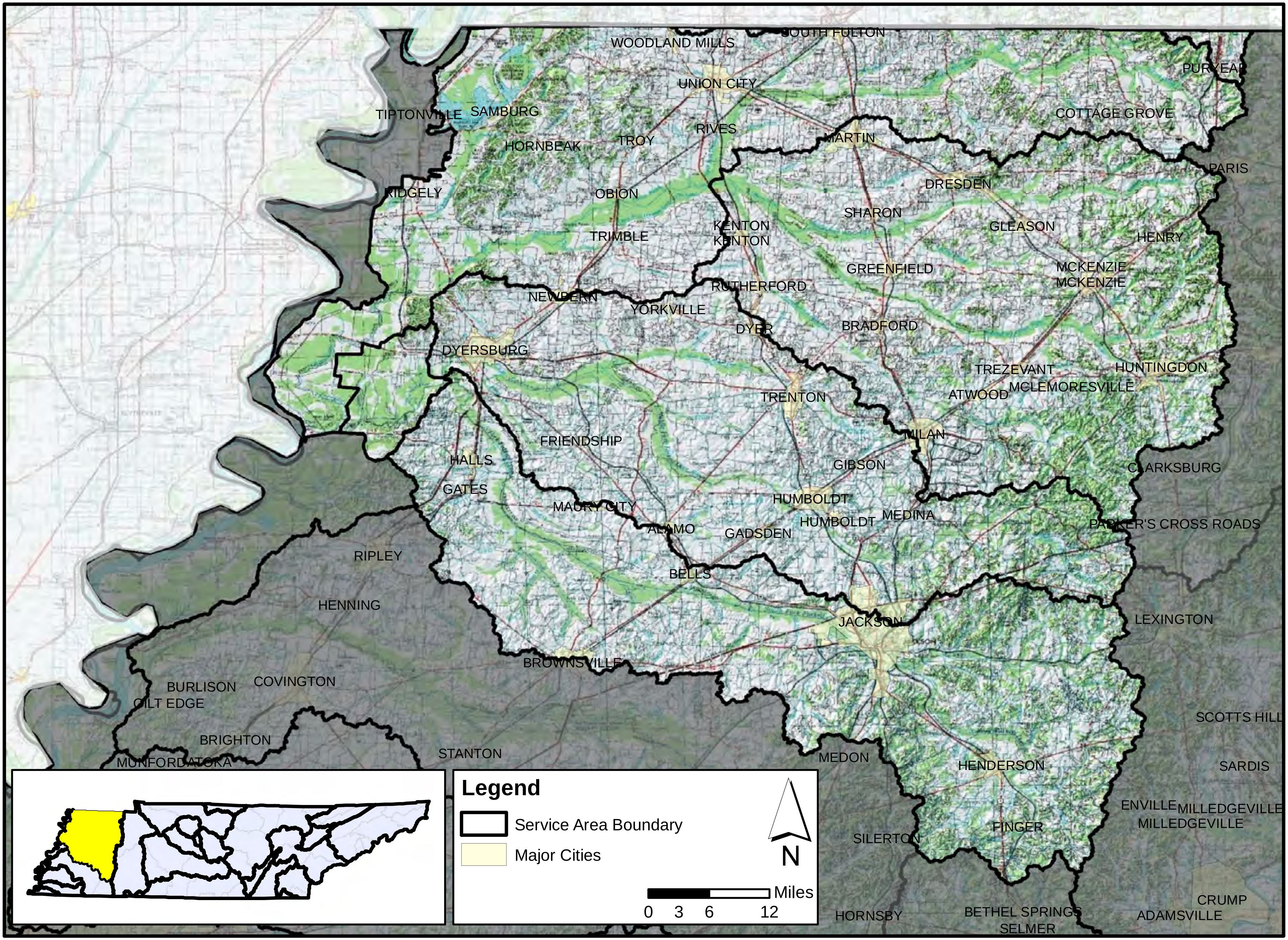


Figure 59: Forked Deer / Obion Service Area Location

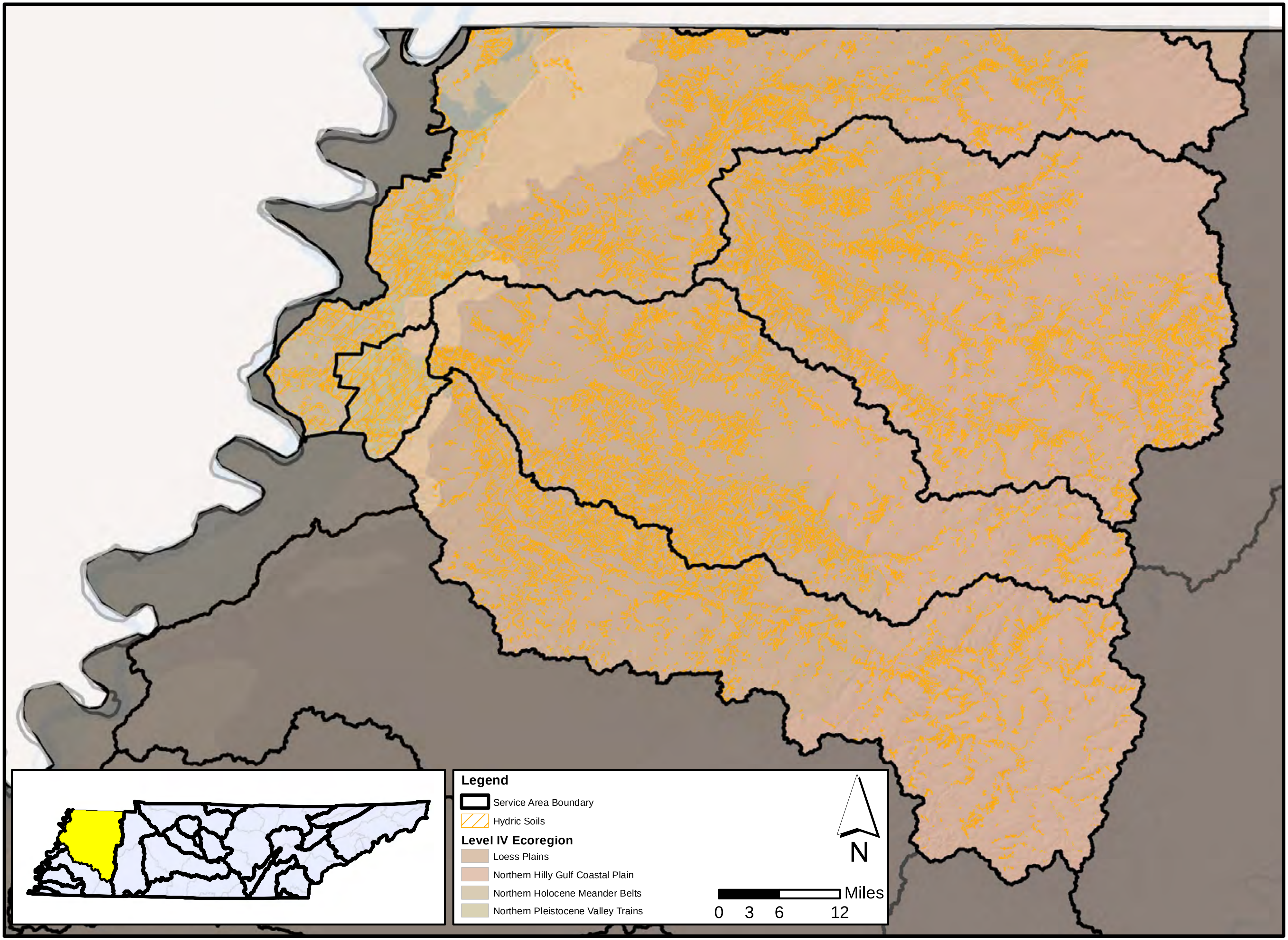


Figure 60: Forked Deer / Obion Service Area Ecoregions and Hydric Soils

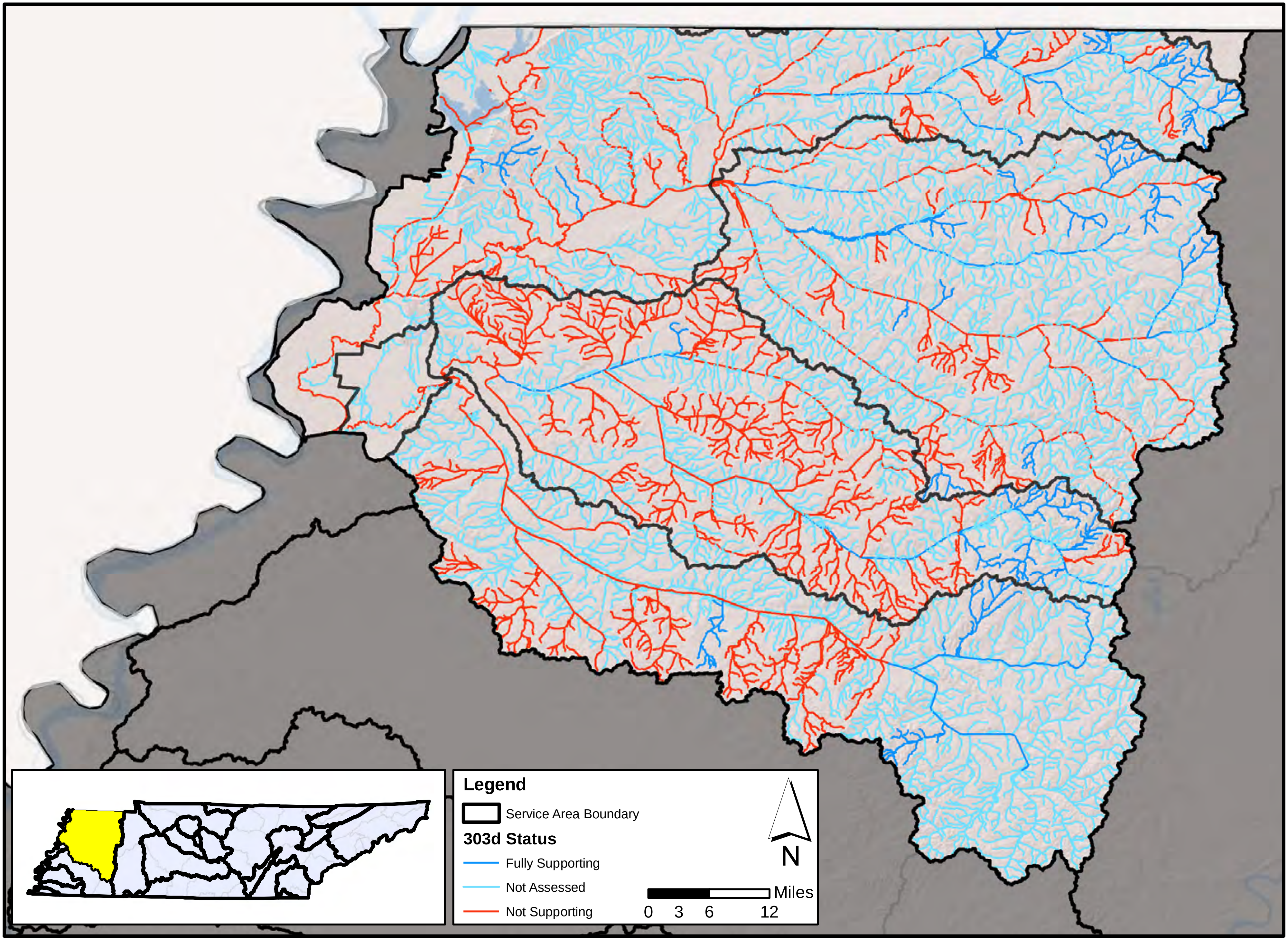


Figure 61: Forked Deer / Obion Service Area 303(d) Streams

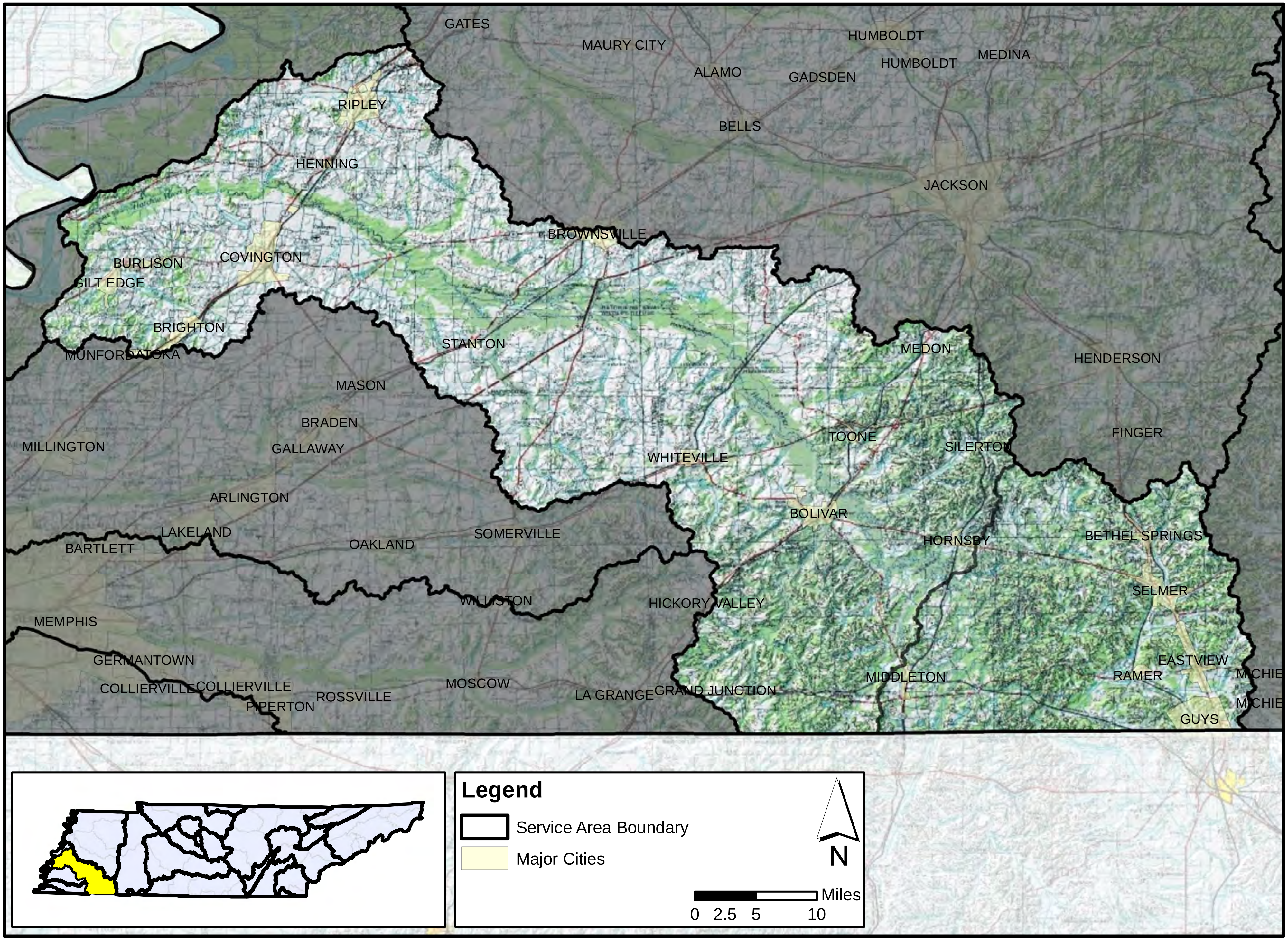


Figure 62: Hatchie River Service Area Location

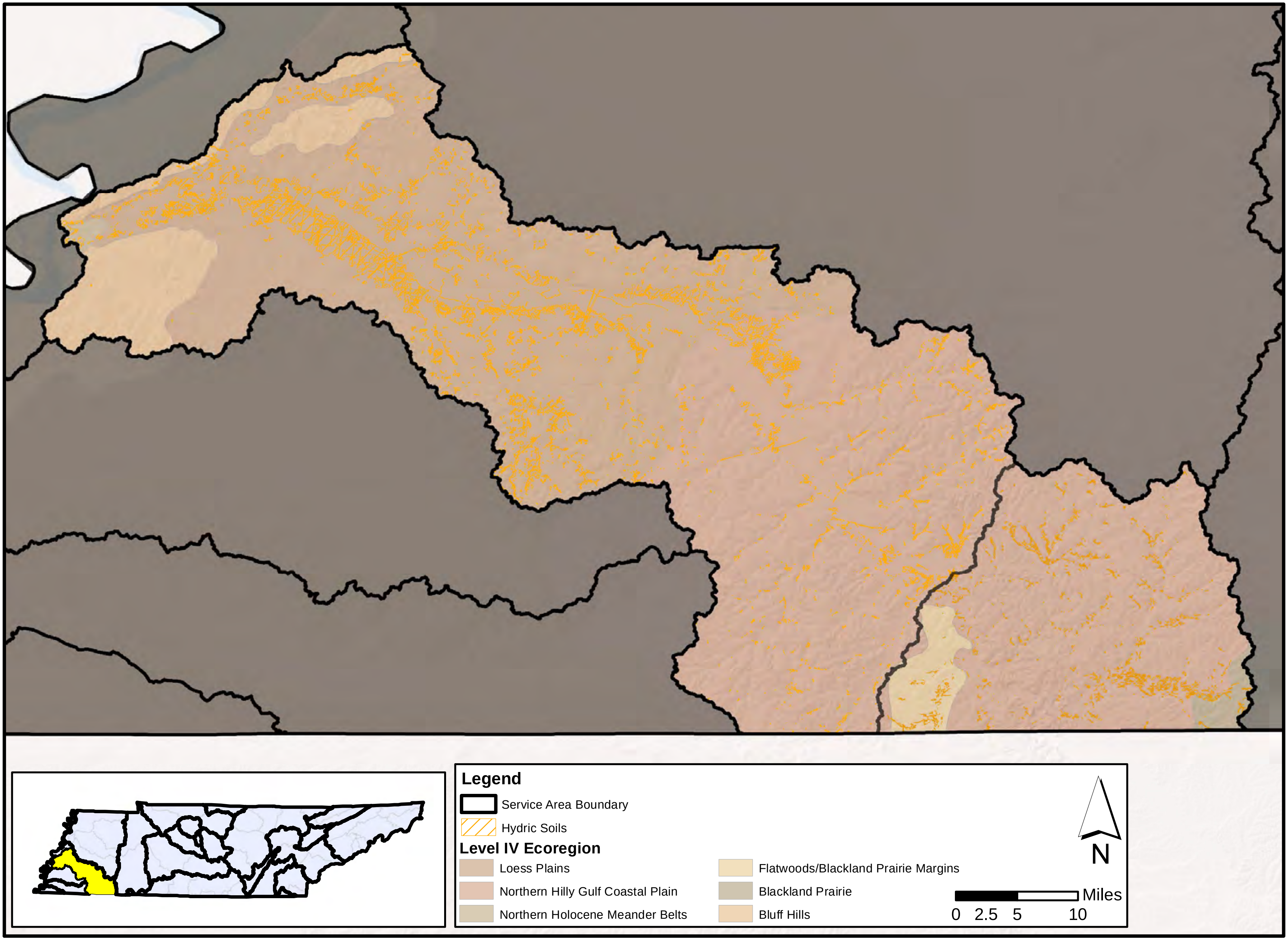


