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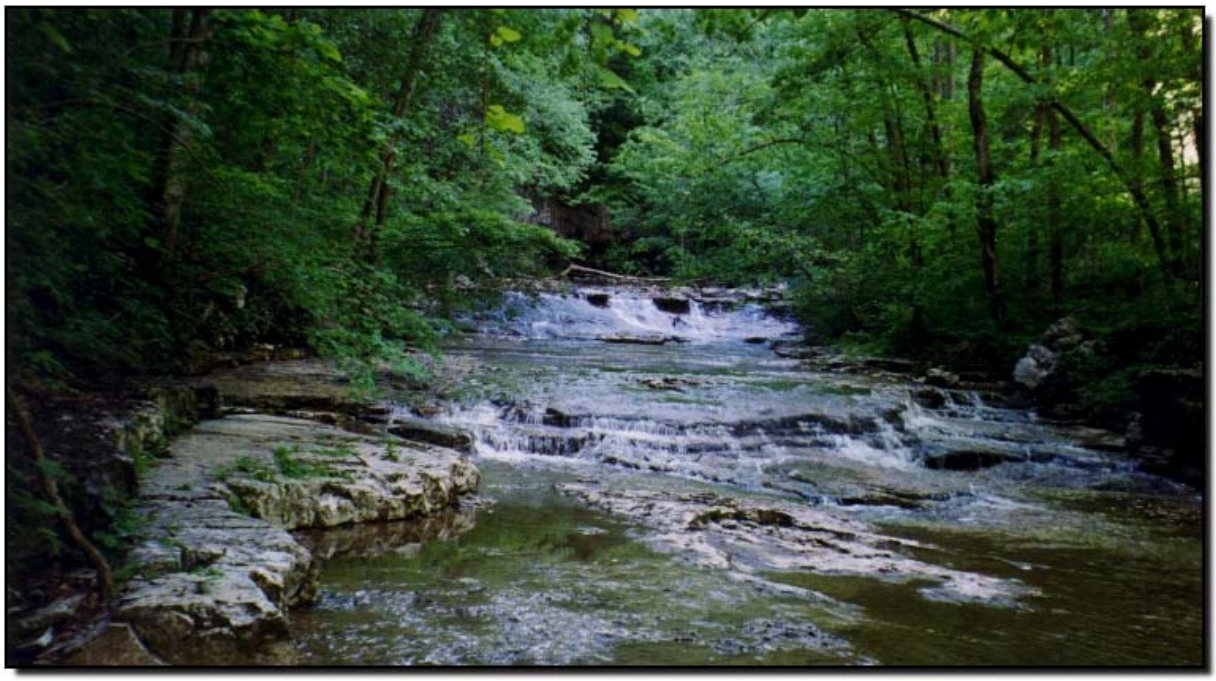
Alabama Natural Heritage Program℠

Paint Rock River Watershed Nonpoint Source Pollution



A Report Prepared for

Alabama Department of Environmental Management

By the

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EXECUTIVE SUMMARY

The Paint Rock River (PRR) watershed is a subwatershed of the Tennessee River Basin covering approximately 123,137 ha (475 mi^2) in the Cumberland Plateau Region of Tennessee and Alabama. This watershed is one of the most biologically diverse watersheds in the southeast, with approximately 100 fish species (Mettee et al. 1996), 45 mussel species (Ortmann 1925, Isom and Yokley 1973, Ahlstedt 1986, Ahlstedt 1991, McGregor and Shelton, 1995, Godwin 2002), and 11 freshwater turtle species (Conant and Collins 1991, Mount 1975). Although the PRR has escaped much of the adverse human impact demonstrated in the rest of the Tennessee River drainage, water quality within the watershed has been impaired by nonpoint source (NPS) pollution, primarily from nutrient enrichment. Although the Alabama Department of Environmental Management (2000a) rated the potential for NPS impairment within the sub-basins of the PRR watershed as low or moderate, NPS pollution has been identified as a threat to the biota of the watershed, particularly the aquatic biota (Ahlstedt 1991, Williams et al. 1993, Godwin 1995, Neves et al. 1997, O'Neil and Mettee 1997, Alabama Department of Environmental Management 200a). The primary purpose of this project was to locate, assess, and quantify sensitive areas and habitats for T & E species and quantify potential NPS land use stresses related to the watershed. As an overall measure, the biodiversity of the PRR watershed has been analyzed through identification of sensitive species and community occurrences indicative of the watershed's health.

Rare, threatened, and endangered species in the Paint Rock River watershed were identified using the Alabama Natural Heritage Program[SM] (ALNHP) Biological Conservation Database (BCD), a natural heritage database documenting rare species and natural communities recorded in Alabama following established Natural Heritage Protocol for processing biological information. BCD data was imported into a Geographic Information System (GIS) for analysis with the other GIS data layers used for this project.

The selection of conservation targets in the watershed and threat assessment was conducted following The Nature Conservancy's (TNC) standard site conservation planning methodology. Conservation targets were selected to represent the biodiversity within the site as determined from ALNHP's records. The threat assessment was conducted using the Microsoft Excel spreadsheet tool for TNC's site conservation planning approach following the identification of potential sources from the GIS layers.

Potential sources of NPS pollution were identified from GIS data layers and previous field work in the watershed by ALNHP, ADEM, the Alabama Soil and Water Conservation Committee, Alabama Water Watch, and others. GIS spatial data layers for the PRR watershed were collected from a variety of sources, including descriptive layers developed by TNC, 30 m Landsat Thematic Mapper satellite data, U.S. Geological Survey (USGS) 7.5 minute topographic quadrangles in digital raster graphic format, USGS digital orthophotographic quarter quadrangles, land use/land cover, and the U.S. Environmental Protection Agency's Better Assessment Science Integrating Point and Nonpoint Sources (BASINS) 3.0 dataset (United States Environmental Protection Agency 2001). Managed areas were identified from managed area records exported from BCD and standard GIS spatial layers identifying public land. Population and demographic information was obtained from U.S. Census Bureau census 2000

data (United States Census Bureau 2000b, 2000c). The watershed was divided into an upper and lower watershed for analysis based on subwatershed hydrologic unit codes because of differences in land use/land cover.

The PRR watershed contains significant biological diversity, particularly aquatic diversity. There were 964 occurrences of rare, threatened, or endangered plant and animal species documented in the PRR watershed in Alabama (538 in the upper PRR and 426 in the lower PRR), and 20 occurrences documented in the watershed in Tennessee. The majority of species were associated with flowing water; 92.9% were <500m from flowing water and 79.8% were <100m from water. The species documented in the watershed included 1 amphibian, 1 bird, 3 fish, 3 mammals, 7 mussels, 1 reptile, and 17 plants that are either federal or state protected species. In addition, there were 4 vascular plant, 2 mussel, 2 insect, and 1 fish species considered to be globally imperiled as indicated by the heritage rank that were documented in the watershed.

Six conservation targets were chosen: riverine system, matrix forest community, endangered bats, riparian vegetation, karst communities, and critically imperiled mussels and fish. The overall viability rank for individual conservation target ranged from fair to very good , with the overall site biodiversity ranked as good for both the upper and lower watershed. Targets receiving fair ranks were critically imperiled mussels and fish in both watershed divisions, and riparian vegetation in the lower watershed.

There were 3 managed areas identified within the PRR watershed: Fern Cave National Wildlife Refuge, Cathedral Caverns State Park, and James D. Martin – Skyline wildlife Management Area. Only 1.9% of the rare species occurrences documented in the watershed were associated with these managed areas.

The majority of the watershed is forested; 89.9% in the upper watershed in Alabama and 62.2 % in the lower watershed. Agricultural land (rowcrop and pasture) is much more prevalent in the lower watershed (32.5%) than in the upper (9.1%). Although the total percentage of agricultural land was relatively low in the upper watershed, agricultural land was usually adjacent to flowing water when present. The watershed is largely rural with little urban development and low population densities. The 2000 population for the census tract group blocks encompassing the watershed was 24,191.

ADEM (200a) estimated the nonpoint source impairment potential in the upper subwatersheds was low, while the potential for the lower subwatersheds was low to moderate. Godwin (1995) documented 100 NPS impacts at 85 sites throughout the watershed, and identified 3 dominant impact types: lack of riparian vegetation, livestock access points, and fording sites). Animal production in the watershed was dominated by cattle. The number of estimated septic systems and failing septic systems was low in all of the upper basin subwatersheds and the Upper Paint Rock watershed in the lower basin. However, the number of estimated septic systems and failing septic systems was orders of magnitude higher for the Lower Paint Rock River and Little Paint Creek subwatersheds. There were 3 active and 2 inactive NPDES permitted discharge sites, 3 Industrial Facilities Discharge sites, 1 hazardous and solid waste site, and 3 mines identified in the watershed; all in the lower subwatersheds. There were no rare species documented within 1

km of any of these sites. ADEM (2000a) identified 3 additional construction/stormwater authorizations in the lower subwatersheds.

Alabama's 2000 Final 303 (d) list of impaired streams included 4 stream reaches in the PRR watershed that currently are not supporting their water use classifications due to siltation, organic enrichment, and dissolved oxygen violations from agricultural and unknown sources: Cole Spring Branch, Guess Creek, Little Paint Rock Creek, and Yellow Bank Creek (Fig. 10) (Alabama Department of Environmental Management 2000c). There were no rare species associated with the listed stream reaches on Cole Spring Branch and Yellow Bank Creek. However, there were 24 occurrences of rare species or ecological features associated with the listed section of Guess Creek (Table 10), including 2 federal endangered species [shiny pigtoe (*Fusconaia cor*) and pale lilliput (*Toxolasma cylindrellus*)] and 1 state protected species [southern cavefish (*Typhlichthys subterraneus*)]. There also were 2 rare occurrences associated with the listed section of Little Paint Rock Creek (Table 10).

Twelve sources of stress were identified in the watershed: crop production practices, livestock production practices, forestry practices, roads, development, invasive/alien species, septic systems, recreational use, channelization, trash disposal, water withdrawal, and regulatory controls of prescribed fire. Although the sources were present in both the upper and lower watershed, the overall ranking of the sources and the source's level of threat for the conservation targets differed between the upper and lower watershed. In general, threats were greater in the lower watershed than in the upper watershed. There were no sources ranked as critical threats in the upper watershed, but agriculture practices (crop and livestock) were considered to be critical threats in the lower watershed. There were 4 moderate threats in the upper watershed (forestry practices, livestock production practices, recreational use, and invasive/alien species), and 5 moderate threats in the lower watershed (roads, forestry practices, development, invasive/alien species, and septic systems). Overall, 6 major sources of stress were identified in the watershed: agriculture (crop and livestock production practices), forestry, development (including roads), invasive/alien species, recreational use, and waste disposal (trash and septic systems).

To demonstrate that protection efforts are successful, monitoring of the target species must be performed. Therefore, monitoring of mussels and other aquatic species should continue. In addition, inventory and survey of the terrestrial community needs further work. The maintenance and/or restoration of vegetated riparian buffers is crucial to maintaining and restoring water quality and aquatic communities in the watershed. However, to be effective, buffers must extend along all streams, including intermittent and ephemeral channels, and should contain native vegetation. In addition, buffers must be augmented with enforceable on-site sediment controls and a limited amount of impervious surfaces. To abate threats to the Paint Rock River watershed, the following goals were developed.

