Conservation Action Plan for the Buttahatchie River Watershed

The Nature Conservancy
March 2007

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Northeast Mississippi Conservation Program Field Office

Tupelo, Mississippi

March 2007

Submitted to the
Mississippi Department of Environmental Quality

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Funding for this Project Provided by:
United States Environmental Protection Agency
Tennessee Valley Authority
Weyerhaeuser Company
BancorpSouth
Mississippi Lignite Mining Company
M. W. Murphy Foundation
Self Foundation

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I. Conservation Area Summary

TNC Ecoregion: Upper East Gulf Coastal Plain
Megasite Name: Buttahatchie River Watershed
Site Name: Buttahatchie River
States: Alabama and Mississippi
Counties, Alabama: Franklin, Lamar, Marion and Winston
Counties, Mississippi: Itawamba, Lowndes and Monroe
Managed Areas:
Alabama Department of Conservation and Natural Resources
Sam R. Murphy Wildlife Management Area (25,150 acres)

II. Executive Summary

The Buttahatchie River begins in the hill country of northwest Alabama. As it flows southwest to its confluence with the Tennessee-Tombigbee Waterway near Columbus, Mississippi it gradually changes from bubbling stream to lazy meandering river. The character of the river is a medley of Cumberland Plateau and Coastal Plain. Along the way, it flows through towns, communities, agricultural and forest lands, and hidden natural areas. The waters of the Buttahatchie become part of the Tombigbee River and eventually reach the Gulf of Mexico in Mobile Bay.

Although impacted by human endeavors the Buttahatchie retains much of its wild character. The Buttahatchie River watershed is a varied landscape of diverse ecosystems. Upland pine-oak forests, pasture/woodland mosaics, bottomland hardwoods and extensive wetlands are present along the course of the river. The river exhibits aspects of good functionality for an Upper East Gulf Coastal Plain river with intact riffle/pool reaches, seasonal flow variations, connection to extensive wetlands and bottomlands. The river is home to a rich diversity of freshwater mussel and fish species. This diversity of mussel species makes the Buttahatchie River a potentially valuable source of mussels for re-introduction to other rivers in the region. The combination of biodiversity and functionality are two key factors why The Nature Conservancy considers the Buttahatchie River watershed a priority conservation area.

The Buttahatchie River Conservation Action Plan (CAP) has been developed to identify key conservation targets, stresses and sources of stresses to those targets, and suggested strategies for implementation for the abatement of stresses. The Buttahatchie River watershed, located in northwest Alabama and northeast Mississippi, is approximately 556,750 acres in size. The geographic focus of this CAP includes the mainstem of the Buttahatchie River from its headwaters to its confluence with the Tennessee-Tombigbee Waterway, major tributaries, associated riparian zones, and wetlands.

The Nature Conservancy's activity in the watershed began in 2001 with the establishment of the Northeast Mississippi Conservation Program as a result of funding for freshwater conservation initiatives within the greater Mobile River Basin provided by the Charles Stewart Mott Foundation. Significant planning has been undertaken since the initial

inception of the program. Highlights of this planning include a Scientific Roundtable (2001) that identified the Buttahatchie River as a priority river system and began the process of identifying conservation targets and system stresses. In 2002 and 2003 TNC staff from Mississippi and Alabama along with freshwater ecologists familiar with the river system formed a team to participate in TNC's Efroymson Conservation Planning Workshop Series. Data and information used during the Efroymson process along with its analysis and evaluation constitute a major component in the development of this CAP. Additional workshops were held to further identify, define and prioritize stresses, sources of stress and conservation strategies.

The conservation targets included in the CAP are those that if protected will provide a measurable indicator of improving environmental conditions and biodiversity health. The broad scope of the targets was selected so that through their protection individual species contained within them would also be protected.

Buttahatchie River Watershed Conservation Targets:
A. Resident Riverine Aquatic Fauna
B. Bottomland Hardwood Forest Complex
C. Cumberland Plateau Mesic Forest

The planning process was also instrumental in the identification of stresses to the conservation targets and the sources of those stresses. Primary stresses and their sources are listed below.
Stresses

- Channel Destabilization
- Sedimentation
- Toxins/Contaminants
- Nutrient Loading
- Modification of Water Levels, or Change in Natural Flow Patterns

Sources of Stress

- Current Channelization of Rivers or Streams
- Historic Channelization of Rivers or Streams
- Incompatible Forestry Practices
- Incompatible Agricultural Practices
- Current In-Stream/Near-Stream Sand and Gravel Mining
- Historic In-Stream/Near-Stream Sand and Gravel Mining
- Abandoned Clay Mines
- Primary Home Development

Throughout the course of the various planning meetings strategies for abating stresses and improving the overall environmental quality and biodiversity health of the watershed were discussed. The following key strategies were identified as the most feasible to implement and the most likely to produce successful, measurable results for long-term conservation and biologic health of the priority conservation targets.

Conservation Strategies

- Education and Outreach
- Stream Bank Stabilization and Restoration
- Grade Stabilization Structures
- Conservation Easements
- Acquisition and Expansion of Public Lands
- Restoration of Abandoned Mine Lands

Implementing effective strategies and ensuring long-term conservation will depend on current and future capacity of The Nature Conservancy, its partners, and local stakeholders to support conservation activities.

III. Introduction

The Buttahatchie River originates in Alabama and flows southwest into northeastern Mississippi where it joins the Tennessee-Tombigbee Waterway north of Columbus, Mississippi. The watershed encompasses approximately 556,750 acres. This total acreage is divided between Mississippi with approximately 128,459 acres and Alabama with approximately 428,291 acres. Counties within the watershed include Itawamba, Lowndes and Monroe Counties in Mississippi and Franklin, Lamar, Marion and Winston Counties in Alabama. The Buttahatchie River is listed as an Important Site for Conservation of Freshwater Biodiversity in North America by the World Wildlife Fund United States in 2000. It has also been classified as a Freshwater Conservation Area by the Nature Conservancy (Smith et al. 2002). In an unpublished survey (Hicks 2004) of 23 biological experts in Mississippi, the Buttahatchie River ranked second, behind the Pascagoula River, out of 14 rivers in Mississippi in terms of priority for conservation and ecological significance.