Figure 63: Hatchie River Service Area Ecoregions and Hydric Soils

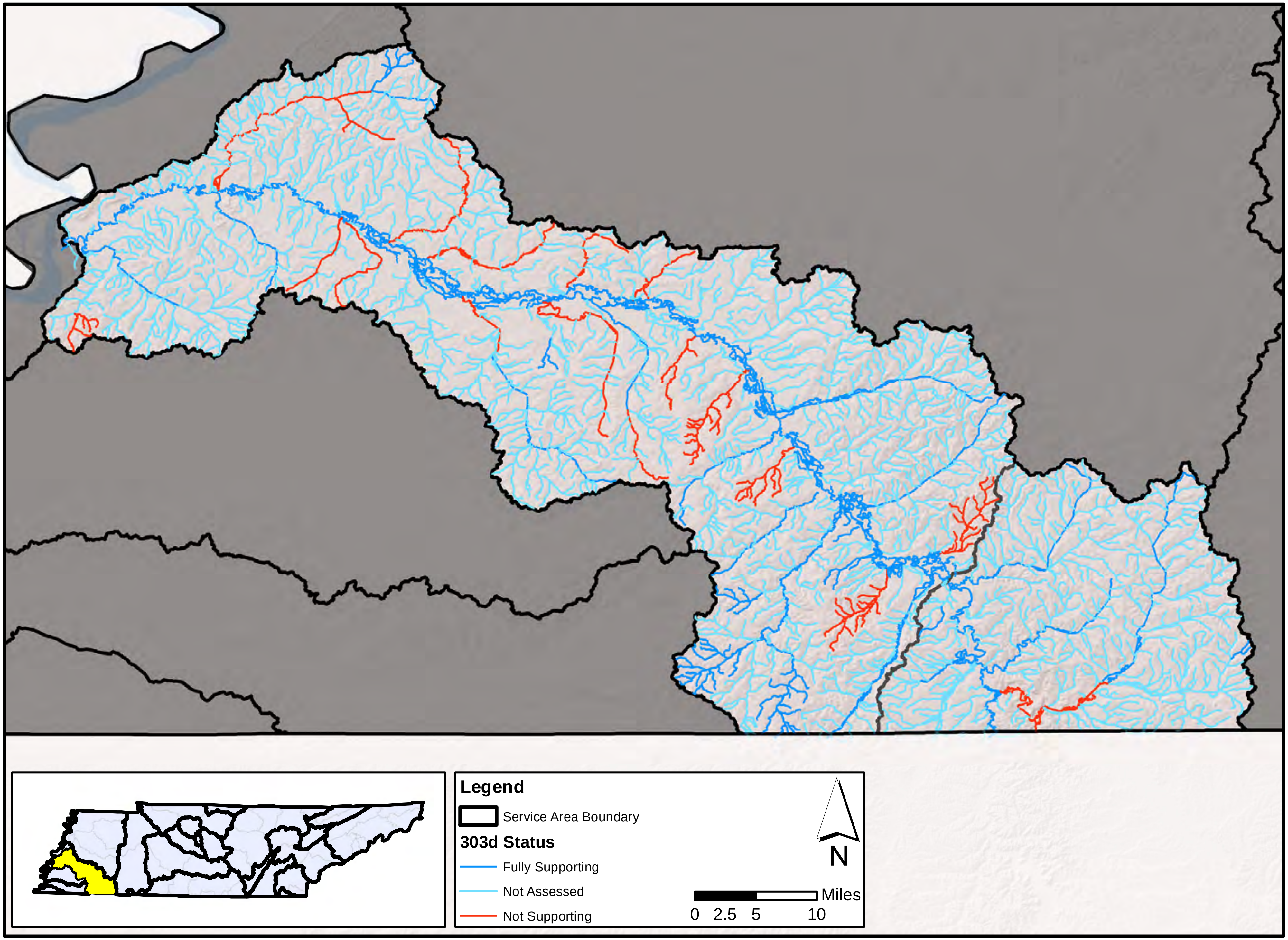


Figure 64: Hatchie River Service Area 303(d) Streams

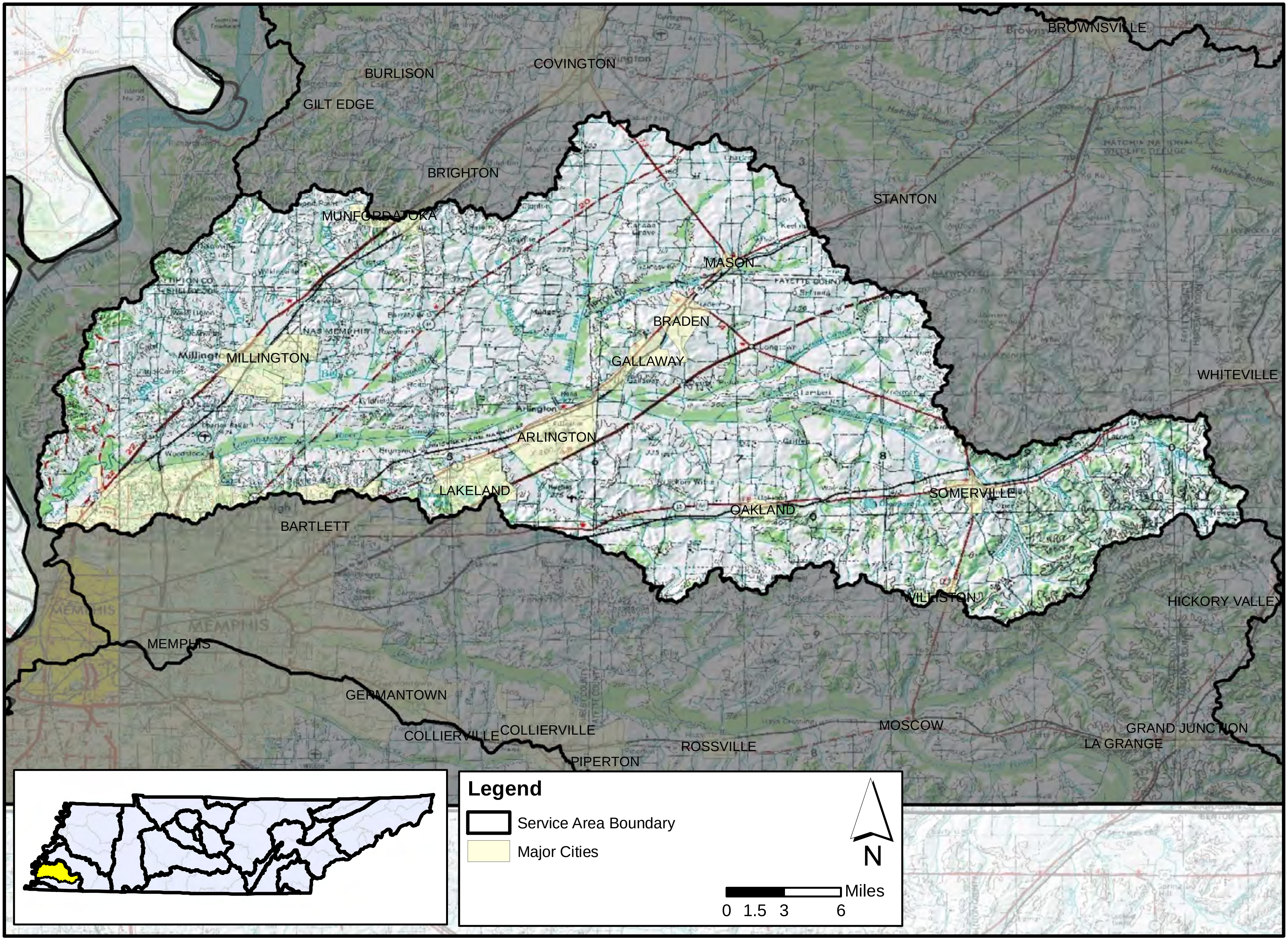


Figure 65: Loosahatchie River Service Area Location

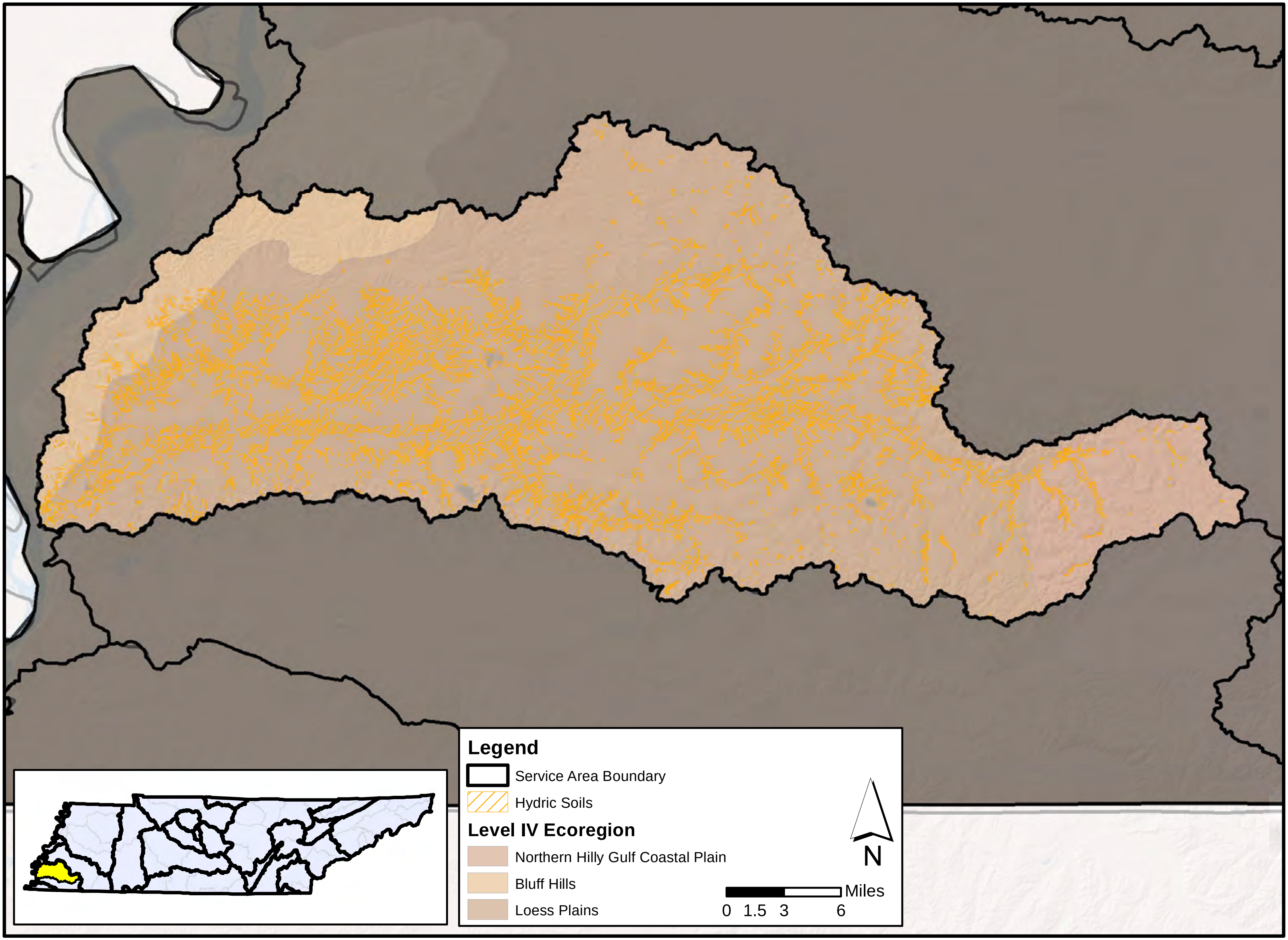


Figure 66: Loosahatchie River Service Area ecoregions and Hydric Soils

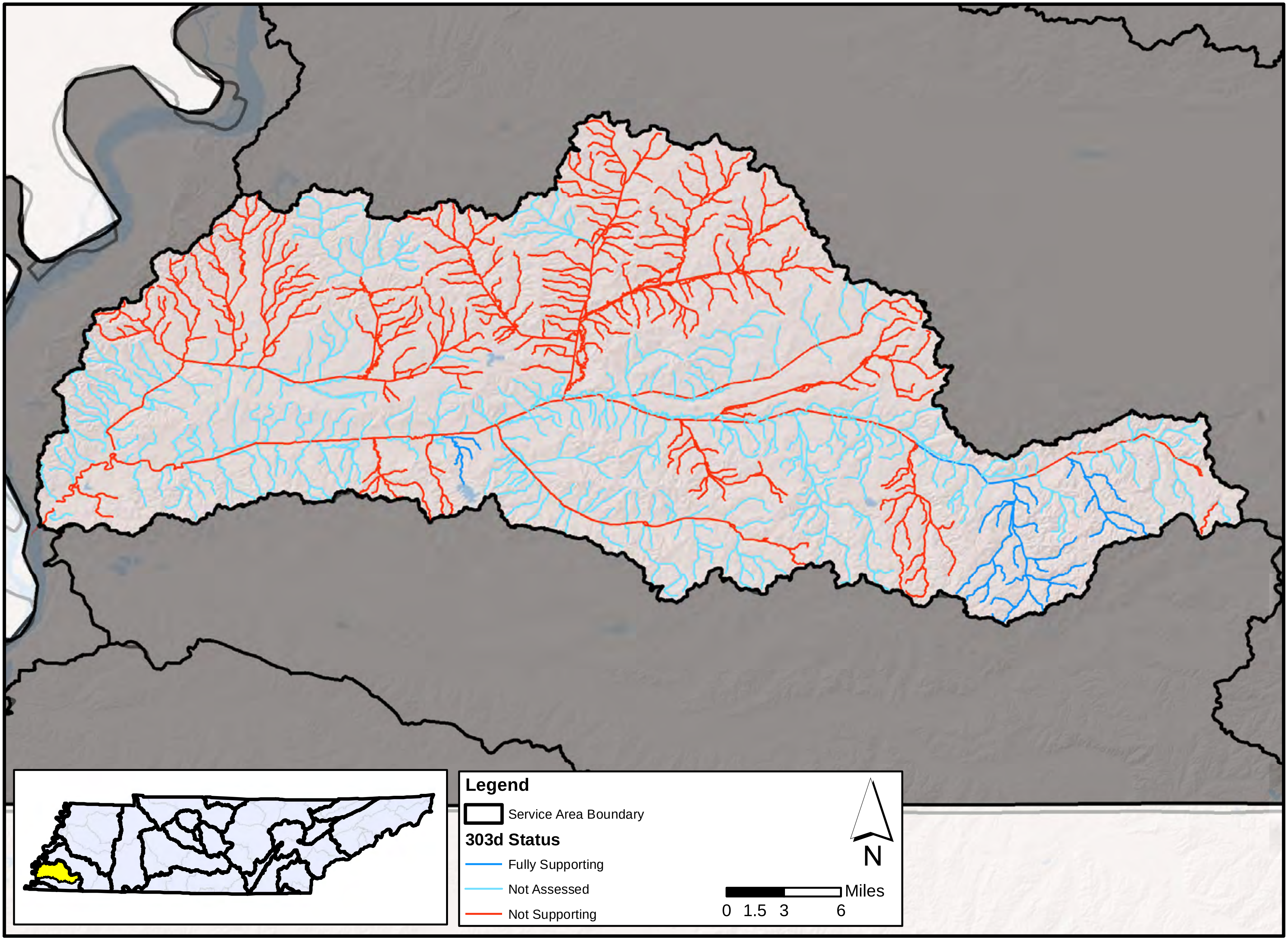