- Protect and maintain multiple, viable populations of all local scale conservation targets ensuring that, for each species, enough populations are protected to conserve their remaining natural range of ecological and genetic diversity.

- Maintain and, where possible, restore riparian vegetation along the main channel and tributaries.

- Maintain or improve water quality and hydrologic function within the watershed
- Maintain or restore the natural ecological processes that maintain this ecosystem including fire and habitat connectivity to the extent possible
- Maintain or restore the condition and long-term viability of the main stem and tributaries
- Increase conservation awareness and promote a land ethic within the watershed
- Conserve key parcels through conservation easements or acquisitions. Smurfit-Stone plans on divesting itself of the property acquired from Mead-Westvaco, with current plans to have the state acquire the land through TNC. Acquisition of this property would play a vital role in protecting the watershed.

INTRODUCTION

The nation's surface water quality has improved in many ways since the enactment of the Clean Water Act in 1972, primarily through reductions in industrial and municipal source pollution as much effort has focused on understanding and addressing point source issues. However, water quality problems remain, especially those associated with non-point source (NPS) pollution which enters water diffusely in the runoff or leachate from rain or melting snow and is often a function of land use (Horan and Ribaudo 1999). NPS pollution has been identified as a major reason for remaining U.S. water quality problems (United States Environmental Protection Agency and United States Department of Agriculture 1998). In recent years, more focus and funding have been dedicated to furthering our understanding of NPS pollution and how to abate this ever-increasing problem in our nation's waters, but major problems still remain. The 2000 U. S. Environmental Protection Agency (EPA) Water Quality Inventory reported that 40% of streams, 45% of lakes, and 50% of estuaries assessed did not meet goals to support designated uses such as fishing and swimming (United States Environmental Protection Agency 2002a). The leading causes of impairment included bacteria, nutrients, metals, and siltation, with the primary sources of impairment being runoff from agricultural lands and urban areas, municipal point sources, and hydrologic modifications (United States Environmental Protection Agency 2002a). The impacts of these pollutants include: loss of fish and wildlife habitat; loss of recreational use of streams, rivers, and lakes; impacts to the drinking water supply; reduction in the aesthetic qualities of the aquatic environment; decreased water storage capacity in streams, lakes, and estuaries; clogging of drainage ditches and irrigation canals; and adverse human health impacts (Tim et al. 1992, Tim and Jolly 1994, United States Environmental Protection Agency 2002a). In addition, NPS pollution is one of the leading national threats to aquatic biota (Richter et al. 1997), and has been identified as the leading factor contributing to the jeopardized status of southeastern native freshwater fishes (Etnier 1997). Nonpoint emissions typically are stochastic due to the impact of weather-related and other environmental processes, and the diffuse and complex nature of NPS pollution makes it difficult to measure and control (Hairston and Stribling 1995, Horan and Ribaudo 1999). NPS pollution has been identified as and remains a threat to water quality in Alabama (Alabama Department of Environmental Management 2002).

Although the Paint Rock River (PRR) has escaped much of the adverse human impact demonstrated in the rest of the Tennessee River into which it drains, the Alabama Department of Environmental Management (2000a, 2000b) reported that water quality within the watershed has been impaired by NPS pollution. ADEM rated the potential for nonpoint source impairment within the sub-basins of the PRR watershed as low or moderate (Alabama Department of Environmental Management 2000a). Results of ADEM's nonpoint source monitoring program indicate that although the watershed is relatively unimpaired, there were adverse impacts to water quality caused by nutrient enrichment (Alabama Department of Environmental Management 2000b). Concentrations of other NPS pollutants were elevated in several watersheds so the PRR system may be susceptible to water quality impairment from NPS runoff. In addition to contributing to water quality impairment, nonpoint source (NPS) pollutants threaten the biological diversity in the watershed (Ahlstedt 1991, Williams et al. 1993, Godwin 1995, Neves et al. 1997, O'Neil and Mettee 1997, Alabama Department of Environmental Management 2000a). Channelization and removal of instream and riparian habitat also have been identified as concerns in the watershed (Ahlstedt 1991, Godwin 1995). Consequently, the

PRR system is listed as a state priority watershed in the Alabama Department of Environmental Management's (ADEM) NPS assessment report (Alabama Department of Environmental Management 1989). Based on its rich and fragile diversity, the PRR watershed also is one of the rivers that is the focus of The Nature Conservancy's (TNC) Freshwater Initiative. In addition, TNC identified the Paint Rock River watershed as a priority area in the Tennessee Cumberland aquatic region for freshwater conservation action (Smith et al. 2002), and the watershed is almost entirely contained within a much larger TNC Cumberlands/Southern Ridge and Valley Ecoregion portfolio site identified based on the existence of large remaining areas of matrix-forming natural communities.

The PRR watershed, a subwatershed of the Tennessee River Basin, is one of the most biologically diverse watersheds in the southeast, with approximately 100 fish species (Mettee et al. 1996), 45 mussel species (Ortmann 1925, Isom and Yokley 1973, Ahlstedt 1986, Ahlstedt 1991, McGregor and Shelton, 1995, Godwin 2002), and 11 freshwater turtle species (Conant and Collins 1991, Mount 1975). The watershed supports several Cumberlandian species; the name Cumberlandian refers to an endemic faunal assemblage that encompasses portions of 7 states bordering the southern Appalachian Mountains and the Cumberland Plateau Region (Ahlstedt 1986). However, as with all aquatic systems, this diversity is at risk of decline. Two fish (palezone shiner, *Notropis albizonatus*, and snail darter, *Percina tanasi*) and 4 mussel species (shiny pigtoe, *Fusconaia cor*; fine-rayed pigtoe, *F. cuneolus*; Alabama lampmussel, *Lampsilis virescens*; and pale lilliput, *Toxolasma cylindrellus*) are currently on the federal threatened and endangered list. The Alabama lampmussel and pale lilliput have been extirpated throughout their range except within the headwaters of the Paint Rock River (United States Fish and Wildlife Service 1984, 1985).

The primary purpose of this project was to identify, remediate, or prevent habitat loss and degradation of various threatened and endangered (T & E) flora and fauna within the PRR watershed. The scope of this project was to locate, assess, and quantify sensitive areas and habitats for T & E species and quantify potential NPS land use stresses related to the watershed. As an overall measure, the biodiversity of the PRR watershed has been analyzed through identification of sensitive species and community occurrences indicative of the watershed's health.

WATERSHED DESCRIPTION

The Paint Rock River watershed is located within the Cumberlands and Southern Ridge and Valley ecoregion encompassing approximately 1,239 km^2 (478 mi^2) in northern Alabama and southern Tennessee. Originating in Franklin County, Tennessee, the majority of the watershed drains portions of Jackson, Madison, and Marshall counties Alabama before entering the Tennessee River at Wheeler Reservoir (Fig. 1). Within Alabama, the main stem PRR comprises the majority of the stream kilometers, and the 3 major tributaries to the main stem PRR are Estill Fork, Hurricane Creek, and Larkin Fork.

The PRR valley seldom exceeds 1.5 km in width and meanders through a smooth alluvial plain throughout its length, with the valley bordered by high forested ridges of the Cumberland Plateau. The highest elevations in the watershed occur on the plateaus along the tributaries in the

Figure 1. Location of the Paint Rock River watershed in Alabama and Tennessee.

upper watershed, and elevational change between the streams and the ridgetops may reach 305 m (1,000 ft). The topography is rugged by eastern U.S. standards, and the scenic values of the area are high.

The river drops approximately 70 m (200 ft) from the headwaters to its confluence with the Tennessee River. The river and its tributaries are generally shallow and relatively narrow (often about 10 m wide), with depths ranging from a few centimeters to >1 m and widths reaching a maximum of 30 m. Upper watershed tributaries are typically high gradient while the main channel near the mouth is slow-moving and controlled by pool-level fluctuations in the reservoir.

Streams in the upper portion of the watershed are characterized by high gradients with a medium, occasionally swift, flow draining relatively steep, forested mountainsides. Water quality in these streams is generally good. Stream substrates are coarse sand, gravel, cobble, and bedrock. The lower watershed is characterized more by flat to gently rolling hills and irregular plains. Streams are low to moderate gradient with substrates of gravel and bedrock, and stream flow is low and fairly sluggish, particularly for the main stem. The flow is greatly diminished several miles upstream of the PRR mouth, and at times may move upstream due to differential in water levels between the reservoir and the river (Godwin 1995). Lower gradient streams in the southern third of the watershed have sand-silt-cobble substrates, are generally turbid year-round, and have occasional flooding problems. Pools and riffles alternate throughout the length of the river and its tributaries, with beds of water willow (*Justicia americana*) common in the riffle areas.

The natural vegetation is primarily a southern Appalachian oak-hickory forest community, with mixed mesophytic forest in riparian areas. The tops of the plateaus and surrounding slopes support forests of oaks (*Quercus* spp.) and hickories (*Carya* spp.), with beech (*Fagus grandifolia*), tulip poplar (*Liriodendron tulipifera*), and sugar maple (*Acer saccharum*) prominent in some area. Herbs such as showy orchis (*Platathera nivea*), twinleaf (*Jeffersonia diphylla*), bent trillium (*Trillium flexipes*), and purple sedge (*Carex purpurifera*) inhabit the humus-rich slopes beneath the hardwood canopy. Streamside zones are well to moderately forested in the upper watershed, but are less well forested in the lower watershed. In the upper watershed, forests continue from the stream up the nearby slopes where the floodplain is narrow. In the areas with a wider floodplain, the wooded riparian zone is narrow and adjacent lands tend to be in pastures and row crops.

The PRR watershed contains 2 soil provinces: Limestone Valleys and Appalachian Plateau (Hajek et al. 1975). The lower watersheds and along the main stem PRR are mainly Limestone Valley, and are generally either Lobelville-Lee or Colbert-Conasauga-Firestone associations. Most of these soils were formed in material weathered from limestone and consist of red clayey soils with silt/loam surface textures. The Appalachian Plateau soil province is the most mountainous in Alabama, and is generally one of the Hartsells associations. Most of the soils are derived from sandstone or shale.

The dominant landscape of the region is karst, and about 760 caves are known within the watershed. The underlying limestone is riddled with caves, springs, and sinkholes, and is one of the hotspots for endemic cave invertebrates in the United States. Jackson County harbors more obligate cave dwelling species than any other county in the nation. Animals and plants found

within these caves include Tennessee cave salamanders (*Gyrinophilus palleucus*), southern cavefish (*Typhlichthys subterraneus*), blind cave crayfish (*Orconectes australis packardi*), Allegheny woodrats (*Neotoma magister*), several bat species, American Hart's-tongue fern (*Asplenium scolopendrium* var *americanum*) and dozens of cave invertebrates.

Human development of the Tennessee River (TR) system has drastically reduced the freshwater fauna in the Tennessee Valley (Ahlstedt 1986). Although the PRR has not been developed and suffered the resulting adverse impacts to the extent of the rest of the TR system, development projects were conducted in the watershed. The U.S. Army Corps of Engineers (USACOE) conducted projects in the watershed during the 1960's involving extensive stream channelization and removal of snags and riverbank timber (Ahlstedt 1991). These channelization projects were conducted in the main stem PRR, Lark Fork, Estill Fork, and Hurricane Creek.