A number of threatened and endangered species have been recorded from critical habitat reaches within the Buttahatchie River watershed. Table 1 gives federally listed species and their habitats and Table 2 is a list of species of concern for the watershed. All but one of the federally listed mussel species (*Lampsilis altilis*) are still present in the Buttahatchie River. One of the major indications that the Buttahatchie River is experiencing degradation and stress is the decline in the population of mussel species, decline in the number of species present, and the viability of mussel beds.

IV. Conservation Area Description

The region contained within the Buttahatchie River watershed is a predominantly rural landscape. Approximately 60 percent of the total region is forested with some subsections surpassing 70 percent forest coverage. Topography varies from relatively flat lowlands in the lower portion of the watershed to forested hills reaching 900 feet in elevation in the upper watershed. Soils in the watershed tend to be moderate to highly erodible weathered chalk with sand-humus-chert and gravels. Geographic regions

contained in part by the watershed include the Fall Line Hills, Flatwoods/Alluvial Prairie Margins, and Blackland Prairie. Upland hardwood/pine forests dominate with good stands of bottomland hardwood forest found along most of the Mississippi reach of the river.

Major tributaries to the Buttahatchie River include Sipsey Creek, Splunge Creek, and Beaver Creek. Approximately 24,803 acres of palustrine wetlands occur along these primary streams and their tributaries including large areas of intact and functional wetland systems. There are no major lakes or impoundments in the watershed.

Land cover, as noted in the USDA Sedimentation Laboratory assessment conducted in 2005, in the riparian zone one kilometer wide, the lowest 34 km of the river is 35.3 percent wetland and 32.4 percent agriculture(pasture and row crops) followed by approximately 22 percent forested land cover. Moving upstream, from river kilometer (rkm) 34 to 60 the wetland cover is 52.5 percent, forested 28.0 percent and agriculture is 19.1 percent. From rkm 60 to 81 the wetland cover averages 63.7 percent and the forest cover is 24.5 percent. From rkm 81 to 128 the forested cover averages 51 percent and the wetland cover about 25 percent. From rkm 128 to 158 the land cover is approximately 65 percent forested and 22 percent agricultural. The upper 14 km of river from rkm 158 to 172 is mostly forested 73.2 percent with approximately 19 percent agriculture.

Row crop agriculture, primarily cotton, has been a major economic contributor to the region. However, row crop agriculture is declining with crop lands converted to pasture, forest or other uses. Forest products and diversified manufacturing currently comprise the two major components of the regional economy. Landownership is primarily private with public ownership limited to Columbus Air Force Base, 16th section lands in Lowndes and Monroe Counties in Mississippi and Sam R. Murphy Wildlife Management Area in Alabama

Sand and gravel mining is a historic and current practice along the Buttahatchie River in Monroe and Lowndes Counties of Mississippi. Downstream of U.S. Highway 45 many old sand and gravel pits have been captured by the river, the channel is wide and exhibits signs of instability. Historically this instability has been confined to the river reach downstream of the highway. However, the river channel has begun widening upstream of the highway for about a half a mile with evidence of stream bed and stream bank destabilization and failure apparently induced by the mining activities. Based on the USDA Sedimentation Laboratory report of 108 sites surveyed over 172 kilometers of stream, 90 percent were considered moderately unstable and showed evidence of deposition of material, often soft sand from widening of channel due to bank retreat. The primary form of instability is stream bank erosion and meander shifting.

The upper reaches exhibit increased sedimentation and bank destabilization. While the lower reaches show meander cutoffs, mine captures and aggredation. The perturbations that have been set in motion contribute to each other are now self perpetuating and effects of these impacts to the system migrate both upstream and downstream.

Municipalities within the watershed include Caledonia, Mississippi, Sulligent and Hamilton, Alabama. The Buttahatchie River is used for fishing, boating and as a water source for livestock.

Upper Buttahatchie River

V. Project History

Many local and regional scientists have long recognized the ecological significance of the Buttahatchie River, especially the unique biological diversity found and documented in this system. Numerous mussel surveys, conducted by the Geological Survey of Alabama, U.S. Fish and Wildlife Service, U.S. Forest Service, Mississippi Department of Wildlife Fisheries and Parks and Mississippi State University have documented viable communities of rare mussel species along several reaches of the Buttahatchie River and some of its major tributaries. In addition, rare and unique fish communities and species have been reported from the Buttahatchie River system. In 2001, the Mississippi Department of Environmental Quality collected benthic macroinvertebrate community samples from multiple micro-habitats found in the Buttahatchie River for the purpose of determining general water quality status as mandated by the Clean Water Act. The resulting data, when compared to least disturbed conditions defined by the Mississippi Benthic Index of Stream Quality (M-BISQ), concluded that the Buttahatchie River is in good health and is fully supporting its water use classification.

Specifically, The Nature Conservancy, the Mississippi Department of Environmental Quality, and the Tombigbee, Big Black and Tennessee Rivers Basin Management Team (coordinated through MDEQ) have committed to performing conservation planning and implementation of conservation practices with the goal of maintaining and improving the

water quality and ecological integrity of the Buttahatchie River watershed. Actions in the Buttahatchie River watershed and upper Tombigbee River basin complement ongoing mussel restoration and recovery in the greater Mobile River Basin.

VI. Conservation Planning Process

As stated in *Conservation by Design*, The Nature Conservancy's conservation goal is "the long term survival of all viable native species and community types" within portfolios of sites by ecoregion. In order to accomplish the ambitious goal of conserving all native biodiversity, the Conservancy has developed many tools for conservation planning at the ecoregional and site-based scale. The Buttahatchie drainage is one of the finest natural areas remaining in Mississippi and Alabama which makes this area one of the highest conservation concerns for The Nature Conservancy and others. The rivers and much of the terrestrial landscape found within the project have been identified as significant sites through The Nature Conservancy's Upper East Gulf Coastal Plain and Cumberlands/Southern Ridge and Valley ecoregional planning processes.