Figure 67: Loosahatchie River Service Area 303(d) Streams

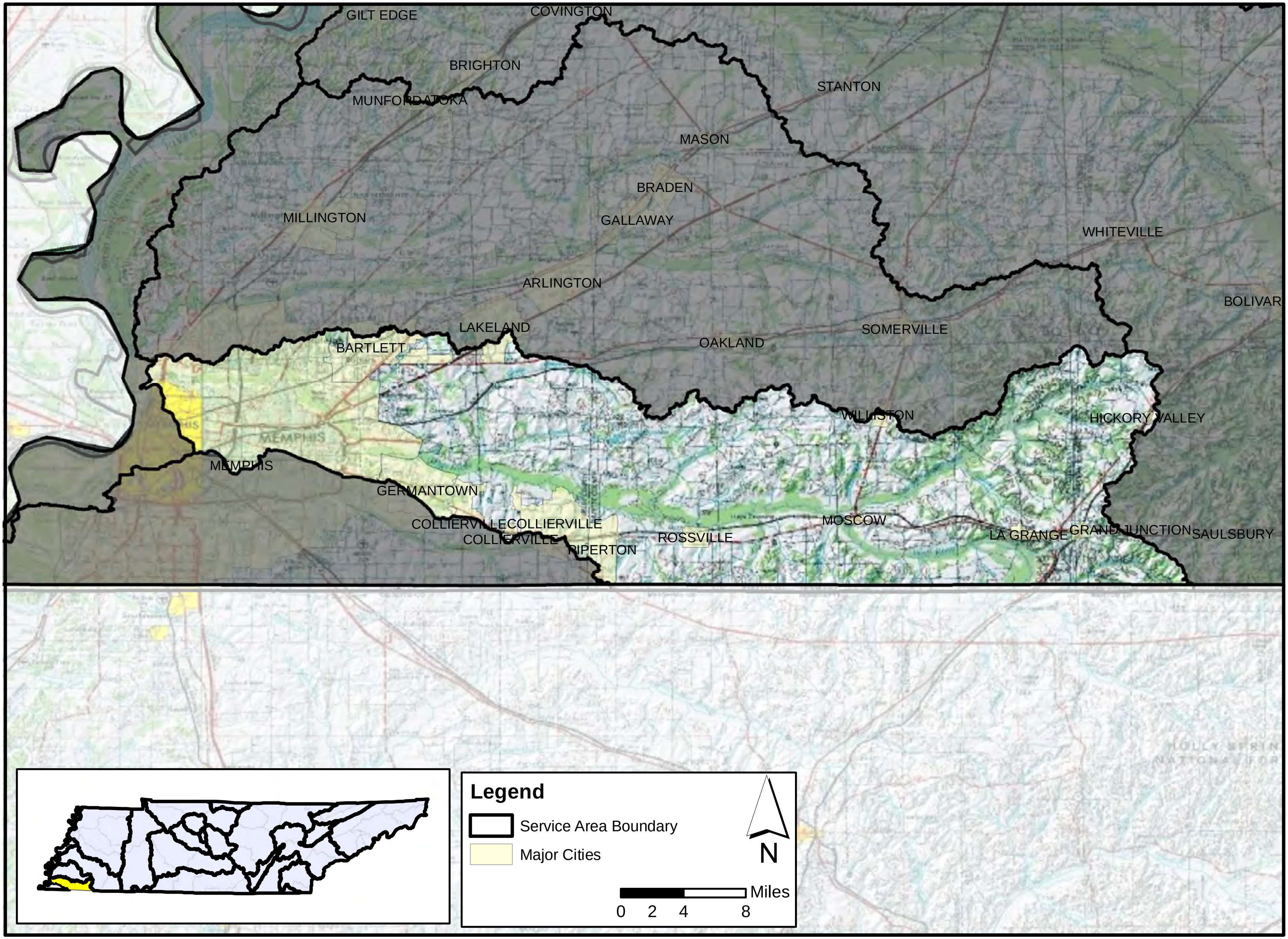


Figure 68: Wolf River Service Area Location

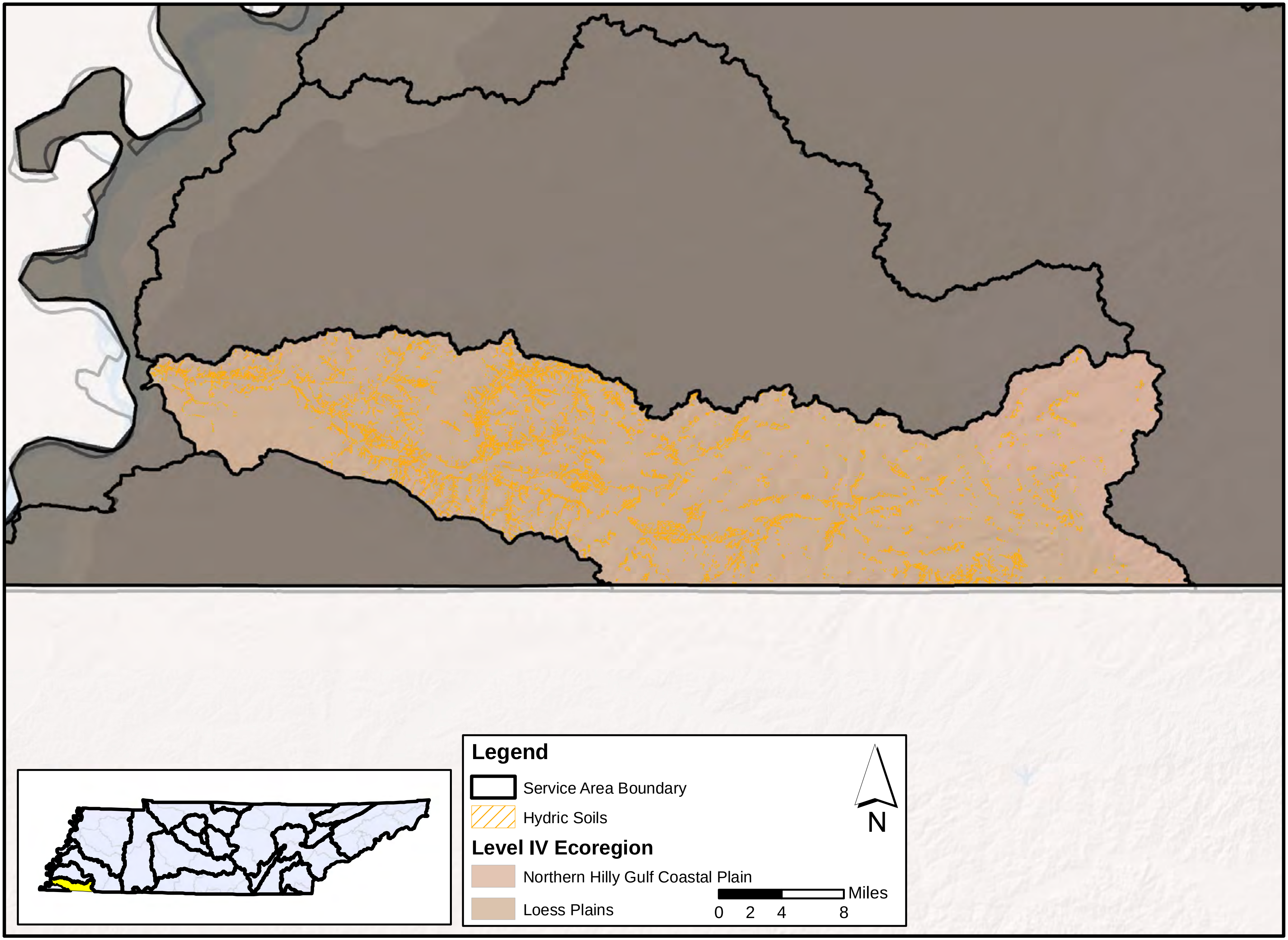


Figure 69: Wolf River Service Area Ecoregions and Hydric Soils

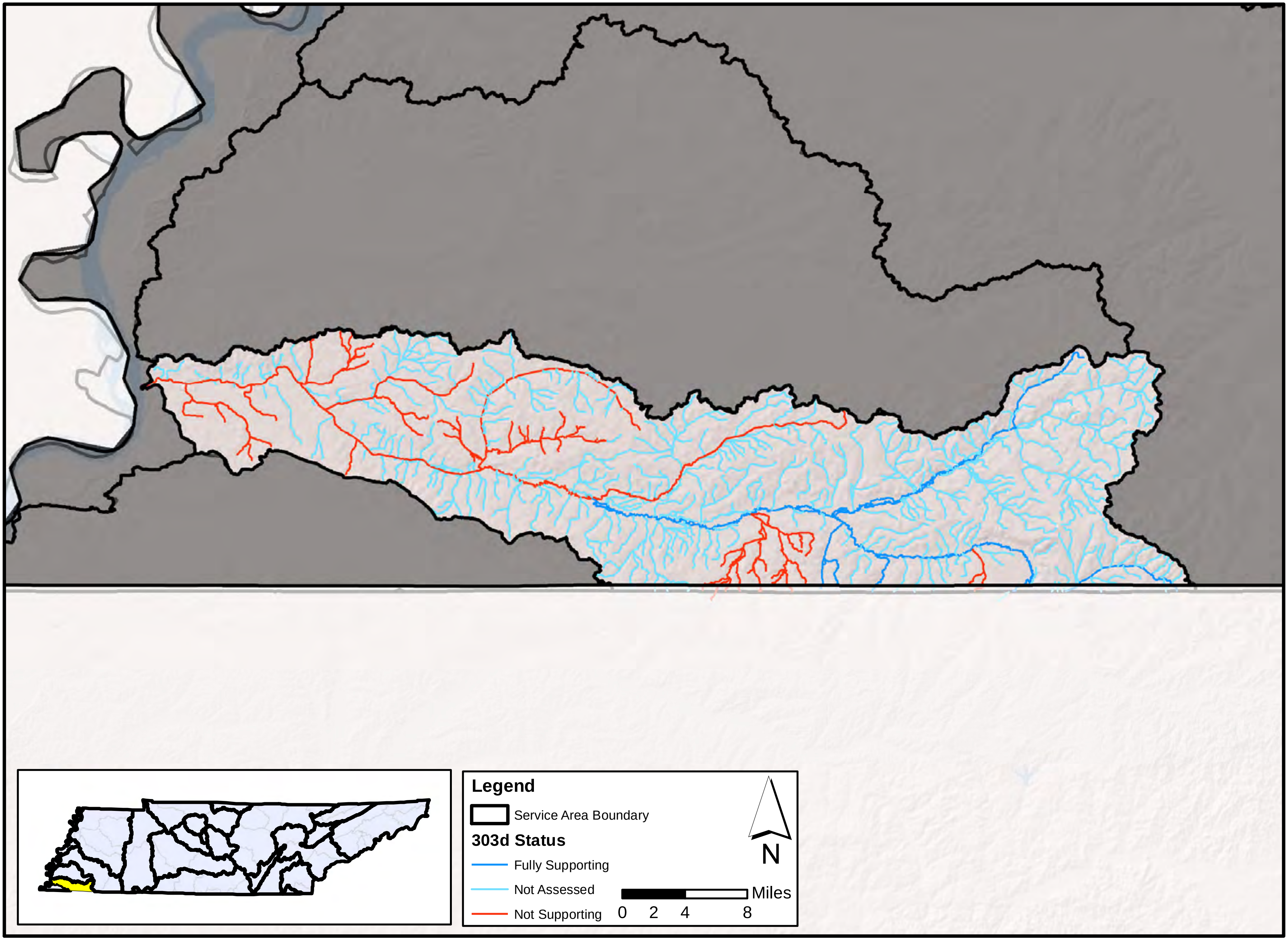


Figure 70: Wolf River Service Area 303(d) Streams

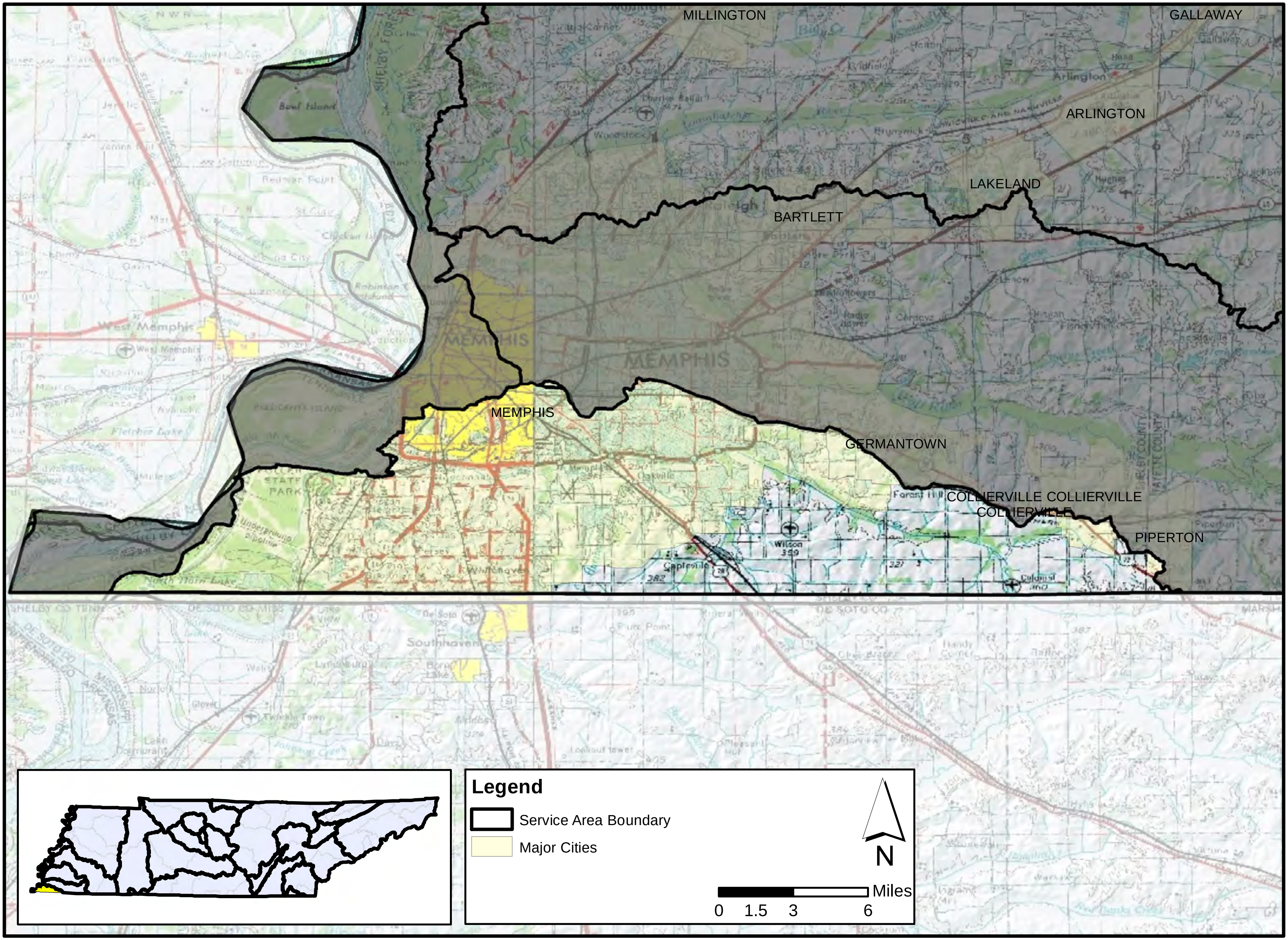


Figure 71: Nonconnah Service Area Location