The PRR watershed was divided into an upper and lower watershed based on hydrologic unit codes (HUC) (Seaber et al. 1987) because of differences in land-use/land-cover and the resulting differences in levels of stress between the two areas (Figure 2). The lower PRR watershed consisted of the Lower Paint Rock River (HUC = 06030002100), Little Paint Creek (HUC = 06030002090), Upper Paint Rock River (HUC = 06030002070), and Clear Creek (HUC = 06030002080) sub-basins. The upper PRR watershed consisted of the Guess Creek (HUC = 06030002060), Estill Fork (HUC = 06030002020), Larkin Fork (HUC = 06030002040), and Lick Fork (HUC = 06030002050) sub-basins. Estill Fork and Larkin Fork include portions of Tennessee.

METHODS

Rare, Threatened, and Endangered Species

Rare, threatened, and endangered species in the Paint Rock River watershed were identified using the Alabama Natural Heritage Program[SM] Biological Conservation Database (BCD), a natural heritage database documenting rare species and natural communities recorded in Alabama following established Natural Heritage Protocol for processing biological information. The basic unit of this protocol is the element: any exemplary or rare component of the natural environment, such as a species, natural community, bird rookery, or other ecological feature. As defined in the Heritage Operations Manual, an Element Occurrence (EO) is "a locational record representing a single extant habitat which sustains or otherwise contributes to the survival of a population" or natural community, and represents the area the element is, or was present. The Element Occurrence Record (EOR) is the computerized record in the database that contains the biological and locational information regarding a specific EO, as well as an assessment and ranking of the conservation value of that EO against other EOs of its kind. A key component of the Heritage EO Methodology is the assignment of Heritage Ranks to species at the global and state level (Appendix A).

Rare species in the PRR watershed were identified by selecting EORs within the watershed boundaries within a geographic information system (GIS). The EOR spatial file was created by exporting all EORs from BCD and converting them to an ArcView (Environmental Research Systems Institute, Redlands, California) shapefile format. EORs within the PRR were selected

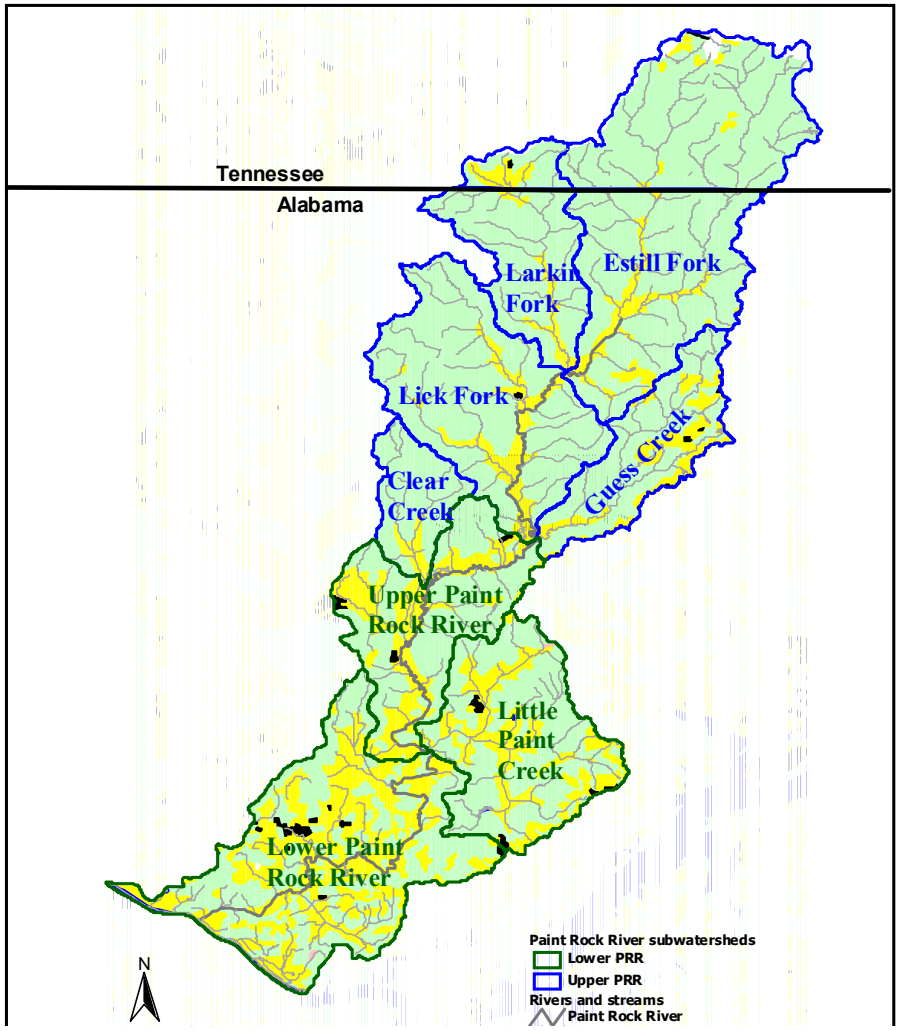

Figure 2. Subwatersheds in the Paint Rock River, Alabama and Tennessee, and upper and lower groupings of the subwatersheds as defined based on differences in land use.

by intersecting the EOR shapefile with a shapefile delineating the watershed boundaries. The EORs were assigned a division (upper or lower) by intersecting the EOR shapefile with a shapefile of the 2 watershed divisions developed from the HUC shapefile.

Conservation Targets

Identification of Conservation Targets

The identification of focal conservation targets is the basis of the TNC standard methodology (The Nature Conservancy 2000) for site conservation (called the Five-S Approach, Appendix B) and is the basis for all subsequent steps of the methodology including identifying threats, developing strategies, and measuring success. The selection of conservation targets has an enormous impact on planning and conservation efforts as they define the ecological processes that need to be protected, managed, and restored as well as defining the ecological boundaries of the conservation effort. In this case, the boundaries for conservation efforts in the PRR watershed were defined by the watershed. However, prioritizing focal areas within the watershed was determined by defining conservation targets at the local, intermediate, and coarse scale levels in order to conserve biodiversity at multiple scales within the landscape along with the ecological processes that sustain biodiversity (See Appendix B for a discussion of scale). Conservation targets were selected to represent the biodiversity within the site as determined from ALNHP's records.

Grading Conservation Targets

To assess biodiversity health, the viability of each element is evaluated, ranked, and the ranks aggregated to provide a biodiversity health rank for the conservation area (for methodology and rank definitions, see Appendix B). Conservation targets were graded for the upper and lower watershed division on the basis of size, condition, and landscape context based on the Natural Heritage Network's principles for ranking element occurrences using a 4-level scale. Size is a measure of the area or abundance of an element's occurrence. Condition is an integrated measure of the composition, structure, and biotic interactions that characterize its occurrence. Landscape context is an integrated measure of the dominant environmental regimes and processes that establish and maintain the element, and connectivity across the landscape. The individual target ranks were aggregated to provide a biodiversity health rank for each watershed division.

Human Context Information

Managed Areas

In addition to data on rare species, information regarding managed areas within the state is maintained in ALNHP's BCD system. All managed areas within the 3 Alabama counties in the PRR watershed were exported from BCD and imported into the GIS for analysis. Managed areas within the PRR watershed were identified by intersecting the managed area data layer with the existing PRR watershed boundary layer and saving the resulting selection as a shapefile. A GIS file of the boundaries of United States Fish and Wildlife Service (USFWS) national wildlife refuges within the watershed was downloaded from the USFWS Region 4 Refuge Boundary Files website (<http://www.fws.gov/data/r4gis/boundary.html>).

Land Use
Land use information was obtained from Alabama Soil and Water Conservation Committee published estimates (Alabama Soil and Water Conservation Committee 1998) of percent land cover for Alabama. Road densities were calculated using Topologically Integrated Geographic Encoding and Referencing (TIGER) system line files (United States Census Bureau 2000a) for road representations and HUC code files.

Population & Demographics
Municipalities were identified using data from EPA's Better Assessment Science Integrating Point and Nonpoint Sources (BASINS) 3.0 dataset (United States Environmental Protection Agency 2001). BASINS is a multipurpose environmental analysis system developed by EPA for use in performing watershed- and water-quality-based studies, and contains both data layers and spatial models and tools. The populated place locations file from the dataset was used to select all populated place locations within the watershed. Population and demographic information was obtained using census 2000 data (United States Census Bureau 2000b, 2000c).

Potential Pollution Sources

Geographic Information System (GIS) spatial data layers for the Paint Rock River watershed were collected from a variety of sources, including descriptive layers developed by The Nature Conservancy and other layers described below. Other spatial layers covering the watershed developed include 30 m LANDSAT Thematic Mapper satellite data, US Geological Survey (USGS) 7.5 minute topographic quadrangles in digital raster graphic format, USGS Digital Orthophotographic Quarter Quadrangles (DOQQ), and land use/land cover. All GIS operations and analyses were conducted using ArcView 3.3 (Environmental Systems Research Institute, Redlands, California, USA).

Godwin's 1995 Survey
Results of Godwin's (1995) nonpoint source assessment were incorporated into the identification of potential sources. He identified impacted sites from primary canoe surveys of the river and its tributaries and secondary road surveys of roads near the streams. Over 80 photographs of river and bank conditions from many sites were scanned and described.

Agricultural & Animal Production
Animal concentrations for each of the subwatersheds were obtained from ADEM (2000a) and the Alabama Soil and Water Conservation Committee (ASWCC) (1998).

Septic Systems
The number of estimated septic systems and estimated number of failing septic systems within each watershed was obtained from Alabama Soil and Water Conservation Committee published estimates (Alabama Soil and Water Conservation Committee 1998)

Permitted Sites
Permitted discharge sites within the watershed were obtained from ADEM (2000a) and from data layers in EPA's BASINS dataset (United States Environmental Protection Agency 2001). BASINS was used to identify toxics release inventory (United States Environmental Protection

Agency 1999) sites; National Pollutant Discharge Elimination System (NPDES) permit compliance system (PCS) sites; Industrial Facilities Discharge (IFD) sites; Resource Conservation and Recovery Information System (RCRIS) hazardous and solid waste sites; Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) or Superfund national priority list sites; Toxic Release Inventory (TRI) sites; and dam and mine locations. Descriptions below are from the metadata for the files.

PCS is a national computerized management information system that automates entry, updating, and retrieval of NPDES data and tracks permit issuance, permit limits and monitoring data, and other data pertaining to facilities regulated under NPDES. PCS records water-discharge permit data on more than 75,000 facilities nationwide. The NPDES permit program regulates direct discharges from municipal and industrial wastewater treatment facilities that discharge into the navigable waters of the United States. Wastewater treatment facilities (also called "point sources") are issued NPDES permits regulating their discharge.

IFD Sites are industrial or municipal point sources discharging to surface waters. The facilities were extracted from the U.S. EPA's IFD database which is contributed to by a number of organizations including federal, state, and interstate agencies (United States Environmental Protection Agency 2001).