To address conservation strategies at the site scale for the Buttahatchie River Watershed, the Conservancy's conservation staff in Mississippi, Alabama and the Southeast Region led a series of workshops over a 5 year period. The goal of these workshops was to apply The Nature Conservancy's site conservation "5-S Framework" to the Buttahatchie River watershed project area, thereby developing a conservation blueprint for action and a baseline from which to measure its success over time. The 5-S's are defined below:

- **Systems**: the conservation targets occurring at a site including suites of species and the ecological systems, and the natural processes that maintain them, are the focus of site-based planning.

- **Stresses**: the types of degradation and impairment afflicting the system(s) at a site.

- **Sources**: the agents generating the stresses.

- **Strategies**: the types of conservation activities deployed to abate sources of stress (threat abatement) and persistent stresses (restoration).

- **Success**: measures of biodiversity health and threat abatement at a site.

Through the guidance of workshops and input from experts and stakeholders, the conservation planning team selected conservation targets (systems), analyzed and ranked stresses and sources of stress for each target, and identified conservation strategies to abate threats. This comprehensive Conservation Action Plan (CAP) and strategy for implementation is a result of that input and will be updated through periodic iterations to focus and direct the TNC's conservation efforts for the next several years as well as serve as a useful tool for other agencies and partners to utilize in their management and conservation efforts.

The Nature Conservancy's Conservation Planning History

In 1999, the Mississippi Chapter of The Nature Conservancy identified the Buttahatchie River Watershed as a priority conservation area, because it contained outstanding biodiversity and important ecosystem habitats. In 2002, The Nature Conservancy supported this prioritization by also including the Buttahatchie River as a priority site for the conservation of freshwater biodiversity in the Southeastern United States (Smith 2002). Both approaches that identified the Buttahatchie River as an ecologically important area for conservation were based mainly on mussel and fish community and species records archived through the Heritage Program and Museum of Natural Science, both of which are part of the Mississippi Department of Wildlife Fisheries and Parks. The designation of the Buttahatchie River Watershed as a priority conservation area by the Nature Conservancy led to the Mississippi and Alabama Chapters setting as a goal to develop and implement a systematic plan for protection and conservation of this landscape scale area.

From 2001 to 2005, the Nature Conservancy conducted a series technical conservation planning workshops regarding the Buttahatchie River watershed. This planning included participation in TNC's internal Efroymson Conservation Planning Workshop Series. These workshops were the first step toward achieving the above mentioned goal and were attended by technical experts from multiple agencies/organizations for the purpose of identifying and evaluating the viability of important species, communities and ecosystems as well as current and potential threats to these targets. The resulting consensus throughout this process was, that currently the Buttahatchie River system is relatively healthy, from a water quality perspective; however the mussel and fish populations have shown declines over the last several decades. This seems to indicate that the system is undergoing a decline due to multiple stressors. The river system is impacted by a variety of stresses primarily bank and channel destabilization resulting in altered flows and sedimentation. It was also concluded that relatively little is known about the status and, more importantly, trends of many biological species, communities and systems. Very little data exists in Mississippi or Alabama that would allow definitive assessment and evaluation of ecological health over time in this system.

Workshop attendees surmised, mainly based on subjective, anecdotal evidence, that sedimentation and habitat degradation were the main stresses. Further, the sources of these stresses leading to increasing suspended and benthic sediment loads and cause of habitat degradation may be due to channel instability and unnatural fluvial geomorphological channel changes. In addition, it was noted that gravel mining operations throughout the watershed and the hydrological effects of the Tennessee-Tombigbee Waterway may be further reason for the unnatural geo-physical changes.

Helping to answer these questions geomorphological assessments conducted by USDA Sedimentation Laboratory in 2005 and Geological Survey of Alabama in 2004-2005 have provided key information on current state and future trends of the river system. As a result of these studies the causes and sources of stresses to the system have been more positively identified leading to the development of appropriate conservation strategies and location for implementation. Additional studies to monitor and track changes in

fluvial geomorphological status and trends may be recommended, in order to quantitatively determine the impact of implemented conservation strategies, improvement to current conditions, and revise prioritization of location and type of strategy implemented to result in the greatest positive impact.

Through initial conservation planning efforts coordinated by The Nature Conservancy, evidence suggests that if something is not done now to curb the downward trend in ecological integrity of the Buttahatchie River, many important species, communities and systems may be permanently lost. It is speculated that before long, the overall indicator of general ecological health, as given by the M-BISQ will show that the Buttahatchie River is indeed impaired and not meeting the Clean Water Act mandate. If it reaches this point, a TMDL or more-intense watershed restoration plan will then have to be developed and implemented at a much greater cost than what would be required for protection and stabilization of existing conditions.

Additional Stakeholder Planning Processes

In 1996, the Buttahatchie River was placed on Mississippi's 303(d) List of Impaired Waterbodies due to violation of water quality criteria for pathogens, as indicated by the presence of elevated fecal coliform bacteria in surface water samples collected monthly from a fixed ambient monitoring station by staff from MDEQ. In 1999, A Total Maximum Daily Load (TMDL) was developed for the purpose of determining the loading capacity of the Buttahatchie River with respect to fecal coliform bacteria. As part of the development of the TMDL, a study that entailed a non-point source pollution inventory and pollutant load estimates was conducted by the Tennessee Valley Authority through a contract with MDEQ. The report from this survey identified areas were stream banks were potentially failing and where cattle had access to the streams as sites of sediment loading. It also located failing septic systems that are potentially providing inputs of harmful bacteria. However, since the original listing of the Buttahatchie River as impaired due to pathogens, assessment and listing methodologies have been modified by MDEQ to be more accurate and scientifically sound. Additional monitoring was conducted in 2001 and 2002 according to the new approach for assessment of water quality standards. This data is planned for assessment in 2004, and a more certain judgment can then be made as to whether the Buttahatchie River is indeed impaired due to increased levels of pathogens. If the listing of the Buttahatchie River as impaired due to increased levels of pathogens is correct, then these excess pathogens can pose a risk to human health through recreational contact and direct consumption. An additional consideration with respect to elevated pathogen levels is that it is unknown to what extent this factor may have on the long-term biological diversity and ecological health of the river system.