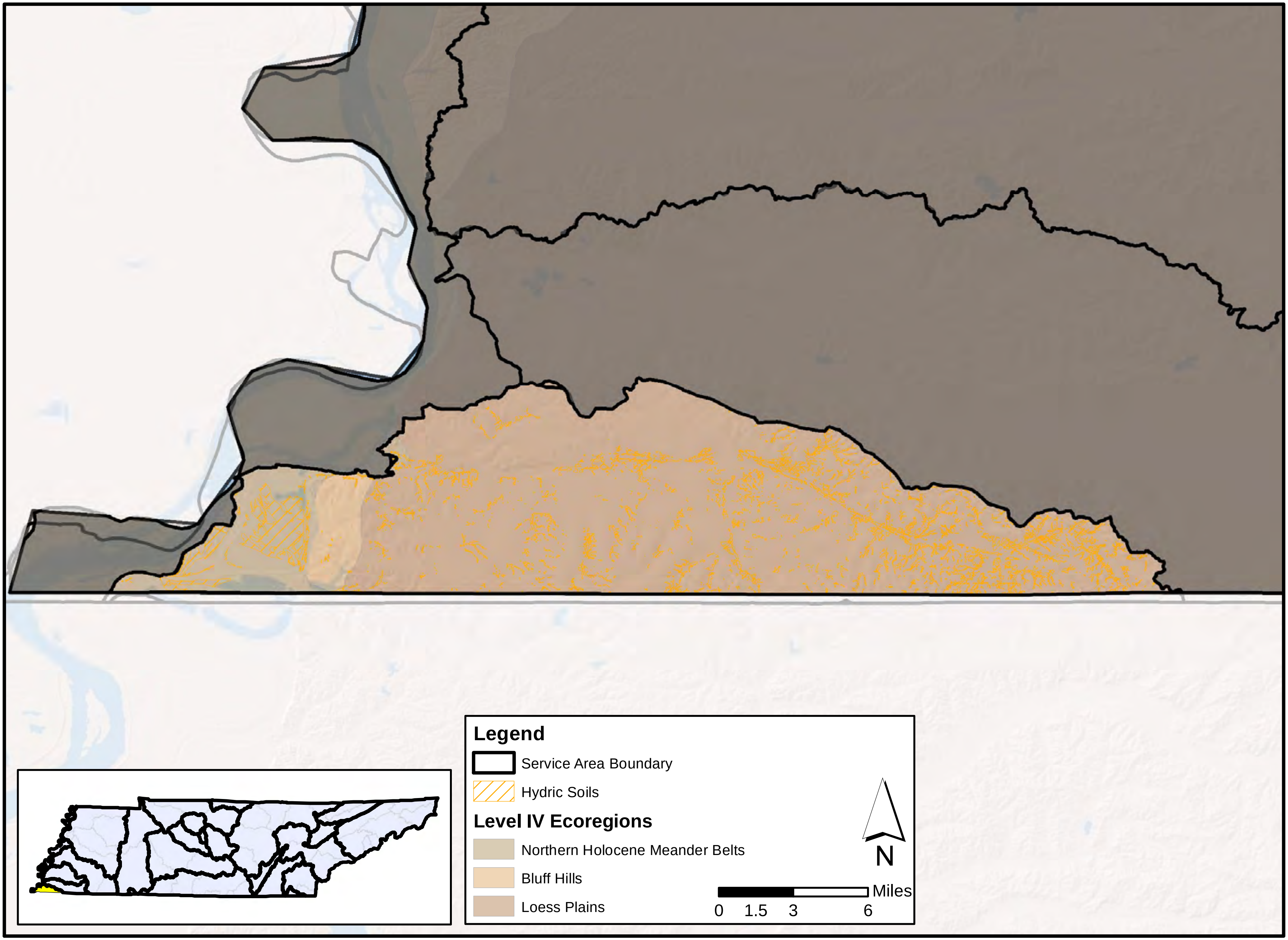


Figure 72: Nonconnah Service Area Ecoregions and Hydric Soils

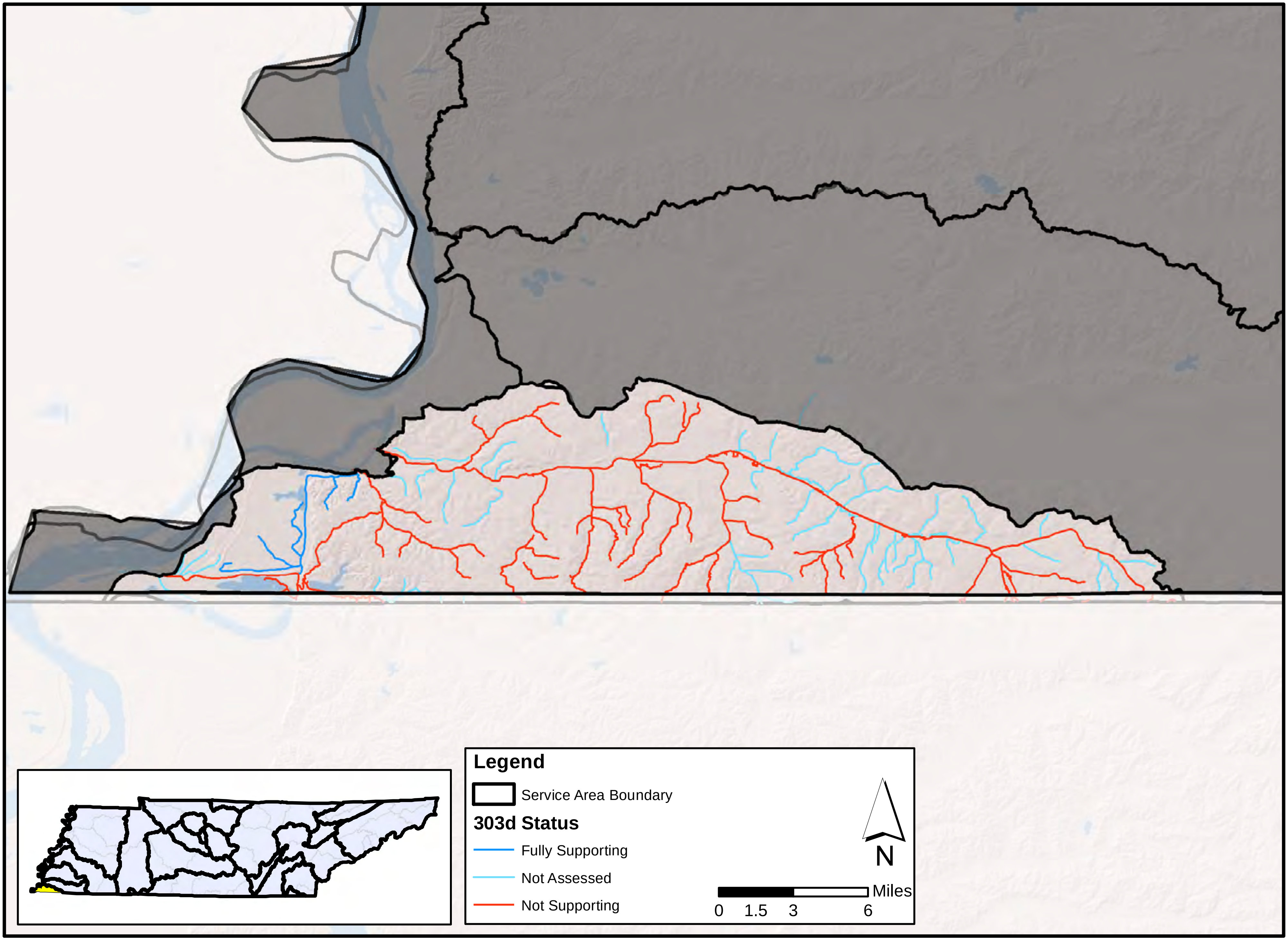


Figure 73: Nonconnah Service Area 303(d) Streams

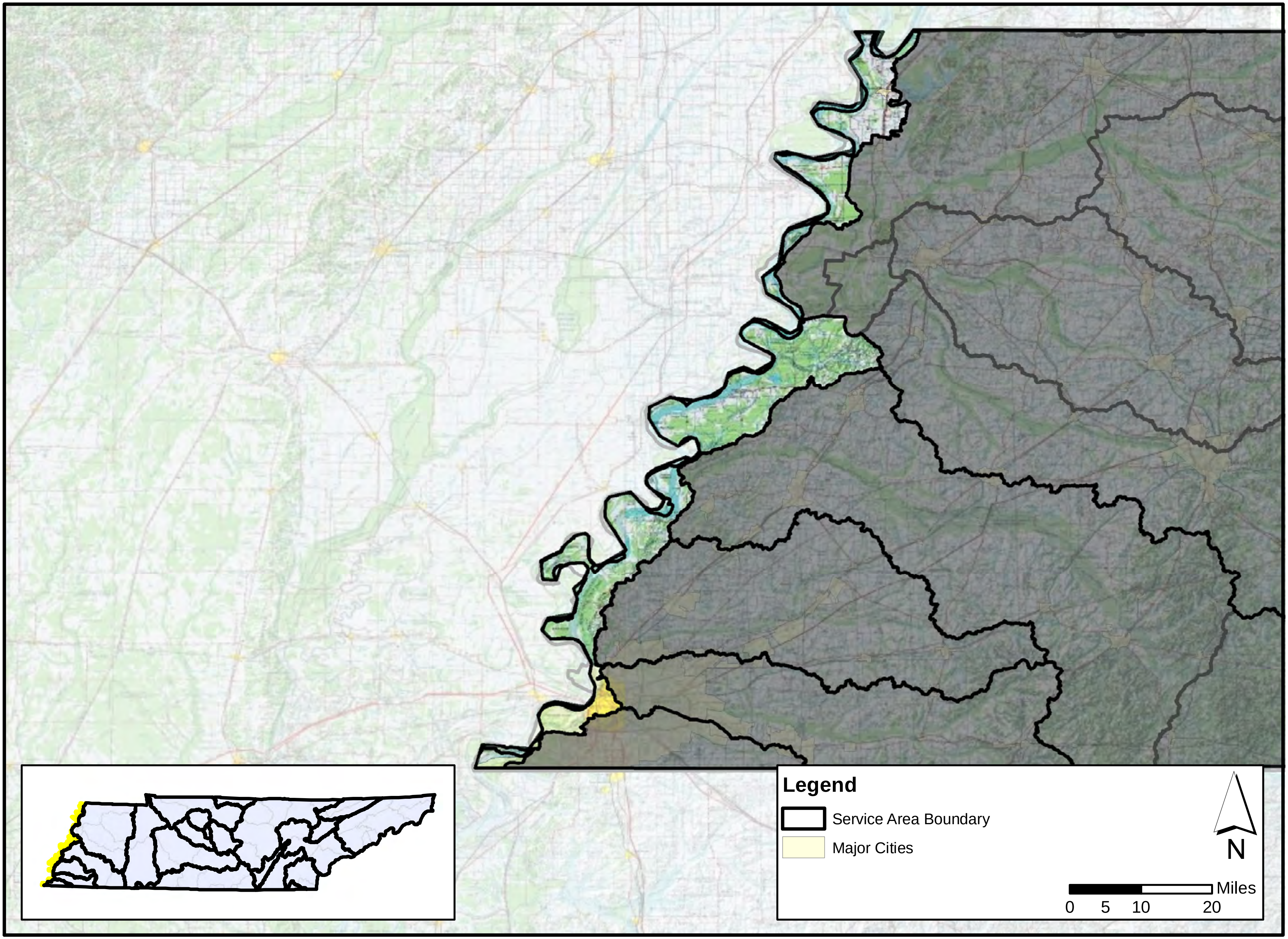


Figure 74: Mississippi River Service Area Location

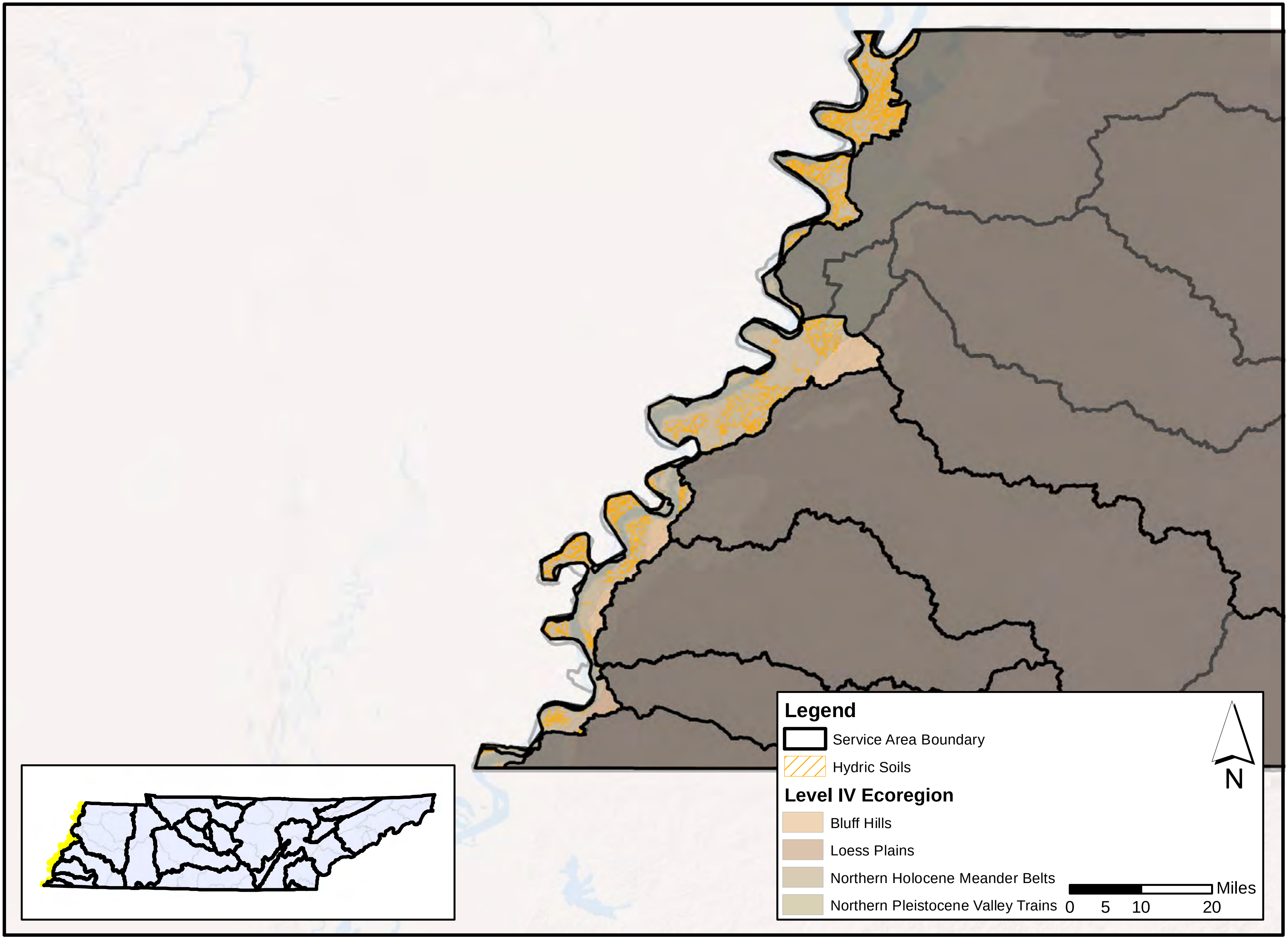


Figure 75: Mississippi River Service Area Ecoregions and Hydric Soils

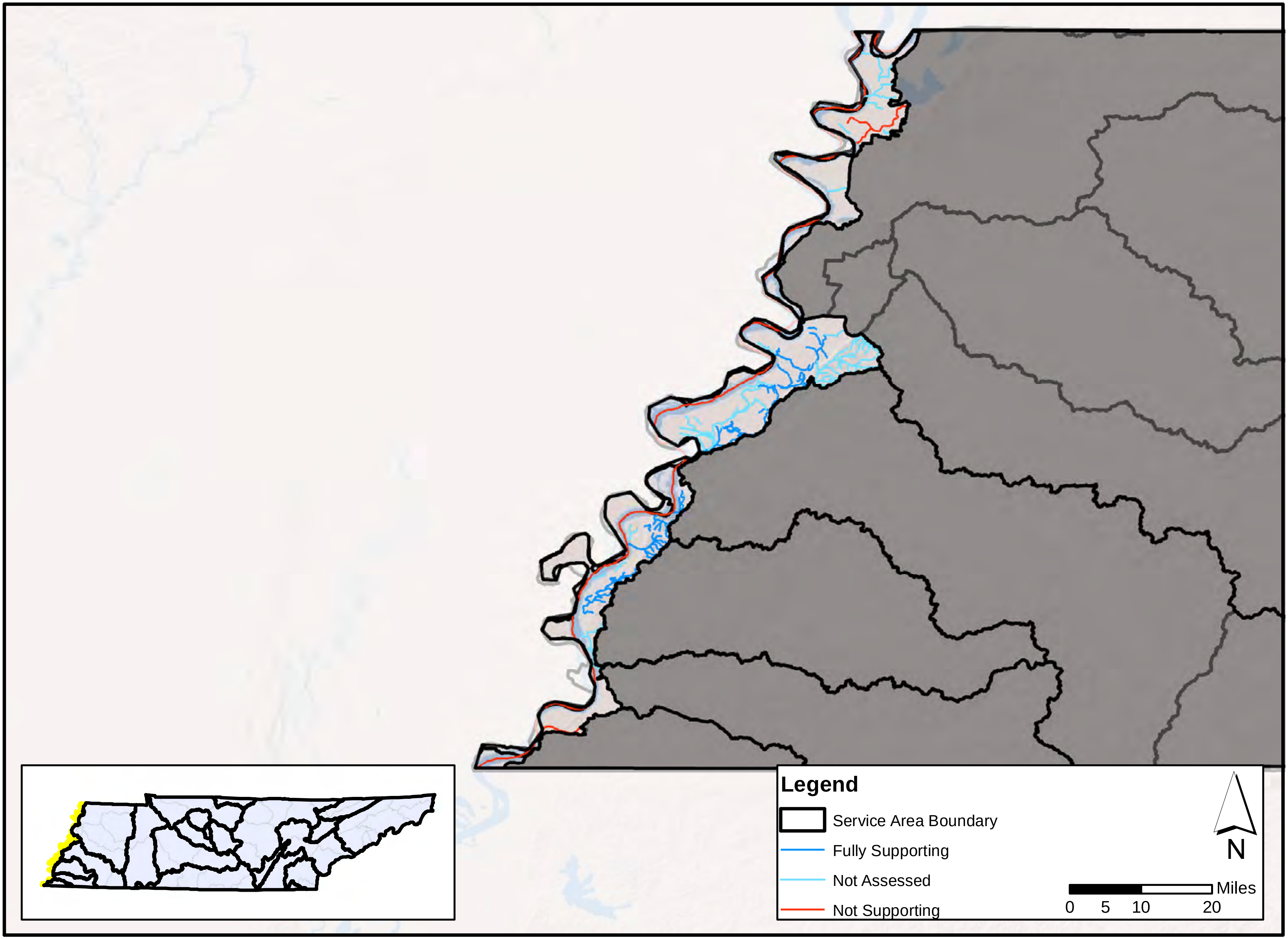