RCRIS is a national computerized management information system in support of the Resource Conservation and Recovery Act (RCRA). RCRA requires that generators, transporters, treaters, storers, and disposers of hazardous waste provide information concerning their activities to state environmental agencies.

CERCLIS is a national computerized management information system that automates entry, updating, and retrieval of CERCLIS data and tracks site and non-site specific Superfund data in support of the Comprehensive Environmental Response, Compensation, and Liability Act. It contains information on hazardous waste site assessment and remediation.

The TRI database contains data on annual estimated releases of over 300 toxic chemicals to air, water, and land by the manufacturing industry. Industrial facilities provide the information, which includes: the location of the facility where chemicals are manufactured, processed, or otherwise used; amounts of chemicals stored on- site; estimated quantities of chemicals released; on-site source reduction and recycling practices; and estimated amounts of chemicals transferred to treatment, recycling, or waste facilities. The TRI data for chemical releases to land are limited to releases within the boundary of a facility. Releases to land include: landfills; land treatment/application farming; and surface impoundments, such as topographic depressions, man-made excavations, or diked areas. Air releases are identified as either point source releases or as non-point (i.e. fugitive) releases, such as those occurring from vents, ducts, pipes, or any confined air stream. Surface water releases include discharges to rivers, lakes, streams, and other bodies of water. In addition, the database covers releases to underground injection wells (where chemicals are injected into the groundwater) and off-site transfers of chemicals to either publicly-owned treatment works (POTWs) or any other disposal, treatment, storage, or recycling facility.

Water Quality Monitoring Sites
Volunteer water quality monitoring site locations were obtained from the Alabama Water Watch website (Alabama Water Watch, online) and incorporated into the GIS.

303 (d) Listed Streams
Alabama's 2000 Final 303 (d) list of impaired streams and the corresponding GIS file were obtained online from ADEM (2000c). The streams were buffered in the GIS and the resulting file was intersected with the BCD export file to determine rare species associated with the listed streams.

Threat Assessment

A threat assessment is the identification, evaluation, and ranking of threats that affect conservation targets (for further methodology details and terminology definitions, see Appendix B) and was conducted following guidelines established by The Nature Conservancy (2000). Threats are a mix of stresses and sources of stress that may be scored by the frequency of stress occurrences; threats may also be weighted by urgency. It is important to understand the distinction between the *stresses* affecting the conservation targets and the *sources* of the stress in order to ensure the development of effective conservation strategies. A stress is a process or event with direct negative consequences for the conservation element (e.g., cessation of water flow in a fish-populated stream). Many or most stresses are caused directly by incompatible human uses of land, water, and natural resources; sometimes, incompatible human uses indirectly cause stress by exacerbating natural phenomena. The source of a stress is the action or entity that produces that stress (e.g., water impoundments). The sources of stress may contribute to more than 1 stress. Stresses and sources were identified and ranked for each conservation target. The threat assessment for the conservation targets identified in the PRR was conducted using the TNC's EXCEL spreadsheet worksheet template (The Nature Conservancy 2000).

Stresses
Stresses were identified by focusing on the destruction, degradation or impairment of conservation targets as a direct or indirect result from human causes. Stresses considered were those currently happening, or that had a high potential to occur in the near future, where the damage was either a direct impact to the target or an indirect impact through an impairment or exacerbation of a natural process.

The relative seriousness of each stress identified was assessed by assigning a 4-scale rank based on the severity of damage and scope of damage for each stress.

- Severity of Damage. What level of damage to the conservation target over at least some portion of the target occurrence can reasonably be expected within 10 years under current circumstances? Total destruction, serious or moderate degradation, or slight impairment?

- Scope of damage. What is the geographic scope of impact to the conservation target expected within 10 years under current circumstances? Is the stress pervasive throughout the target occurrences, or localized?

An overall stress rank for each stress affecting a conservation target was obtained by combining the ranks for severity and scope.

Sources

For each stress afflicting a given conservation target, 1 or more sources of stress were identified and listed. Sources were ranked using a 4-scale rank based on the relative seriousness of the source for degree of contribution to the stress and irreversibility of the stress.

- Degree of contribution to the stress. The contribution of a source, acting alone, to the full expression of the stress assuming the continuation of the existing management or conservation situation.

- Irreversibility of the stress. The reversibility of the stress caused by the source.

The contribution and irreversibility ranks were combined to provide an overall source rank for each source of stress.

Threat Ranks

Stress and source ranks help elucidate the factors influencing each element and subsequently, the necessary conservation strategies for the site. The final step in the assessment of stresses and sources was an analysis and synthesis of the individual stress and source ranks to provide an overall threat rank for each element and source. One important part of the threat assessment is the determination of critical threats. Critical threats are highly ranked threats that jeopardize multiple conservation elements or threats that affect at least one element and are ranked "very high." Critical threats necessitate development of immediate conservation strategies. Several critical threats acting at a conservation area usually indicate that the site is highly or very highly threatened.

Threat Abatement and Conservation Measures

A threat is a combination of a stress and a source of stress. For taking corrective actions, the source was the tangible item on which strategies to abate the threat had to be focused, with the assumption that abatement of the NPS source will alleviate the stress and result in higher viability and health of the conservation targets.

RESULTS AND DISCUSSION

Rare, Threatened and Endangered Species

The Paint Rock River watershed contains significant biological diversity, particularly aquatic biodiversity. There were 964 occurrences of rare plant and animal species and natural communities documented in the PRR watershed in Alabama (538 in the upper PRR and 426 in the lower PRR), with 20 occurrences documented in the watershed in Tennessee (Appendix C). Additional occurrences of rare mussels were documented in the Estill Fork subwatershed in a recent survey (Godwin 2002) for which EORs have not yet been extracted and entered into BCD.

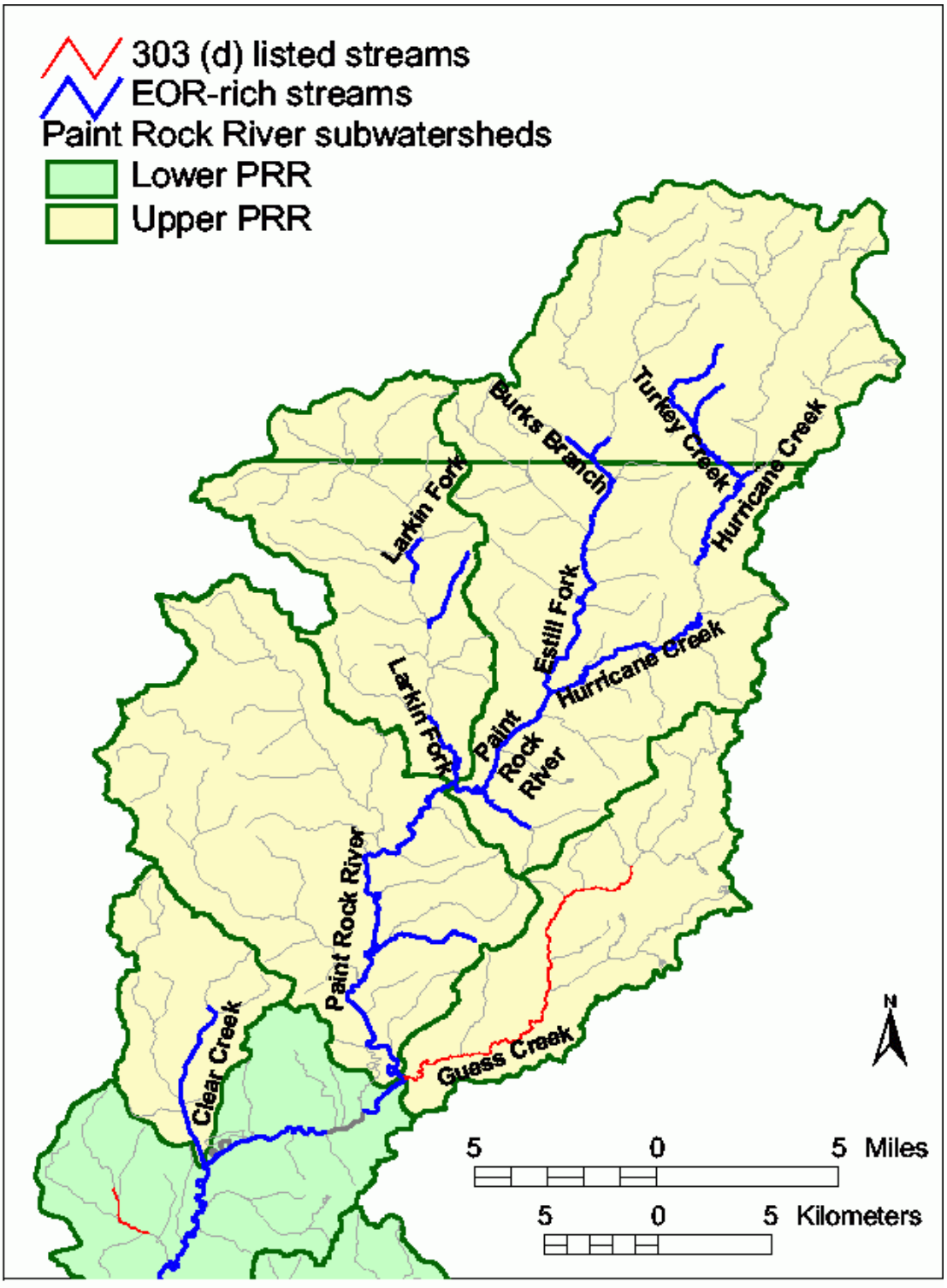

Figure 3. Streams and rivers with ≥5 EORs associated with the stream in the Upper Paint Rock River watershed, Alabama and Tennessee.