The Basin Management Approach

In 1998 the Mississippi Department of Environmental Quality implemented the Basin Management Approach (BMA) with the goal to develop and implement management plans for each major Basin Group in Mississippi. As of 2003, the Tombigbee River, part of Basin Group I, was in year five of its management cycle, which involved implementation of a watershed management plan. A Tombigbee River Basin watershed

management plan has been developed, and in the plan, the Buttahatchie River sub-watershed was ranked as a high priority and was selected for implementation of restoration activities. In addition, the plan recognizes several agencies and organizations as members of the Buttahatchie River Basin Team, committed to partnering on conservation activities in the watershed. Agencies and organizations represented on the Team include: The Nature Conservancy, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers Mobile District, U.S. Geological Survey, U.S.D.A. Cooperative Extension Service, Natural Resource Conservation Service, Mississippi Department of Health, Mississippi Department of Environmental Quality, Mississippi Department of Agriculture and Commerce, Mississippi Soil and Water Conservation Committee, Mississippi Department of Wildlife Fisheries and Parks, Alabama Clean Water Partnership and Alabama Department of Environmental Management.

VII. Description and Status of Conservation Targets

Initial work to identify conservation targets within the Buttahatchie River watershed for the purpose of developing conservation strategies was conducted during TNC's Efroymson workshop series in 2002. At the time, the Buttahatchie River system was merged with several other medium-sized coastal plain river systems as a single conservation target within the greater Upper Tombigbee River system of the Mobile River Basin. This planning process was initially directed to address conservation objectives at a much larger landscape-scale. However, this planning process ultimately resulted with a decision to focus TNC's conservation efforts in the region to the Buttahatchie River watershed. Conservation target data and information collected during the Efroymson process included identification of conservation targets resident within the Buttahatchie River watershed.

Buttahatchie River Conservation Targets

A. Resident Riverine Aquatic Fauna
B. Bottomland Hardwood Forest Complex
C. Cumberland Plateau Mesic Forest

A. Resident Riverine Aquatic Fauna

A number of threatened and endangered species are present, or have the potential to be present, in the watershed. See Table 2.2 for a list of species and their habitats. All but one of the listed mussel species (*L. altilis*) are still present in the Buttahatchie River, however, only north of Highway 45. Downstream of Highway 45 these species have been eliminated due to the influence of backwater from the impoundment of the Tombigbee River and removal of mussels by gravel mining (Hartfield and Jones 1990). The number of mussel species in general appears to be declining in the Buttahatchie River. A 1990 survey of the river by Mississippi Museum of Natural Science biologist found 27 mussel species, down from 42 mussel species found during previous surveys performed in the last 30 years.

Suitable areas of stable substrate capable of maintaining mussel beds are declining in the Buttahatchie River likely a result of human impacts to the system such as stream bed

destabilization, stream bank failure and increased sediment from a variety of sources. Geomorphic instability throughout the Buttahatchie River system has been documented by the United States Department of Agriculture's Sedimentation Laboratory and reported in their Stability Analysis of the Buttahatchee River Basin, Mississippi and Alabama. This instability is a primary contributing factor adversely affecting mussel and fish habitat. Other factors may also be contributing to the decline of some mussel and fish species including loss of riffle and pool habitat, channel modification, and contaminants (pollution and toxins).

B. Bottomland Hardwood Forest Complex

Areas of bottomland hardwood forest exist throughout the Buttahatchie River watershed. They are most prevalent in the lower half of the system. Bottomland hardwoods exist as natural communities usually associated with medium to large river systems. Dominant species within these forests may vary, but forests typically contain a mixture of deciduous, evergreen, understory and shrub species. A key characteristic of this forest type is seasonal flooding, usually during the spring, with a duration of several days to several weeks. Where they exist, bottomland hardwoods provide important spawning and foraging areas for both aquatic and terrestrial animal species, aid in the maintenance of water quality, help attenuate flooding and can serve as sources of stream recharge.

An example of plants associated with this type of forest in the Buttahatchie River watershed include Sycamore (*Platanus occientalis*), Green Ash (*Fraxinus pennsylvanica*) Sugarberry (*Celtis laevigata*), Yellow Poplar (*Liriodendron tulipifera*), Pignut Hickory (*Carya glabra*), Black Walnut (*Juglans nigra*), Southern Sugar Maple (*Acer barbatum*), Box Elder (*Acer negundo*) Spicebush (*Lindera benzoin*), Giant Cane (*Arundinaria gigantea*), and Hog Peanut (*Amphicarpa bracteata*).

While this forest type is relatively common, examples of old growth are extremely rare. Causes for decline in this forest type are primarily historic in nature resulting from destruction/conversion, fragmentation and altered composition.

C. Cumberland Plateau Mesic Forest

The Cumberland Plateau mesic forest exists as an extremely rare forest type within the Buttahatchie River watershed. Its occurrence along the Buttahatchie River may comprise the southwestern limit of this forest type's range in North America. This forest type exists in the watershed as small isolated remnants in the mid to upper reaches of the watershed.

Plants associated with this forest type include Eastern Hemlock (*Tsuga canadensis*), Yellow Poplar (*Liriodendron tulipifera*), Beech (*Fagus grandifolia*), Bigleaf Magnolia (*Magnolia macrophylla*), American Holly (*Ilex opaca*), White Oak (*Quercus alba*), Chestnut Oak (*Quercus prinus*), Pignut Hickory (*Carya glabra*), Red Maple (*Acer rubrum*) and Flowering Dogwood (*Cornus florida*).