Figure 76: Mississippi River Service Area 303(d) Streams

Tables

Table 1: Impact Acreage (2000 - 2009) and Advance Credits, By Service Area				
Service Area	Area (Sq. mi)	Impact Acres	Percent Hydric Soils	Advance Credits
Barren River	426	0.46	1	10
Buffalo - Duck Rivers	3,490	10.25	2.34	10
Cheatham Lake	539	6.2	1.28	10
Chickamauga	1,189	9.38	2.7	10
Conasauga River	124	0	4.88	10
Elk River - Border Lakes	3,131	11.82	3.48	10
Emory River - Watts Barr Lake	3,011	17.53	1.48	10
Forked Deer - Obion Rivers	4,426	164.76	14.15	25
French Broad - Holston Rivers	4,582	14	2.07	10
Harpeth River	867	10.17	4.73	10
Hatchie River	1,858	33.84	5.33	20
Hiwassee - Ocoee Rivers	1,209	19.21	3.42	20
Loosahatchie River	742	6.01	13.64	12
Lower Clinch River	633	10.32	1.84	10
Lower Cumberland	2,779	17	2.12	10
Lower Tennessee River	3,496	20.32	2.75	18
Mill Creek	108	0.4	1.25	10
Mississippi River	583	67.29	19.85	25
Nonconnah Creek	183	9.91	9.36	15
Sequatchie Valley	602	0.1	1.8	10
Stones River	936	28.99	3.22	20
Upper Cumberland	5,526	22.99	1.28	10
Upper Tennessee	1,117	1.34	0.67	10
Wolf River	556	83.04	7.79	25

Program Account Information

TABLE 2: Income Accounting Table							
Corps File #	Project Requiring Mitigation	Service Area	Number of Credits	Fee Amount	Interest Accrued	Funds Expended	Funds Available