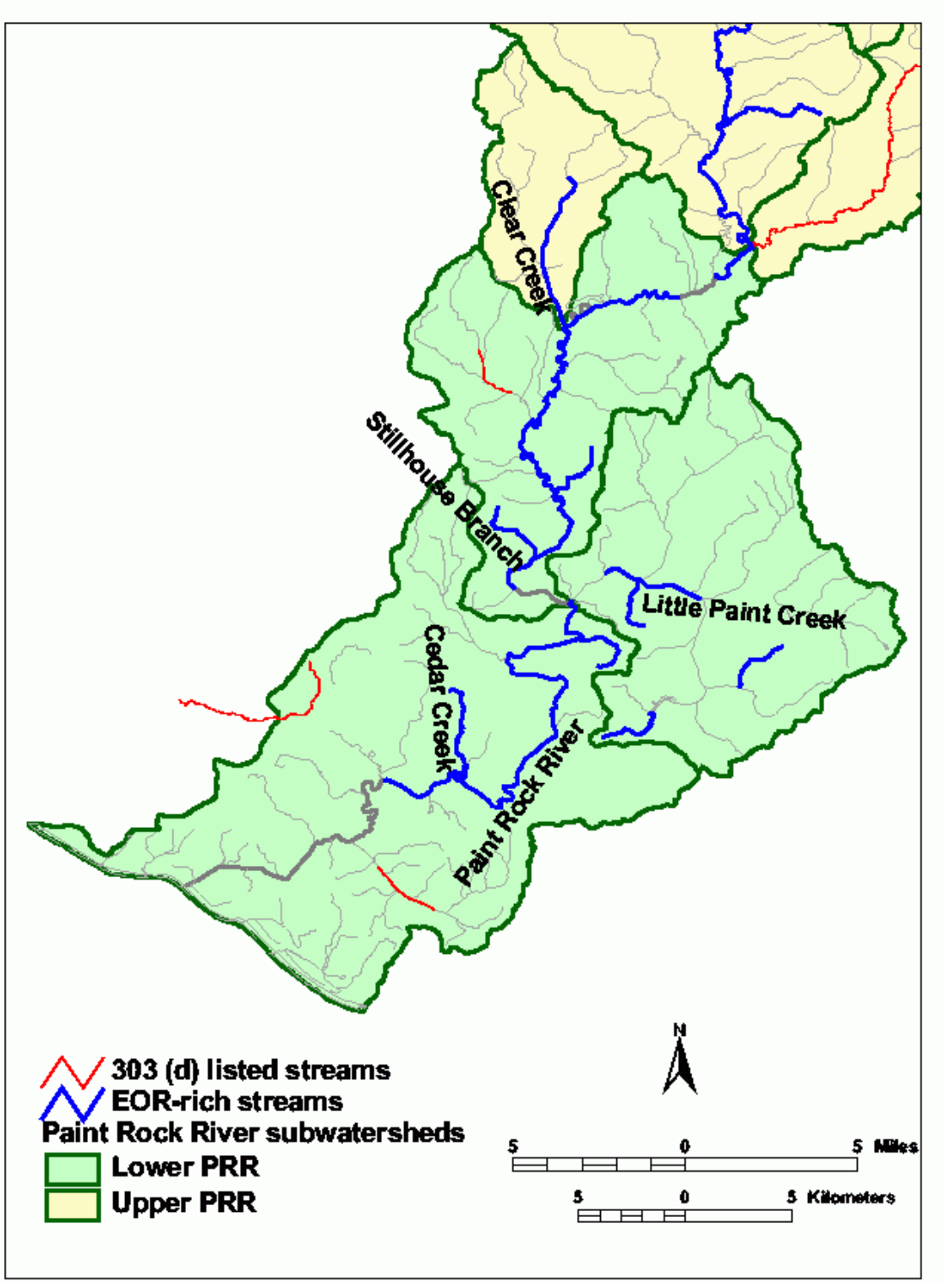

Figure 4. Streams and rivers with ≥5 EORs associated with the stream in the Lower Paint Rock River watershed, Alabama and Tennessee.

The majority of this diversity was associated with the streams and rivers in the watershed; 92.9% of all the occurrences were within 500 m of flowing water (79.8% were within 100 m). In the upper PRR subwatersheds, the majority (90.8%) of the documented rare species occurrences were associated with Burkes Branch, Clear Creek, Estill Fork, Hurricane Creek, Larkin Fork, Paint Rock River (main stem upper), Turkey Creek, or unnamed tributaries (Fig. 3). In the lower PRR subwatersheds, 81.2% of the documented rare species were associated with Cedar Creek, Little Paint Creek, Paint Rock River, Stillhouse Branch, , or unnamed tributaries (Fig. 4).

This close association with flowing water was partially a result of different sampling efforts because more effort has gone into sampling the aquatic fauna of the watershed than the terrestrial flora and fauna. However, it was mainly a factor of the rich aquatic biodiversity in the watershed. The southeastern United States has been recognized as a global center for freshwater bidioversity (Lydeard and Mayden 1995, Stein 2002), with globally unparalleled diversity of bivalves and gastropods (Neves et al. 1997). Because Alabama is home to an exceptionally rich freshwater fauna, and the PRR is a significant contributor to this biodiversity, it supports an extremely diverse array of aquatic life.

The rare species documented in the PRR watershed included 145 occurrences (95 upper PRR and 50 lower PRR) of 19 species in Alabama and 15 occurrences of 14 species in Tennessee that are federal or state protected species (Table 1). Godwin (2002) documented 9 additional occurrences of threatened or endangered mussels in the Estill Fork subwatershed. With the exception of 10 occurrences [1 southern cavefish (*Typhlichthys subterraneus*), 3 Rafinesque's big eared bat (*Corynorhinus rafinequii*), 1 pale lilliput (*Toxolasma cylindrellus*), 2 white fringeless orchid (*Platanthera integrilabia*), 1 horse-tail spikerush (*Eleocharis equisetoides*), 1 death-camas (*Zigadenus leimanthoides*), and 1 Virginia chainfern (*Woodwardia virginica*)], all federal threatened and endangered and state protected species in the upper PRR were associated with EOR-rich streams listed above (Fig. 5). The distribution of protected species is more diffuse in the lower PRR with fewer concentrations of rare species. Fifteen occurrences (30%) of protected species [1 Price's potato-bean (*Apios priceana*), 1 American hart's-tongue fern (*Asplenium scolopendrium* var *americanum*), 1 Tennessee cave salamander (*Gyrinophilus palleucus*), 4 bald eagle (*Haliaeetus leucocephalus*), 1 slabside pearlymussel (*Lexingtonia dolabelloides*), 3 gray bat (*Myotis grisescens*), 1 Indiana bat (*Myotis sodalis*), 1 orange-foot pimpleback (*Plethobasus cooperianus*), and 2 southern cavefish (*Typhlichthys subterraneus*)] were not associated with EOR-rich streams (Fig. 6).

There were an additional 10 species (with 15 occurrences) considered globally imperiled (Table 2) by Natural Heritage ranks that are not state or federally protected, and 45 species considered state imperiled but not globally imperiled (Table 3). Again, more imperiled species were present in the upper watershed than in the lower watershed.

Table 1. Federal listed endangered and threatened species and state protected species documented by the Alabama Natural Heritage Program[SM] and the Tennessee Division of Natural Heritage occurring in the Paint Rock River (PRR) watershed, Jackson, Madison, and Marshall counties, Alabama, and Franklin County, Tennessee.

Major Group	Scientific name	Common Name	Global Rank[a]	State Rank[a]	Federal Status[a]	State Protected[a]	Number of Occurrences[b]
Lower PRR[c]							
Amphibians	*Gyrinophilus palleucus*	Tennessee cave salamander	G2G3	S2		SP	1
Birds	*Haliaeetus leucocephalus*	bald eagle[d]	G4	S3B	PS:LT,PDL	SP	4
Fish	*Percina tanasi*	snail darter[d]	G2G3	S1	LT	SP	3
Fish	*Typhlichthys subterraneus*	southern cavefish	G4	S3		SP	2
Mammals	*Myotis grisescens*	gray bat[d]	G3	S2	LE	SP	4
Mammals	*Myotis sodalis*	Indiana bat[d]	G2	S2	LE	SP	1
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	6
Mussels	*Fusconaia cuneolus*	fine-rayed pigtoe	G1	S1	LE,XN	SP	3
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	LE,XN	SP	1
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	19
Mussels	*Plethobasus cooperianus*	orange-foot pimpleback[d]	G1	SH	LE	SP	1
Mussels	*Toxolasma cylindrellus*	pale lilliput	G1	S1	LE	SP	1
Vascular Plants[e]	*Apios priceana*	Price's potato-bean[d]	G2	S2	LT		1
Vascular Plants[e]	*Asplenium scolopendrium* var *americanum*	American hart's-tongue fern[d]	G4T3	S1	LT		1
Vascular Plants[e]	*Clematis morefieldii*	Morefield's leather-flower[d]	G1	S1	LE		1

Table 1. Continued.

Major Group	Scientific name	Common Name	Global Rank[a]	State Rank[a]	Federal Status[a]	State Protected[a]	Number of Occurrences[b]
Upper PRR - Alabama[f]							
Amphibians	*Gyrinophilus palleucus*	Tennessee cave salamander	G2G3	S2		SP	1
Fish	*Notropis albizonatus*	palezone shiner[g]	G2	S1	LE	SP	7
Fish	*Typhlichthys subterraneus*	southern cavefish	G4	S3		SP	2
Mammals	*Corynorhinus rafinesquii*	Rafinesque's big-eared bat [g]	G3G4	S2		SP	4
Mussels	*Alasmidonta viridis*	slippershell mussel[gh]	G4G5	S1		SP	3
Mussels	*Fusconaia cor*	shiny pigtoe[h]	G1	S1	LE,XN	SP	20
Mussels	*Fusconaia cuneolus*	fine-rayed pigtoe	G1	S1	LE,XN	SP	3
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	LE,XN	SP	16
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel[h]	G2	S1	C	SP	30
Mussels	*Toxolasma cylindrellus*	pale lilliput[h]	G1	S1	LE	SP	7
Vascular Plants [e]	*Platanthera integrilabia*	white fringeless orchid[g]	G2G3	S2	C		1
Upper PRR – Tennessee[i]							
Reptiles	*Anolis carolinensis*	green anole	G5	S3		D	1
Vascular Plants	*Eleocharis equisetoides*	horse-tail spike-rush	G4	S1		E	1
Vascular Plants	*Helianthus eggertii*	Eggert's sunflower	G3	S3	LT	T	1
Vascular Plants	*Hydrastis canadensis*	goldenseal	G4	S3		S-CE	1
Vascular Plants	*Melanthium woodii*	ozark bunchflower	G5	S1S2		E	1
Vascular Plants	*Onosmodium molle* ssp *subsetosum*	smooth false gromwell	G4G5T ?	S1		E	1
Vascular Plants	*Platanthera integrilabia*	white fringeless orchid	G2G3	S2S3		E	1
Vascular Plants	*Ponthieva racemosa*	shadow-witch	G4G5	S1		E	1
Vascular Plants	*Silphium brachiatum*	Cumberland rosinweed	G2	S2		E	2
Vascular Plants	*Spiranthes lucida*	shining ladies'-tresses	G5	S1S2		T	1
Vascular Plants	*Talinum teretifolium*	roundleaf fameflower	G4	S2		T	1

Table 1. Continued.

Major Group	Scientific name	Common Name	Global Rank[a]	State Rank[a]	Federal Status[a]	State Protected[a]	Number of Occurrences[b]
Vascular Plants	*Viburnum bracteatum*	limerock arrowwood	G1	S1		E	1
Vascular Plants	*Woodwardia virginica*	Virginia chainfern	G5	S2		S	1
Vascular Plants	*Zigadenus leimanthoides*	death-camas	G4Q	S2		T	1

[a] See Appendix B for an explanation of Global and State Ranks and Federal and State Protection Status.
[b] Number of Element Occurrence Records in ALNHP's Biological Conservation Database as of December 2002 and TDNH's BCD as of 2000.
[c] The lower PRR watershed included the Lower Paint Rock River (HUC = 06030002100), Little Paint Creek (HUC = 06030002090), and Upper Paint Rock River (HUC = 06030002070) sub-basins.
[d] Documented in the PRR watershed only in the lower watershed.
[e] Plant species have no mechanism for state protection in Alabama.
[f] The upper PRR watershed included the Clear Creek (HUC = 06030002080), Guess Creek (HUC = 06030002060), Estill Fork (HUC = 06030002020), Larkin Fork (HUC = 06030002040), and Lick Fork (HUC = 06030002050) sub-basins in Alabama.
[g] Documented in the PRR watershed only in the upper watershed.
[h] Additional occurrences documented by Godwin (2002) in recently completed survey for which EORs have not yet been extracted.
[i] The Estill Fork and Larkin Fork sub-basins include portions of Tennessee.