Table 1. List of Freshwater Mussels in Buttahatchie River watershed protected by Federal Endangered Species Act

Species	Federal Status	Habitat
Fine-lined pocketbook mussel *Lampsilis altilis*	Threatened	Stable gravel and sandy gravel substrate in high quality lotic habitats
Orange-nacre mucket mussel *Lampsilis perovalis*	Threatened	Stable gravel and sandy gravel substrate in high quality lotic habitats
Alabama moccasinshell mussel *Medionidus acutissimus*	Threatened	Stable gravel and sandy gravel substrate in high quality lotic habitats
Southern clubshell mussel *Pleurobema decisum*	Endangered	Stable gravel and sandy gravel substrate in high quality lotic habitats
Ovate clubshell mussel *Pleurobema perovatum*	Endangered	Stable gravel and sandy gravel substrate in high quality lotic habitats

Table 2. List of Aquatic Species of concern in Buttahatchie River watershed

Species	State Status	Habitat
Fish		
Fluvial Shiner *Notropis edwardraneyi*	MS-Special Concern	Main channel-small to large rivers often over sand or gravel, stable sand, gravel or mud bars in impoundments and flowing channels of large rivers
Alabama Shiner *Cyprinella callistia*	MS-Special Concern	Gravel and rubble bottom pools and runs of creeks and small to medium rivers, medium streams with swift flowing runs and riffles over boulders, cobble and gravel substrates
Frecklebelly madtom *Noturus munitis*	MS-Endangered	Rocky riffles and runs of medium to large rivers, often near vegetation
Crystal darter *Crystallaria asprella*	MS-Endangered	Clean sand and gravel runs of small to medium rivers, sand and gravel bars in large flowing rivers and streams
Backwater darter *Etheostoma zonifer*	MS-Special Concern	Mud-bottomed, often vegetated pools of sluggish creeks and small rivers, small turbid streams
Freckled darter *Percina lenticula*	MS-Special Concern	Fast, deep, rocky riffles of small to medium rivers, deep, swift areas of flowing rivers and large streams
Mussels		
Alabama spike *Elliptio arca*	MS-S3	Gravel bar in swift current
Southern combshell *Epioblasma penita*	MS-S1	
White heelsplitter *Lasmigona complanta*	MS-S2	Small rivers, Streams
Southern hickorynut *Obovaria jacksoniana*	MS-S2	Small rivers, Streams of low to moderate gradient
Alabama hickorynut *Obovaria unicolor*	MS-S3	Small and Large Rivers of moderate gradient, sand/gravel substrate in moderate current
Heavy pigtoe *Pleurobema taitianum*	MS-SH	Big to medium rivers with high to moderate gradients, riffles and shoals on sandy gravel to gravel-cobble substrate with moderate to fast current
Ridged mapleleaf *Quadrula rumphiana*	MS-S2	Small rivers, Streams, sand/gravel substrate in moderately silty waters, also reservoirs

Species	State Status	Habitat
Squawfoot *Strophitus undulates*	MS-S1	
Fawnsfoot *Truncilla donaciformis*	MS-S4	Small rivers, Streams

VIII. Viability Assessment for the Buttahatchie River Watershed

A key first step in conservation action planning involves the identification of the primary elements of conservation concern. The Nature Conservancy refers to these primary elements as focal conservation targets. Once these have been determined the viability of conservation targets and the biodiversity health of the area as a whole can be evaluated. Viability represents the measure or likelihood that a target will persist long-term. Biodiversity health reflects the combined viability of all conservation targets, and the probability that the conservation area will continue long-term ecological functionality. Current known conditions are used as the basis in determining the viability assessment of a target.

The viability of each target is evaluated and ranked; these individual rankings are combined to determine the relative biodiversity health rank for the conservation area. Three criteria are used to assess viability: size, condition, and landscape context. Each criterion encompasses several distinct facets. Size, may be a geographical measurement of the size of a target system and or a measure of abundance in the case of a specific species. Condition, includes the measures of composition, structure, and biotic interactions that characterize a target's occurrence. Landscape context, serves as a measure of the key environmental regimes and or processes, including connectivity across and through the landscape, allowing for the current and continued existence of the target.

The current biodiversity health rank for the Buttahatchie River Conservation Area was determined as Good by a planning team involved in TNC's internal Efroymson Conservation Planning Workshop Series. The size and condition components were ranked Good while the landscape context was ranked as only Fair, primarily because of loss of connectivity to other streams caused by the unnatural fragmenting effects of the Tennessee-Tombigbee Waterway project.

IX. Threats to the Buttahatchie River Watershed

A threat to a conservation target may be defined as a priority source of stress to a particular species or system. TNC ranks the severity of a threat as a factor or a combination of one or more stresses initiated by a source of stress. A highly ranked threat may result from an active or historic source of stress. The threat ranking is achieved by aggregating information on all related sources of stress. By compiling the ranked stresses and sources of stress for each conservation target an overall system-wide threat ranking can be determined. Identification of the highest ranking threats enables the development and prioritization of conservation strategies that may be implemented to abate the identified threats.

The abatement of the following five stresses were identified as critical to the long-term ecological health and biodiversity protection in the Buttahatchie River watershed.
1) Channel Destabilization
2) Sedimentation
3) Toxins/Contaminants
4) Nutrient Loading
5) Modification of Water Levels, or Change in Natural Flow Patterns

Channel destabilization and sedimentation were the two highest ranking stresses. The overall threat ranking for the Buttahatchie River watershed was determined as Medium.

Eight primary sources of stress have been identified as present in the watershed. These consist of the following:
1) Active Channelization of Rivers or Streams
2) Historic Channelization of Rivers or Streams
3) Incompatible Forestry Practices
4) Incompatible Agricultural Practices
5) Active In-Stream/Near-Stream Sand and Gravel Mining
6) Historic In-Stream/Near-Stream Sand and Gravel Mining
7) Abandoned Clay Mines
8) Primary Home Development.

Of these primary sources of stress the following threats ranked high enough across all conservation targets to be considered critical in maintaining and improving the ecological health of the Buttahatchie River.

Channelization of Rivers or Streams (active and historic)
These two sources of stress can encompass a variety of hydrologic alterations. The Buttahatchie River continues to be impacted by both the historic legacy of the construction of the Tennessee-Tombigbee Waterway and its ongoing maintenance. Construction of the Waterway resulted in cutting off the lower 2.4K of the river and the creation of a new river mouth at the junction with the Waterway. This hydrologic change has generated general river bed destabilization, widening of the river channel and stream bank instability and failure in the lower reaches of the river. Stream bank failure provides a source of excessive in-stream sediments. River bed instability and excessive sedimentation are detrimental to mussels, benthic organisms and fish habitat. Water levels in the lower reach of the river are rising and decreasing in depth due in part to aggredation of sediments and response to increased water level of the Aberdeen pool located downstream of the mouth of the river on the Tennessee-Tombigbee Waterway. According to the geomorphologic assessment conducted by the USDA Sedimentation Laboratory the Buttahatchie River is moderately to highly unstable through the majority of its main stem.