TABLE 3: Expense Accounting Table					
Corps File #	Project requiring Mitigation	Service Area	Mitigated Acres	Funds Expended	Expense Category

TABLE 4: Mitigation Credit Accounting Table										
Corps File #	Project requiring Mitigation	Service Area	Impact Acreage	Mitigation Acres Required	Name of Mitigation Project	Impact Wetland Type (Class)	Mitigation Type (Class)	Status	Progress Report Due Date	Dates Progress Report Received

TABLE 5: Advance Credit Accounting Table by Service Area					
Service Area	Date	Advance Credits	Advance Credits Sold	Released Credits	Balance of Advance Credits

TABLE 6. Sub-basins Within the Conasauga Service Area									
SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Conasauga River	03150101	727	124	17.0%	GA TN	0	492	3,857	4.88%

TABLE 7. Sub-basins Within the Barren River Service Area									
SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Barren River	05110002	2265	426	18.8%	KY TN	0.46	712	2,719	1.00%

TABLE 8. Sub-basins Within the Upper Cumberland River Service Area									
SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Clear Fork of the Cumberland	05130101	2331	342	14.7%	KY TN VA	0	703	2,667	1.22%
Upper Cumberland / Lake Cumberland	05130103	1882	38	2.0%	KY TN	0	20	105	0.44%
South Fork of the Cumberland	05130104	1383	984	71.2%	KY TN	0.696	974	9,398	1.49%
Obey River	05130105	947	783	82.7%	KY TN	1.43	4,685	4,461	0.89%
Cordell Hull Reservoir	05130106	797	797	100.0%	TN	2.9	1,373	3,014	0.59%
Collins River	05130107	787	787	100.0%	TN	10.755	15,137	13,434	2.67%
Caney Fork	05130108	1797	1796	100.0%	TN	7.205	8,814	12,209	1.06%

TABLE 9. Sub-basins Within the Lower Cumberland River Service Area									
SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Old Hickory Lake	05130201	986	985	99.9%	TN	4.835	1,629	15,170	2.41%
Lake Barkley	05130205	2334	987	42.3%	KY TN	7.823	10,274	8,401	1.33%
Red River	05130206	1454	795	54.7%	KY TN	4.558	7,423	14,017	2.75%

TABLE 10. Sub-basins Within the Cheatham Reservoir Service Area									
SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Cheatham Lake	05130202	539	539	100.0%	TN	6.2	2,166	4,365	1.28%

TABLE 11. Sub-basins Within the Stones River Service Area									
SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Stones River	05130203	935	935	100.0%	TN	28.99	1,726	19,272	3.22%

TABLE 12. Sub-basins Within the Harpeth River Service Area									
SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Harpeth River	05130204	867	867	99.9%	TN	10.167	2,752	26,239	4.73%

TABLE 13. Sub-basins Within the Mill Creek Service Area									
SUBBASIN	HUC 10 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Mill Creek	0513020203	108	108	100.0%	TN	0.4	434	875	1.25%

TABLE 14. Sub-basins Within the French Broad - Holston Rivers Service Area									
SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
North Fork of the Holston River	06010101	727	22	3.1%	TN VA	0	42	508	3.53%
South Fork of the Holston River	06010102	1179	554	47.0%	NC TN VA	6.4775	885	17,645	4.98%
Watauga River	06010103	868	675	77.7%	NC TN	2.666	244	5,390	1.25%

Holston River	06010104	1000	1002	100.2%	TN VA	1.338	911	16,066	2.51%
Upper French Broad River	06010105	1879	224	11.9%	NC SC TN	0.0638	240	352	0.25%
Pigeon River	06010106	689	160	23.2%	NC TN	0	252	656	0.64%
Lower French Broad River	06010107	797	798	100.2%	NC TN	2.3435	878	4,093	0.80%
Nolichucky River	06010108	1758	1141	64.9%	NC TN	1.3351	922	15,779	2.16%

TABLE 15. Sub-basins Within the Upper Tennessee River Service Area

SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Upper Clinch River	06010205	1966	704	35.8%	TN VA WV	1.344	574	3,545	0.79%
Powell River	06010206	947	396	41.9%	KY TN VA	0	171	1,169	0.46%

TABLE 16. Sub-basins Within the Emory River - Watts Barr Service Area

SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Emory River	06010208	869	869	100.0%	TN	13.1536	1,907	5,998	1.08%
Watts Bar Lake	06010201	1354	1354	100.0%	NC TN	4.233	1,776	18,822	2.17%
Lower Little Tennessee River	06010204	1055	789	74.8%	NC TN	0.139	1,818	3,725	0.74%
Upper Little Tennessee River	06010202	837	4	0.5%	GA NC TN	0	0	0	0.00%

TABLE 17. Sub-basins Within the Lower Clinch River Service Area

SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Lower Clinch River	06010207	634	634	100.1%	TN	10.3229	920	7,468	1.84%

TABLE 18. Sub-basins Within the Chickamauga - Nickajack Service Area

SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)

Nickajack / Chickamauga Reservoirs	06020001	1864	1199	64.3%	AL GA TN	9.3763	3,419	20,747	2.70%

TABLE 19. Sub-basins Within the Sequatchie Service Area

SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Sequatchie River	06020004	602	601	100.0%	TN	0.1	1,497	6,946	1.80%

TABLE 20. Sub-basins Within the Hiwassee - Ocoee Service Area

SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Hiwassee River	06020002	2056	1012	49.2%	GA NC TN	19.036	2,648	25,024	3.86%
Ocoee River	06020003	639	202	31.7%	GA NC TN	0.173	202	1,587	1.23%

TABLE 21. Sub-basins Within the Elk River - Border Lake Service Area

SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Guntersville Lake	06030001	1997	330	16.5%	AL GA TN	1.02	1,204	2,470	1.17%
Wheeler Lake	06030002	2893	210	7.3%	AL TN	1.983	7,871	31,823	23.70%
Upper Elk River	06030003	1284	1282	99.9%	AL TN	2.359	15,310	20,394	2.49%
Lower Elk River	06030004	964	700	72.6%	AL TN	1.258	3,396	8,154	1.82%
Pickwick Lake	06030005	2282	606	26.6%	AL MS TN	5.203	4,707	6,895	1.78%

TABLE 22. Sub-basins Within the Buffalo - Duck Rivers Service Area

SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Upper Duck River	06040002	1181	1180	99.9%	TN	3.735	15,683	39,346	5.21%
Lower Duck River	06040003	1547	1545	99.9%	TN	5.968	10,780	7,488	0.76%
Buffalo River	06040004	763	762	99.9%	TN	0.5443	8,165	5,375	1.10%

TABLE 23. Sub-basins Within the Lower Tennessee River Service Area									
SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Beech River	06040001	2086	2041	97.8%	MS TN	10.872	41,978	51,647	3.95%
Kentucky Lake	06040005	1815	1451	79.9%	KY TN	9.447	50,695	10,043	1.08%
Lower Tennessee River	06040006	698	18	2.6%	KY TN	0	269	0	0.00%

TABLE 24. Sub-basins Within the Mississippi River Service Area									
SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Mississippi River	08010100	1097	580	52.9%	IL KY MO MS	67.286	172,887	73,727	19.85%

TABLE 25. Sub-basins Within the Forked Deer- Obion Rivers Service Area									
SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Bayou De Chien / Mayfield	08010201	970	4	0.4%	KY TN	0	1	97	4.12%
Obion River	08010202	1315	1162	88.3%	KY TN	18.851	480,144	113,088	15.21%
South Fork Obion River	08010203	1158	1157	100.0%	TN	128.862	57,495	92,238	12.45%
North Fork Forked Deer River	08010204	954	954	100.0%	TN	15.446	50,112	97,305	15.93%
South Fork Forked Deer River	08010205	1061	1061	100.0%	TN	1.5968	61,496	72,333	10.65%
Forked Deer River	08010206	71	71	100.0%	TN	0	4,856	24,322	53.35%

TABLE 26. Sub-basins Within the Hatchie River Service Area									
SUBBASIN	HUC 8 CODE	TOTAL AREA (sq. mi.)	TN AREA (sq. mi.)	SUBBASIN AREA in TN	HUC 8 STATES	Wetland Impact Acres (In TN 2000 - 2009)	NWI Acres (in TN)	Hydric Soil Acres (in TN)	Percent Wetland (in TN)
Upper Hatchie River	08010207	1146	411	35.9%	MS TN	23.438	19,898	6,582	2.50%
Lower Hatchie River	08010208	1464	1447	98.9%	MS TN	10.403	118,654	56,762	6.13%

TABLE 27. Sub-basins Within the Loosahatchie River Service Area									
SUBBASIN	**HUC 8 CODE**	**TOTAL AREA (sq. mi.)**	**TN AREA (sq. mi.)**	**SUBBASIN AREA in TN**	**HUC 8 STATES**	**Wetland Impact Acres (In TN 2000 - 2009)**	**NWI Acres (in TN)**	**Hydric Soil Acres (in TN)**	**Percent Wetland (in TN)**
Loosahatchie River	08010209	742	742	100.1%	TN	6.005	30,556	64,781	13.64%

TABLE 28. Sub-basins Within the Wolf River Service Area									
SUBBASIN	**HUC 8 CODE**	**TOTAL AREA (sq. mi.)**	**TN AREA (sq. mi.)**	**SUBBASIN AREA in TN**	**HUC 8 STATES**	**Wetland Impact Acres (In TN 2000 - 2009)**	**NWI Acres (in TN)**	**Hydric Soil Acres (in TN)**	**Percent Wetland (in TN)**
Wolf River	08010210	815	557	68.3%	MS TN	83.0414	36,510	27,732	7.79%

TABLE 29. Sub-basins Within the Nonconnah Creek Service Area									
SUBBASIN	**HUC 8 CODE**	**TOTAL AREA (sq. mi.)**	**TN AREA (sq. mi.)**	**SUBBASIN AREA in TN**	**HUC 8 STATES**	**Wetland Impact Acres (In TN 2000 - 2009)**	**NWI Acres (in TN)**	**Hydric Soil Acres (in TN)**	**Percent Wetland (in TN)**
Horn Lake / Nonconnah Creek	08010211	279	183	65.6%	MS TN	9.908	6,736	10,966	9.36%