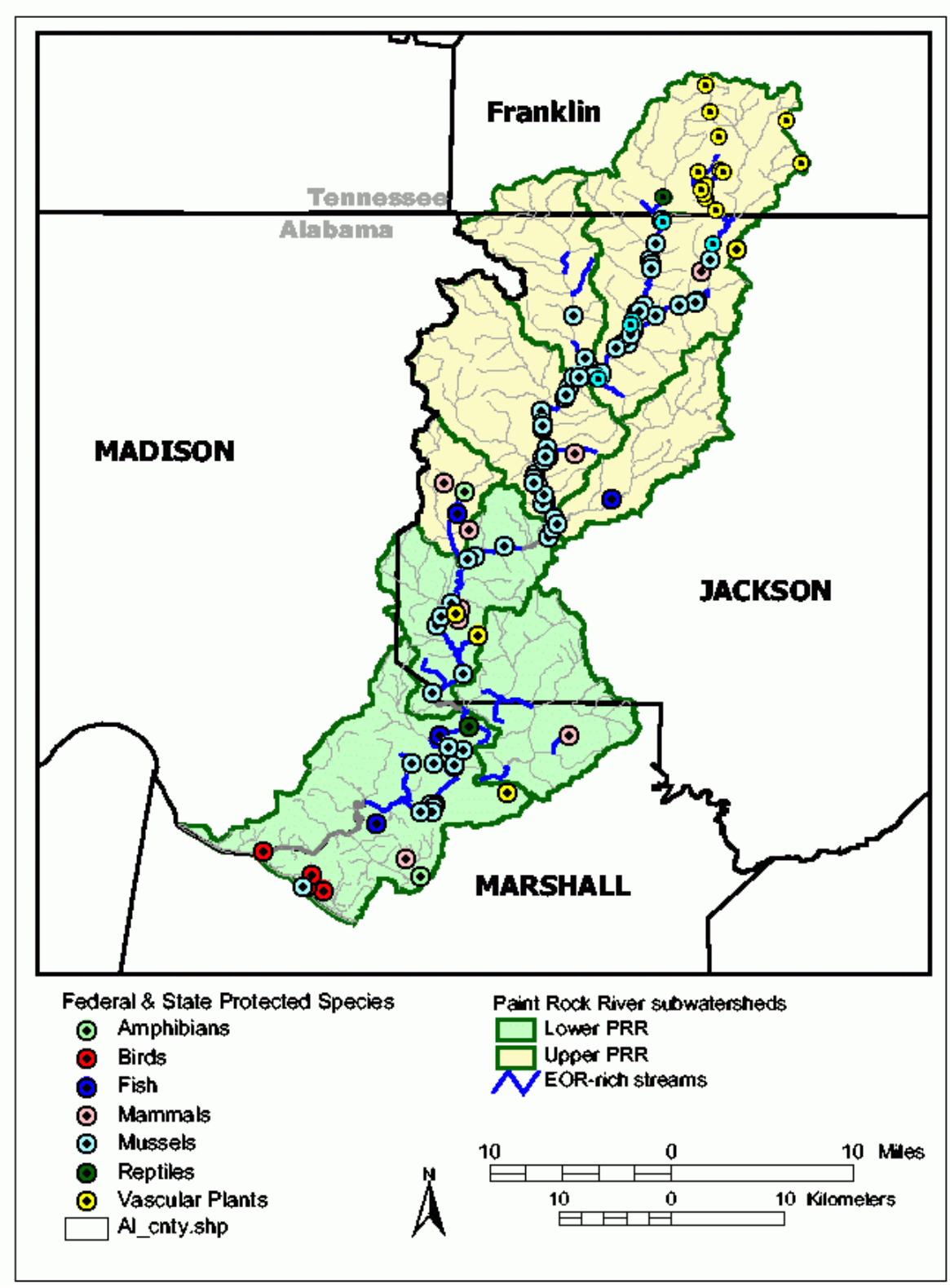

Figure 5. State and federal protected species documented in the Paint Rock River watershed, Alabama and Tennessee, by the Alabama Natural Heritage Program and the Tennessee Division of Natural Heritage.

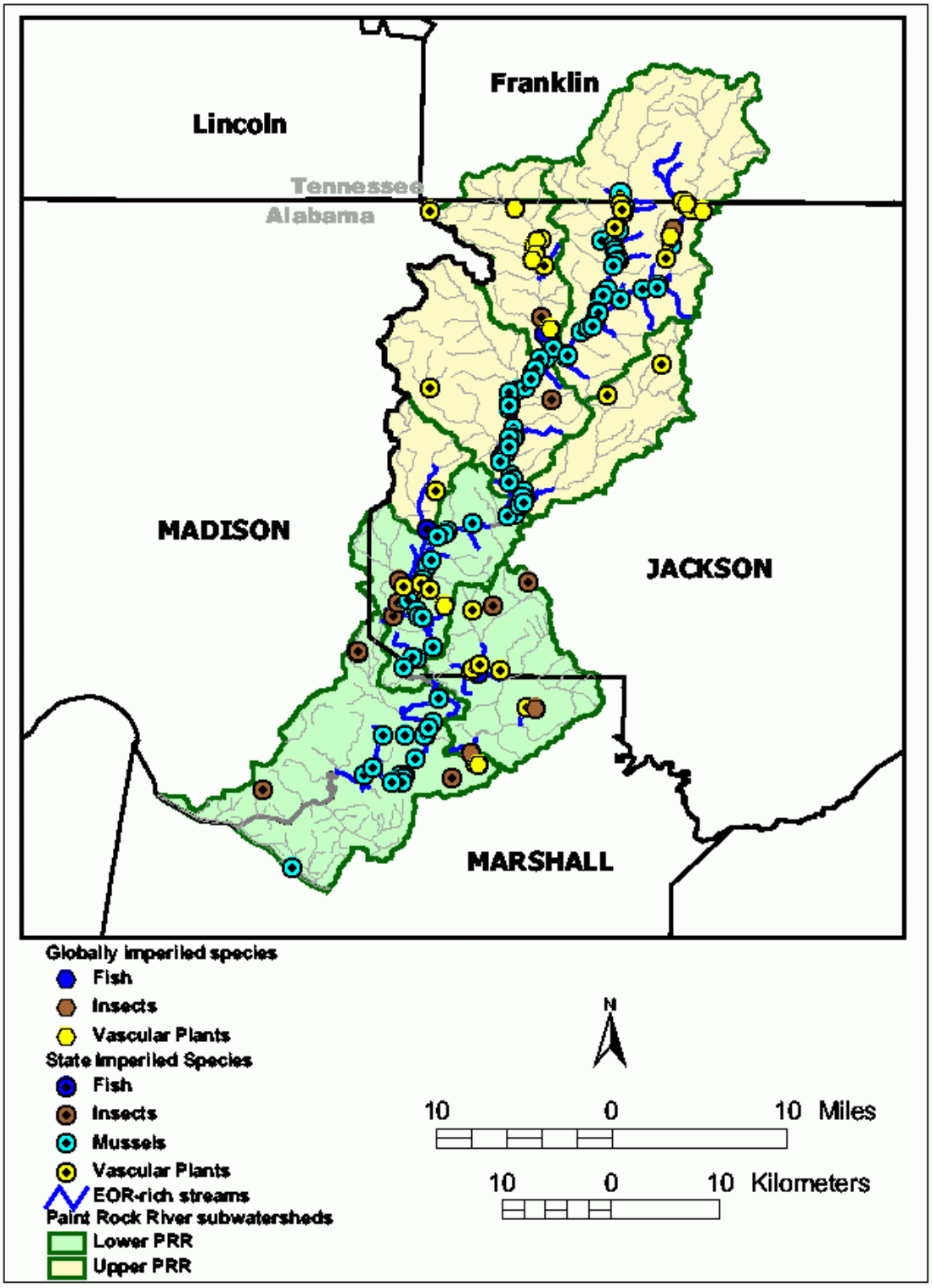

Figure 6. State and global imperiled or critically imperiled species without state or federal protection documented in the Paint Rock River watershed, Alabama, by the Alabama Natural Heritage Program.

Table 2. Globally imperiled or critically imperiled species without state or federal protection documented occurring within the Paint Rock River (PRR) watershed, Alabama, by the Alabama Natural Heritage Program[SM]. Imperilment status was indicated by Natural Heritage ranks[a].

Major Group	Scientific name	Common Name	Global Rank[a]	State Rank[a]
Lower PRR [b]				
Diplopoda	*Pseudotremia nyx*	a cave obligate millipede	G1G2	S?
Insects	*Subterrochus steevesi*	a cave obligate beetle	G1G2	S?
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2
Vascular Plants	*Silphium brachiatum*	Cumberland rosinweed	G2	S2
Upper PRR[c]				
Fish	*Percina burtoni*	blotchside darter	G2	S1
Insects	*Rhyacophila alabama*	caddisfly	G1	S1
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2
Vascular Plants	*Blephilia subnuda*	smooth blephilia	G1G2	S1S2
Vascular Plants	*Neviusia alabamensis*	Alabama snow-wreath	G2	S2
Vascular Plants	*Silphium brachiatum*	Cumberland rosinweed	G2	S2
Vascular Plants	*Viburnum bracteatum*	limerock arrowwood	G1	S1

[a] See Appendix B for an explanation of Heritage Global and State Ranks.
[b] The lower PRR watershed included the Lower Paint Rock River (HUC = 06030002100), Little Paint Creek (HUC = 06030002090), and Upper Paint Rock River (HUC = 06030002070) sub-basins.
[c] The upper PRR watershed included the Clear Creek (HUC = 06030002080), Guess Creek (HUC = 06030002060), Estill Fork (HUC = 06030002020), Larkin Fork (HUC = 06030002040), and Lick Fork (HUC = 06030002050) sub-basins in Alabama.

Table 3. Alabama state imperiled or critically imperiled species (not globally imperiled) without state or federal protection documented occurring within the Paint Rock River (PRR) watershed, Alabama, by the Alabama Natural Heritage Program[SM]. Imperilment status was indicated by Natural Heritage ranks[a].

Major Group	Scientific name	Common Name	Global Rank[a]	State Rank[a]
Lower PRR [b]				
Fish	*Notropis leuciodus*	Tennessee shiner	G5	S1
Mussels	*Elliptio dilatata*	spike	G5	S1
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2
Mussels	*Lampsilis ovata*	pocketbook	G5	S1
Mussels	*Lasmigona costata*	fluted-shell	G5	S2
Mussels	*Ligumia recta*	black sandshell	G5	S2
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1
Mussels	*Quadrula nodulata*	wartyback	G4	S1S2
Mussels	*Truncilla truncata*	deertoe	G5	S1
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2
Vascular Plants	*Agastache nepetoides*	yellow giant hyssop	G5	S1
Vascular Plants	*Carex purpurifera*	purple sedge	G4?	S2
Vascular Plants	*Cotinus obovatus*	American smoke-tree	G4	S2
Vascular Plants	*Cystopteris tennesseensis*	Tennessee bladderfern	G5	S2
Vascular Plants	*Dicentra cucullaria*	Dutchman's breeches	G5	S2
Vascular Plants	*Jeffersonia diphylla*	twinleaf	G5	S2
Vascular Plants	*Trillium sessile*	toadshade	G4G5	S2
Upper PRR[c]				
Fish	*Erimystax insignis*	blotched chub	G3G4	S2
Fish	*Notropis leuciodus*	Tennessee shiner	G5	S1
Insects	*Pseudanophthalmus profundus*	a cave obligate beetle	G3	S2
Insects	*Ptomaphagus laticornis*	a beetle	G3	S1
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2
Mussels	*Lampsilis ovata*	pocketbook	G5	S1
Mussels	*Lasmigona costata*	fluted-shell	G5	S2
Mussels	*Lasmigona holstonia*	Tennessee heelsplitter	G3	S1S2
Mussels	*Medionidus conradicus*	Cumberland moccasinshell	G3G4	S1
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1

Table 3. Continued.