Columbus Lake

In-Stream/Near-Stream Sand and Gravel Mining (active and historic)
Sand and gravel mining operations are concentrated in the lower reaches of the river. However, the impacts of these operations extend both up and down stream. Historically near stream mining resulted in the capture of portions of the lower reach of the Buttahatchie River when

earthen levees separating mining operations from the river failed. The lower reach of the river has thus been re-routed with subsequent channel braiding and widening.

Sand and gravel operations continue to act as a source of sediment input. River bed disturbance/channel instability, bank instability and failure as a result of both active and historic mining operations continue to negatively impact mussel habitat through the reduction of suitable substrate. This reduction of suitable substrate diminishes effective mussel recruitment.

Abandoned Clay Mines

Abandoned kaolin clay mines located in the extreme headwaters of the Buttahatchie River in Alabama have been, and are believed to be, a continuing source of excessive fine sediment into the system. It is not known how much sediment this source may still be contributing to the system, but it is thought that these fine sediments have already moved through the system and constitute a historic source of stress. Further study is needed to adequately determine the current severity and scope of this source of stress.

Table 3. Summary of Stresses

	Severity	**Scope**	**Stress**
Channel Destabilization	High	High	High
Sedimentation	Medium	High	Medium
Toxins/Contaminants	High	Low	Low
Nutrient Loading	High	Low	Low
Modification of water levels, or changes in natural flow patterns	High	Low	Low

Table 4. Summary of Sources of Stress

Source of Stress	**Channel Destabilization**	**Sedimen-tation**	**Toxins and Contaminants**	**Nutrient Loading**	**Mod. of water level or changes in natural flow pattern**	**Rank**
Active channelization of rivers or streams	High	Low	---	---	---	High
Historic channelization of rivers or streams	High	Medium	---	---	---	High
Incompatible forestry practices	Low	Low	Low	---	---	Low
Incompatible agricultural practices	Low	Low	Low	---	---	Low
Active in-stream/near-stream gravel mining	Medium	Low	---	---	---	Med
Historic in-stream/near-stream gravel mining	High	Low	---	---	---	High
Abandoned clay mines	---	Medium	---	---	---	Med
Primary home development	---	Low	Low	Low	---	Low

X. Conservation Strategies for the Buttahatchie River Watershed

Conservation strategies are the on-the-ground methodologies developed to abate identified stresses and sources of stress to the system and achieve conservation goals. These strategies were selected as those most likely to produce long-term conservation success and feasible to implement given staff, time and funding capacity. As initial strategies are implemented and revisions to the plan are made, based on evaluation and new information, additional strategies may be developed.

Top Ranking Strategies for the Buttahatchie River Watershed

1. Education and Outreach.

Several related strategies have been grouped together under the broad heading of education and outreach. Key among these is the development of a bi-state Buttahatchie River Watershed Group. One of the issues of concern in addressing conservation actions at landscape-scale, across a watershed, is the ability to effectively work across multiple political boundaries. Such is the case in the Buttahatchie River watershed. The Nature Conservancy has the ability to work across these boundaries and because of this is well positioned to facilitate the establishment of this type of group. Creating long-term conservation benefits often depends on engaging local citizens in support, promotion and implementation of conservation strategies. Other education and outreach activities that have been and should continue to be accomplished either by the watershed group, TNC or other partners include, but are not limited to, public/civic presentations promoting the natural resource value and biological diversity found in the Buttahatchie River watershed, input into local watershed planning with respect to community growth and economic development, input in future road or right-of-way development that may impact ecologically sensitive areas, and in promoting the adoption and use of best management practices (BMPs). Examples of BMPs that have a high likelihood for successful implementation across the watershed include the establishment and maintenance of streamside management zones (SMZs) or vegetated buffer strips between the main river stem and/or tributaries and agricultural, silvicultural and mine lands; fencing pastures to prohibit livestock from eroding stream banks and entering the river; installing or maintaining vegetated land cover on road and other right-of-ways where they cross the main river stem and tributaries.

2. Stream Bank Stabilization and Restoration

The geomorphologic assessments conducted by the USDA Sedimentation Laboratory and the Geologic Survey of Alabama provide much needed data with regard to both systemic hydrologic concerns and localized problem or "hot spots" such as bank failures. This information can be used to target areas for implementing stream bank stabilization and restoration projects that can abate excessive sediment input into the river system. The Nature Conservancy in collaboration with partner organizations, governmental agencies and local landowners can implement these projects as time, funding and staff capacity allow. Numerous methods exist such as root wad, coir log, flood plain bench, log bundles, erosion control cloth and re-vegetation that can be adapted and used alone or in combination successfully in the Buttahatchie River. Priority areas for initial implementation of stream bank stabilization and restoration projects include main stem river reaches from the Mississippi/Alabama state line, downstream to the river mouth.

3. Grade Stabilization Structures.

The construction of the Tennessee-Tombigbee Waterway has left a legacy in ongoing stream bed, channel and bank instability. This is likely a key factor in declining mussel populations and loss of suitable stable habitat for mussel beds. Enabling the river to attain a long-term stable bed structure throughout its length may entail the construction of in-stream grade stabilization structures. Hydrologic and hydraulic data provided through geomorphologic assessments have indicated generally where these types of structures should be constructed to provide the most benefit. The primary areas identified are in the lower reaches of the river, specifically at or near the river's confluence with the Tennessee-Tombigbee Waterway, upstream and downstream of the Highway 45 bridge, and between the Highway 45 bridge and Highway 278 bridge below the confluence of Sipsey Creek. Additional engineering studies and analysis will be necessary to identify specific sites for implementation. The Nature Conservancy working with partners may conduct these studies and implement the projects as time, funding and staff capacity allow. .