Major Group	Scientific name	Common Name	Global Rank[a]	State Rank[a]
Mussels	*Truncilla truncata*	deertoe	G5	S1
Mussels	*Villosa taeniata*	painted creekshell	G3G4	S1
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2
Vascular Plants	*Carex austrocaroliniana*	sedge	G4	S2?
Vascular Plants	*Carex eburnea*	ebony sedge	G5	S2
Vascular Plants	*Carex purpurifera*	purple sedge	G4?	S2
Vascular Plants	*Dicentra cucullaria*	Dutchman's breeches	G5	S2
Vascular Plants	*Diplazium pycnocarpon*	narrow-leaved glade fern	G5	S1S2
Vascular Plants	*Enemion biternatum*	false rue-anemone	G5	S2
Vascular Plants	*Frasera caroliniensis*	Carolina gentian	G5	S2
Vascular Plants	*Hydrastis canadensis*	golden seal	G4	S2
Vascular Plants	*Hydrophyllum appendiculatum*	appendage waterleaf	G5	S2?
Vascular Plants	*Jeffersonia diphylla*	twinleaf	G5	S2
Vascular Plants	*Monarda clinopodia*	basil bee-balm	G5	S2
Vascular Plants	*Oxalis grandis*	giant wood-sorrel	G4G5	S1
Vascular Plants	*Polymnia laevigata*	Tennessee leafcup	G3	S2S3
Vascular Plants	*Populus heterophylla*	swamp cottonwood	G5	S2
Vascular Plants	*Stylophorum diphyllum*	celandine poppy	G5	S1
Vascular Plants	*Synandra hispidula*	guyandotte beauty	G4	S1
Vascular Plants	*Trillium flexipes*	nodding trillium	G5	S2S3
Vascular Plants	*Trillium flexipes*	nodding trillium	G5	S2S3
Vascular Plants	*Trillium sessile*	toadshade	G4G5	S2
Vascular Plants	*Valeriana pauciflora*	valerian	G4	S1
Vascular Plants	*Viola canadensis*	Canada violet	G5	S2

[a] See Appendix B for an explanation of Heritage Global and State Ranks.
[b] The lower PRR watershed included the Lower Paint Rock River (HUC = 06030002100), Little Paint Creek (HUC = 06030002090), and Upper Paint Rock River (HUC = 06030002070) sub-basins.
[c] The upper PRR watershed included the Clear Creek (HUC = 06030002080), Guess Creek (HUC = 06030002060), Estill Fork (HUC = 06030002020), Larkin Fork (HUC = 06030002040), and Lick Fork (HUC = 06030002050) sub-basins in Alabama.

Conservation Targets

Identification of Conservation Targets
Six conservation targets were chosen: riverine system, matrix forest community, endangered bats, riparian vegetation, karst communities, and critically imperiled mussels and fish.

I. Coarse Scale

The terrestrial system which is represented at the coarse scale in the PRR watershed was the southern Appalachian oak-hickory forest community which forms the matrix terrestrial community of the region. The PRR and its tributaries, as part of the larger Tennessee River system, represents the regional aquatic system.

A. Oak-hickory matrix forest communities

This target encompasses large blocks of the natural communities which make up the natural vegetative cover of the watershed. The natural vegetation is primarily an oak-hickory forest community, with mixed mesophytic forest in riparian areas. The tops of the plateaus and surrounding slopes support forests of oaks and hickories, with beech, tulip poplar, and sugar maple prominent in some areas. Streamside zones are well to moderately forested in the upper watershed, but are less well forested in the lower watershed. The large blocks of matrix-forming communities are believed to be of great significance for breeding populations of Neotropical migratory songbirds, although the extent of the significance has not been well-documented.

B. Riverine ecosystem

This target comprises the riverine aquatic ecosystem (main stem and tributaries) throughout the PRR watershed and the ecological processes needed to maintain this system. The PRR supports an extremely diverse array of aquatic life, including approximately 100 fish, 45 mussel species, and 11 freshwater turtle species. In addition, many other aquatic plants and invertebrates are supported in the watershed.

C. Endangered and Protected Bats

The endangered bat species within the watershed were chosen as a conservation target because of their federal status, continued vulnerability to population declines, and limited information for some species. They were separated from the rest of the karst system fauna because of the unique characteristics of these mammals. The endangered bats in the PRR system were Rafinesque's big-eared bat, gray bat, and Indiana bat. There is a general paucity of information regarding the status of bat species in the state of Alabama.

1. Rafinesque's Big-eared Bat

Rafinesque's big-eared bat is a state protected species and is considered a species of special concern in Alabama (Mount 1986) and by the USFWS. The Natural Heritage Network and The

Nature Conservancy consider Rafinesque's big-eared bat to be rare to secure globally, but imperiled in Alabama.

Rafinesque's big-eared bat is found throughout the southeastern United States from Virginia, southern West Virginia, Ohio, Indiana, and Illinois, south through the lower Mississippi Valley through southeastern Missouri, central Arkansas, southeastern Oklahoma and eastern Texas to the Gulf and Atlantic coasts (Barbour and Davis 1969). In Alabama, it is probably distributed statewide, but most records are from the northern one-half of the state (Mount 1986).

This species is perhaps the least known of any southeastern U.S. bat. Rafinesque's big-eared bat often occurs in forested regions largely devoid of natural caves; they use a variety of low light intensity sites for roosting, including caves, hollow trees, crevices behind bark, a variety of spaces in human buildings, and abandoned mines (Mount 1986, Davis and Schmidly 1994). It has been observed most frequently in buildings, both occupied and abandoned. Preferred hibernacula are usually those showing the least potential for temperature fluctuation during winter (Mount 1986).

Little is known about the overall population status, but this species is infrequently encountered and appears to have declined in Alabama, as well as throughout its range. Disturbance at roosting sites, disturbance and destruction of preferred roosting habitat, and reductions in the amount of available habitat by razing of old buildings and some forestry practices likely have contributed to the apparent decline (Mount 1986, Bat Conservation International 1999).

Rafinesque's big-eared bat had 4 documented occurrences in the PRR watershed, all within the upper PRR division. The species was documented in the Clear Creek (Garth Pit Cave and maternity colony at Saltpeter Cave), Lick Fork (Williams Saltpeter Cave – probably a maternity site), and Estill Fork (Walls of Jericho macrosite – Keepout Cave) subwatersheds.

2. Gray Bat

The gray bat was listed as a federal endangered species by the USFWS in 1976 due to dramatic declines in many areas, and is a state protected species in Alabama. The Natural Heritage Network and The Nature Conservancy consider the gray bat to be rare globally and imperiled in Alabama.

Primarily restricted to limestone karst regions of the southeastern United States, gray bats typically roost in caves along rivers and large reservoirs, with populations found mainly in Alabama, northern Arkansas, Kentucky, Missouri, and Tennessee (United States Fish and Wildlife Service 1982). The gray bat is perhaps the most restricted to cave habitats of any U.S. mammal (Barbour and Davis 1969, Hall and Wilson 1966). Because of highly specific roost and habitat requirements, fewer than 5% of available caves are suitable for occupation by gray bats, so gray bats congregate in larger numbers and in fewer hibernating caves than any other North American vespertilionid (Tuttle 1979).

The concentrations of large numbers of bats in relatively few caves made the species especially susceptible to declines. The declines in gray bat populations have been attributed to human

disturbance and vandalism (excessive disturbance may cause a colony to completely abandon a cave), commercialization of hibernaculum and roosting caves; disturbances caused by increased numbers of spelunkers and bat banding programs; pesticide and other contaminant poisoning; natural calamities such as flooding and cave-ins, loss of caves due to inundation by man-made impoundments, and possibly a reduction in insect prey over streams that have been degraded through excessive pollution and siltation (Tuttle 1979; Mount 1986; Clark et al. 1988; United States Fish and Wildlife Service 1991a, 1992). Improper cave gating or cave commercialization have also contributed to some population declines. Clark et al. (1988) documented organochlorine contamination and possible organochlorine-induced bat deaths in northern Alabama in the Tennessee River Basin. In response to cave protection, the Alabama populations in general appear to be stable (Alabama Agricultural Experiment Station 1984).

The gray bat occupied 4 caves within the lower PRR division: Fern Cave, Ledbetter Cave, Little Nat Cave, and Cathedral Caverns. Fern Cave is Alabama's only Priority 1 (major hibernacula and their most important maternity colonies; United States Fish and Wildlife Service 1981) gray bat hibernaculum, and is reportedly used by over 50% of the entire gray bat population (Miller and Sankaran 1991; Hudson 1993, 1995). It is located within the Upper Paint Rock River subwatershed. The cave is protected within the Fern Cave National Wildlife Refuge, but some entrances to the cave are outside of the refuge boundary. Ledbetter Cave and Little Nat Cave are Priority 3 caves (requires further investigation) located within the Lower Paint Rock River and Upper Paint Rock River subwatersheds. They appear to have relatively small bat populations, that have not received the survey attention given to Fern Cave (Hudson 1993, 1995). Cathedral Caverns is a Priority 4 cave (all remaining caves, most of which are of marginal consequence and require no action) located in the Little Paint Creek subwatershed. Cathedral Caverns is managed by the Alabama Department of Conservation and Natural Resources as a State Park and tourist attraction.

3. Indiana Bat

The Indiana bat was listed as a federal endangered species by the USFWS in 1967 due to declining populations, but populations have continued to decline since the species was listed (Georgia Department of Natural Resources 1999). It is a state protected species in Alabama. The Natural Heritage Network and The Nature Conservancy consider the gray bat to be a globally imperiled species.

The distribution of Indiana bats is associated with the major cavernous limestone areas and areas just north of cave regions in the midwestern and eastern United States (Thomson 1982). In Alabama, the Indiana bat is known only from the northeastern third of the state where small hibernating groups have been reported from at least 9 cave systems in 8 counties (Mount 1986). The nearest known maternity colonies are in southern Kentucky (United States Fish and Wildlife Service 1999). Winter habitat consists of suitable caves and mines with cool and stable temperatures below 10°C, preferably from 4° to 8°C, throughout the winter that contain standing water which maintains relative humidity above 74% (Thomson 1982, Georgia Department of Natural Resources 1999).