4. Conservation Easements

Conservation easements have not been used in any great measure in the Buttahatchie River watershed, however the opportunity exists both with riparian and upland landowners. Easements offer the benefit of resource protection from incompatible land use activities while maintaining the landscape in private ownership. The Nature Conservancy, other conservation non-profit organizations or land management agencies would need to be identified as the eventual holder of the easements. The watershed group would serve as one means to promote interest in the use of easements to protect areas of the watershed.

5. Acquisition and Expansion of Public Lands

Where feasible and appropriate, TNC will work with public and private partners to protect conservation targets and other ecologically important areas across the watershed. Forever Wild (Alabama), Forest Legacy (Alabama and Mississippi) and the voluntary Mississippi Scenic Streams Programs are examples of the types of programs that may be used in the conservation of both aquatic and terrestrial habitats.

6. Restoration of Abandoned Mine Lands in Both the Lower Reaches and Headwaters

In the lower reaches of the river, restoration activities involving abandoned sand and gravel mine lands could aid in bank stabilization, prevent further widening of the channel, and river capture by abandoned mine pits. In the headwaters, restoration of abandoned clay mines could reduce excessive fine sediments from entering the system. Both these areas have been documented and mapped and implementation could begin as funding and other capacity needs are secured. Restoration of mine lands, abandoned and operational, affords an opportunity for TNC to collaborate with the mining industry and local operators to implement BMP's and demonstrate sustainable mining practices.

Table 5. Summary of Strategies for Threat Abatement and Restoration

Stress	Channel Destabilization		Sedimentation		Toxins Contaminants		Nutrient Loading		Modification of water levels, changes in natural flow patterns		Strategy Benefit by Source	Overall Strategy Benefit
	High		Medium		Low		Low		Low			
Strategy	current threat rank	future abate-ment	current threat rank	future abate-ment	current threat rank	future abate-ment	current threat rank	future abate-ment	current threat rank	future abate-ment		
Education and Outreach	Med	Yes	Low	Yes	Low	Yes	Low	Yes	-------	-------	Med	Med
Acquire and expand public lands	Low	Yes	Low	Yes	Low	Yes	Low	Yes	-------	-------	Low	Med
Stream bank stabilization and restoration	Med	Yes	High	Yes	-------	-------	-------	-------	Low	Yes	Med	High
Grade stabilization structures	High	Yes	Med	Yes	-------	-------	-------	-------	Low	Yes	High	High
Restoration of abandoned mine lands	High	Yes	Low	Yes	-------	-------	-------	-------	-------	-------	Med	High
Utilize conservation easements	Low	Yes	Low	Yes	Low	Yes	Low	Yes	-------	-------	Low	Med

XI. Project Capacity and Monitoring

The Nature Conservancy utilizes three factors in analysis of a project's capacity or likelihood for success. The first of these is Project Leadership and Support. Within this category, Focused Staff Responsibility, Conservation Manager and Project Support Team are weighed to provide an overall ranking. In the case of the Buttahatchie River Watershed Project this first factor was given a High ranking.

The second factor, termed Strategic Approach, represents the understanding and application of the Conservancy's 5-S Approach to planning and implementation of an interative, adaptive approach to developing key conservation strategies. With regard to this project the Strategic Approach was ranked as Medium.

The third and final factor focuses on project funding. Two criteria are considered when determining the capacity ranking; Start-up Funding and Sustainable Support. For the Buttahatchie River Watershed Project these two areas were ranked High and Medium respectively, giving an overall Project Funding rank of Medium.

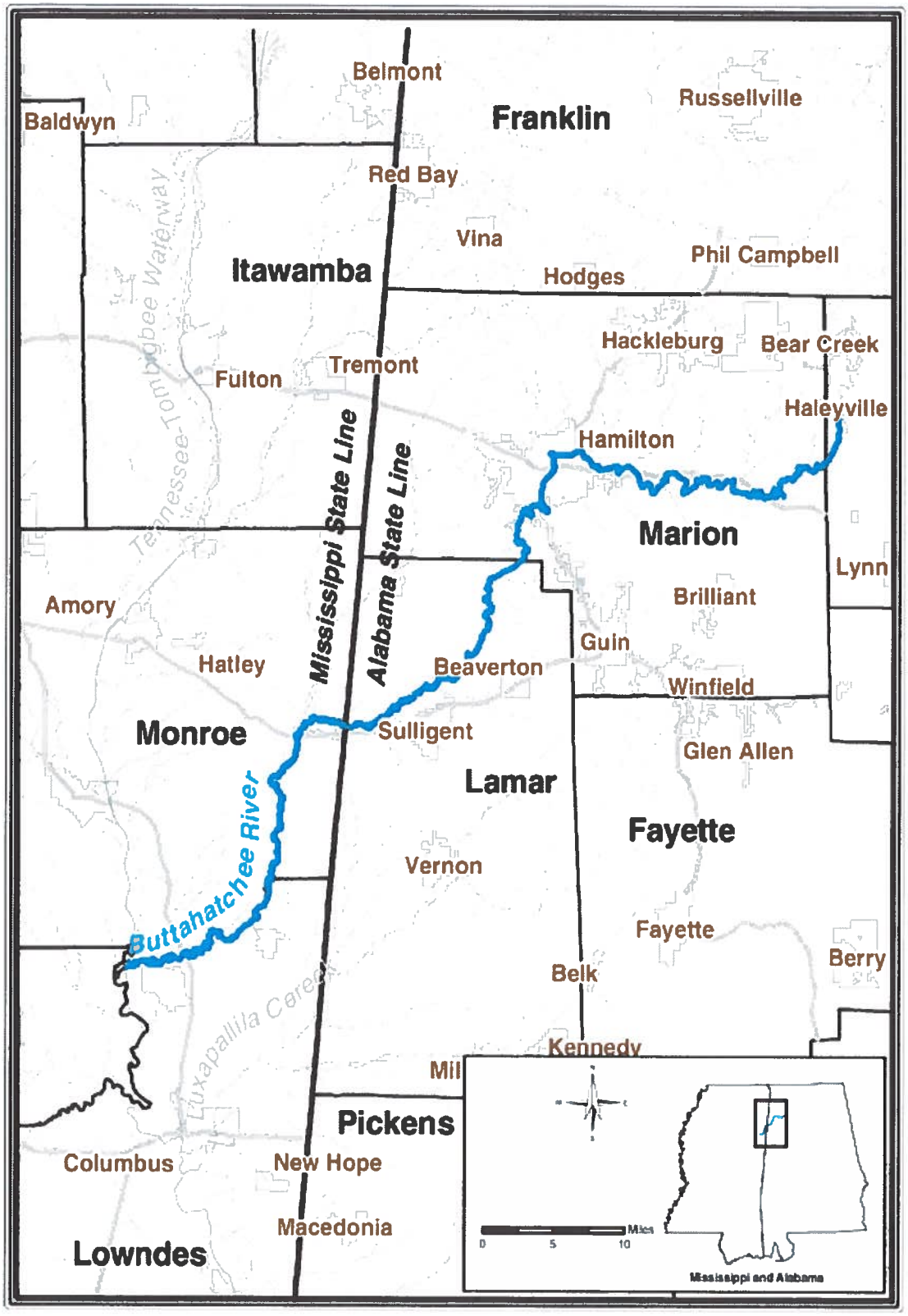
The compilation of the three factors for project capacity produced an overall project ranking of Medium.

Additional measures of success include facilitating the establishment of Buttahatchie River Watershed Group and the adoption and implementation of BMPs by agricultural, forestry, sand

and gravel mining operations within the watershed. Examples of biological measures of success would included, but not be limited to, such factors as improvements to hydrologic function, improvement in water quality, reduced fragmentation of bottomland hardwood forests, mussel bed habitat improvement and increased mussel recruitment.

With respect to monitoring, TNC and partners involved with the implementation of conservation strategies will need to develop adaptive management and monitoring that considers both individual projects and the cumulative effects across the watershed. Two key monitoring components for each conservation target are biodiversity health and abatement of stress. Ecological or biodiversity health monitoring would take into account viability and ecological attributes of conservation targets. Stress abatement monitoring would evaluate the effects of implemented conservation strategies in reducing the impacts of the stress on individual conservation targets or the system as a whole.

Figure 1. Buttahatchie River Region



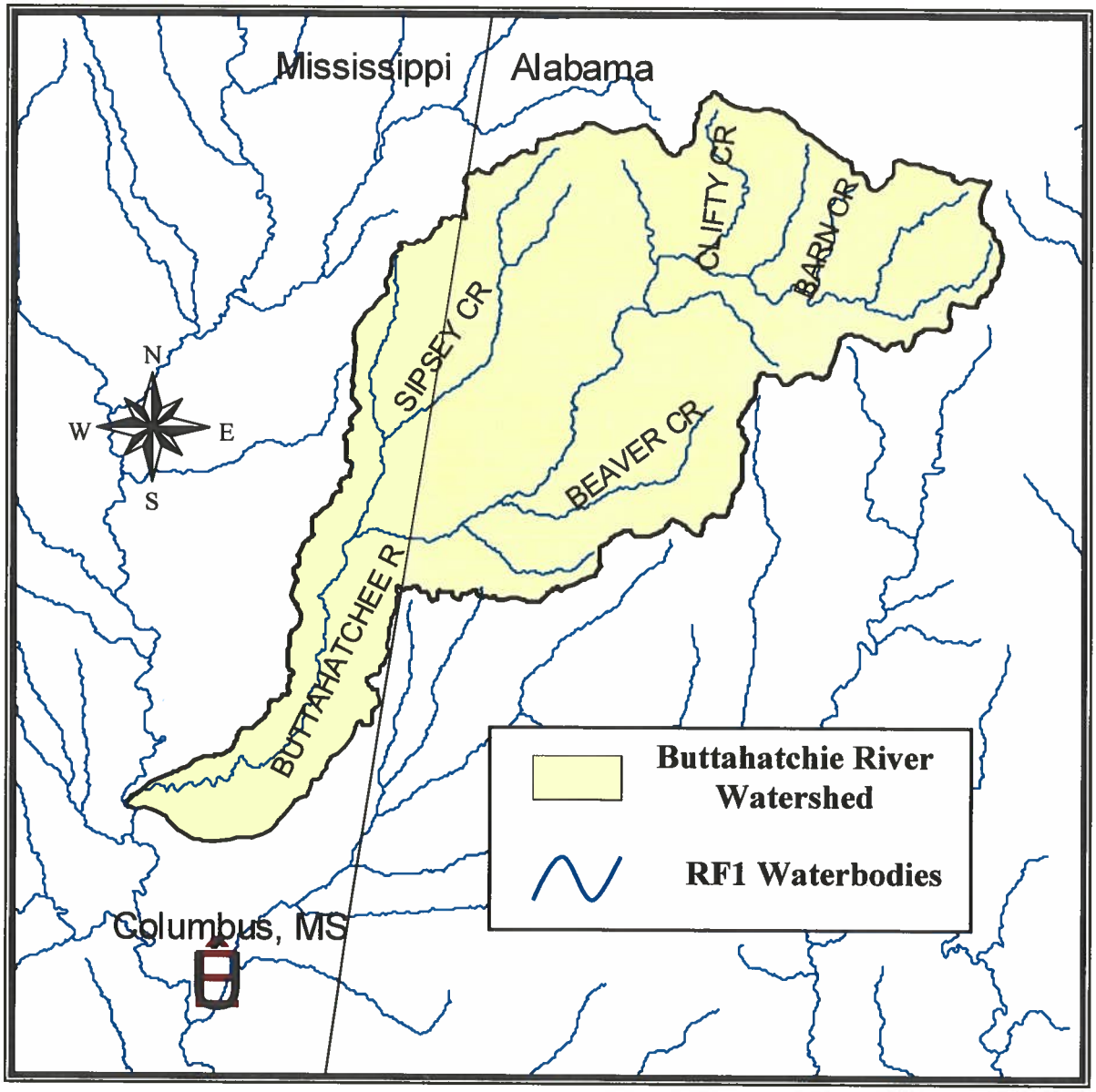


Figure 2. Buttahatchie River Watershed.

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