The Indiana bat is nearly extinct over most of its former range in the northeastern states, and since 1950, the major winter colonies in caves of West Virginia, Indiana, and Illinois have disappeared (United States Fish and Wildlife Service 1991b). Population trends in Alabama are not known (United States Fish and Wildlife Service 1999). A high degree of aggregation during winter makes the species vulnerable. During this period approximately 87 percent of the entire population hibernates in only seven caves (United States Fish and Wildlife Service 1991b). The Indiana bat's decline has been attributed to commercialization of roosting caves, wanton destruction by vandals, disturbances caused by increased numbers of spelunkers and bat banding programs, use of bats as laboratory experimental animals, elimination of riparian and floodplain forests and other land use changes such as stream channelization, natural hazards such as flooding and cave ceiling collapse, improper cave gates and structures, and possibly insecticide poisoning (Mount 1986; United States Fish and Wildlife Service 1983, 1991b, 1999).

The Indiana bat was documented in the PRR watershed only in Fern Cave, within the Upper Paint Rock River subwatershed. The cave is protected within the Fern Cave National Wildlife Refuge, but some entrances to the cave are outside of the refuge boundary.

II. Intermediate Scale

Riparian Vegetation

Riparian vegetation encompasses natural communities along the streams and rivers of the PRR watershed. Riparian vegetation in the watershed is a mixture of mesic species including willows and sedges. Loss of riparian vegetation has been identified as a concern for aquatic communities in the watershed and the surrounding region (Godwin 1995, Williams et al 1993).

III. Local Scale

A. Karst Communities

The PRR watershed is a center of subterranean biotic diversity. The dominant landscape of the region is karst, and about 760 caves are known within the watershed. The underlying limestone is riddled with caves, springs, and sinkholes, and is one of the hotspots for endemic cave invertebrates in the United States. Jackson County harbors more obligate cave dwelling species than any other county in the nation. Animals and plants found within these caves include Tennessee cave salamanders, southern cavefish, blind cave crayfish, Allegheny woodrats, several bat species, American Hart's-tongue fern, and dozens of cave invertebrates.

B. Freshwater Mussels & Fish of Critical Conservation Concern

The freshwater mussels and fish of critical conservation concern within the PRR watershed were separated from the remaining freshwater mussels and fish for additional attention because of the importance of these fauna in the watershed and the importance of the watershed to several species of the fauna. This target included those fish, mussels, and other aquatic taxa that are federal or state protected species or are considered globally imperiled (ranked G1 or G2). In a recent survey (Godwin 2002) in the Estill Fork subwatershed, 23.8% of species collected alive

were of critical conservation concern. The species included in this target were shiny pigtoe, (*Fusconaia cor*), fine-rayed pigtoe (*F. cuneolus*), Tennessee pigtoe (*F. barnesiana*), Alabama lampmussel (*Lampsilis virescens*), slabside pearlymussel (*Lexingtonia dolabelloides*), pale lilliput (*Toxolasma cylindrellus*), slippershell mussel (*Alsmidonta viridis*), purple lilliput (*Toxolasma lividus lividus*), palezone shiner (*Notropis albizonatus*), snail darter (*Percina tanasi*), and blotchside darter (*P. burtoni*).

The shiny pigtoe, (*Fusconaia cor*) was listed as a federal endangered species by the USFWS June 1976, and is considered to be critically imperiled (rank G1) by the Natural Heritage Network (NHN) and the Nature Conservancy (TNC). The species is found from Virginia, through Tennessee, and into Alabama in the Tennessee River drainage, and is considered to be declining throughout its range (Parmalee and Bogan 1998). Stream habitat is shallow clear water, with a moderate to fast current, in shoals and riffles. Historically, this species has been documented in both the upper and lower subwatersheds, and Godwin (2002) collected this species at 1 site on the upper Paint Rock River during sampling in the Estill Fork subwatershed.

The fine-rayed pigtoe was listed as a federal endangered species by the USFWS (United States Fish and Wildlife Service 1984a), and is considered to be critically imperiled (rank G1) by the NHN and TNC. The species is found from Virginia, through Tennessee, and into Alabama in the Tennessee River drainage, and is considered to be declining throughout its range and has been extirpated throughout most of its former range (Parmalee and Bogan 1998).Stream habitat is considered to be shoals and riffles of rivers with moderate gradient (Parmalee and Bogan 1998) Historically it has been documented in both the upper and lower subwatersheds, but the most recent observation was in 1991.

The Alabama lampmussel was listed as a federal endangered species by the USFWS June 1976 (United States Fish and Wildlife Service 1985), and is considered critically imperiled (rank G1) by the NHN and TNC. This species has been extirpated throughout most of its range, and now survives only in the uppermost reaches of the Paint Rock River system. Historically, this species has been documented in both the upper and lower subwatersheds, but Godwin (2002) did not collect a live specimen of this species in sampling the Estill Fork subwatershed, which prompts the question as to whether or not its extinction is eminent.

The pale lilliput was listed as a federal endangered species by the USFWS September 1975 (United States Fish and Wildlife Service 1984b), and is considered critically imperiled (rank G1) by the NHN and TNC. This species is a Cumberlandian species of the Tennessee River system, and has been extirpated throughout the majority of its former range. The upper headwaters of the PRR is the only locality from which it can be reliably found. It is found in habitats consisting of small clear streams with a slow to moderate current and gravel and sand substrate (Parmalee and Bogan 1998). Historically, this species has been documented in both the upper and lower subwatersheds, and Godwin (2002) collected this species at only 2 sites during sampling in the Estill Fork subwatershed, but did document active reproduction.

The slabside pearlymussel is a USFWS candidate species, a state protected species, and is considered globally imperiled (rank G2) and state critically imperiled (rank S1) by the NHN and TNC. This species has a narrow distribution, and is only found in the upper Tennessee River

drainage. It is found in small to medium-sized streams with a moderately strong current, and substrates of sand, fine gravel, and cobble (Parmalee and Bogan 1998). Historically, this species has been documented in both the upper and lower subwatersheds, and Godwin (2002) collected this species at only 2 sites during sampling in the Estill Fork subwatershed.

The Tennessee pigtoe is considered globally imperiled to rare (rank G2G3) and state critically imperiled (rank S1) by the NHN and TNC. This species is found in the Cumberland and Tennessee River systems, ranging from Mississippi through Tennessee and north Alabama, to North Carolina and Virginia (Parmalee and Bogan 1998). The species occupies small to medium-sized shallow streams with coarse sand to gravel substrates. Historically, this species has been documented in both the upper and lower subwatersheds, and was one of the most common species Godwin (2002) collected during sampling in the Estill Fork subwatershed.

The slippershell mussel is a state protected species and is considered apparently secure globally (rank G4G5), but state critically imperiled (Rank S1) by the NHN and TNC. The species is found in the upper Mississippi River, Ohio, and Great Lakes drainages (Parmalee and Bogan 1998). The species reaches the southern limits of its distribution in northern Alabama with the distribution extending northward to the Great Lakes region in Wisconsin and Michigan. It is considered to be a headwater and small stream species (Parmalee and Bogan 1998). The species has only been documented in the Estill Fork subwatershed, and Godwin (2002) collected this species at only 1 site during sampling in the Estill Fork subwatershed.

The palezone shiner was listed as a federal endangered species by the USFWS April 1993 (United States Fish and Wildlife Service 1997), and is considered globally imperiled (rank G2) and state critically imperiled (rank S1) by the NHN and TNC. The palezone shiner is endemic to the Tennessee and Cumberland river drainages in Alabama, Kentucky, and Tennessee, and is restricted to 2 widely disjunct populations, the Little South Fork and Marrowbone Creek in the Cumberland River drainage in Kentucky, and the PRR and Cove Creek (a Clinch River tributary) in the Tennessee River drainage in Alabama and Tennessee (Warren et al. 1994). This species is restricted to the upper subwatersheds.

The snail darter was listed as a federal threatened species by the USFWS October 1975 (Federal Register 49:27510-27514 [Available online at <http://ecos.fws.gov/tess/frdocs/1984/84-17755.pdf>]), and is considered globally imperiled to rare (rank G2G3) and state critically imperiled (rank S1) by the NHN and TNC. Once considered restricted to the lower Little Tennessee River in Tennessee, this species has also been found in the upper Tennessee River and its tributaries in Alabama, Georgia, and Tennessee (Mount 1986). It is a benthic species, found in large moderate-current, free-flowing streams and rivers with gravel and sand shoals (Mettee et al. 1996). The only known population in Alabama was found in the lower Paint Rock River in 1981.

The blotchside darter is considered globally imperiled (rank G1) and state critically imperiled (rank S1) by the NHN and TNC. This species is widely distributed (but not common) in upland streams of the Tennessee and Cumberland rivers. The blotchside darter is found in riffles and pools with gravel and small cobble substrates in moderately large streams and smaller rivers that are clear and have exceptionally good water quality (Mettee et al. 1996). This species is only

found in the state in the upper PRR subwatersheds. ALNHP only had 1 record of the species in the Larkin Fork subwatershed, but Mettee et al. (1996) also reported it to be found in the Estill Fork subwatershed.

Grading Conservation Targets

The overall viability rank for individual conservation targets ranged from fair to very good (Table 4). In general, ranks for targets were better in the upper watershed than the lower. Two conservation elements in the lower subwatersheds and 1 in the upper subwatersheds received a fair viability, meaning they are at or below the desired threshold, but recoverable.

Human Context Information

Managed Areas

There were 3 managed areas identified within the PRR watershed: Fern Cave National Wildlife Refuge, Cathedral Caverns State Park, and James D. Martin - Skyline Wildlife Management Area (Fig. 7). Total managed area acreage within the watershed was 2,464.5 ha (6,091.1 ac). Only a very small fraction (1.9%) of the rare species occurrences documented in the watershed were associated with these managed areas.

I. Fern Cave National Wildlife Refuge

Fern Cave National Wildlife Refuge (FCNWR) was established in 1981 by USFWS, and is a presently unstaffed refuge 2 miles north of Paint Rock in Jackson County, Alabama (Fig. 7) administered by Wheeler National Wildlife Refuge, Decatur, Alabama. The Refuge consists of 80.5 ha (199 ac) of upland hardwoods and limestone outcroppings with 5 entrances to the massive cave which gives the refuge its name. The refuge's objectives are to protect Indiana bats (*Miotis sodalis*), gray bats (*M. grisescens*), American Hart's-tongue fern (*Asplenium scolopendrium* var *americanum*) and their critical habitat; provide habitat for a natural diversity of wildlife and plants, especially species associated with cave systems; and provide opportunity for compatible outdoor recreation, environmental education, and interpretation (United States Fish and Wildlife Service 2002).

Fern Cave is home to the federal endangered Indiana and gray bat and the threatened American Hart's-tongue fern. More than one million gray bats hibernate in the cave, as well as several hundred Indiana bats. An American Hart's-tongue fern project is presently underway to produce plants for reintroduction to natural sites (United States Fish and Wildlife Service 2002). An additional state protected species documented within the FCNWR boundaries by ALNHP was the southern cavefish (*Typhlichthys subterraneus*). Other species considered rare by the Natural Heritage Network documented within FCNWR by ALNHP were *Litocampa valentinei* (rank G3G4/S?), a cave obligate spider (*Nesticus barri*; rank G3G4/S3), American smoke-tree (*Cotinus obovatus*; rank G4/S2), purple sedge (*Carex purpurifera*; rank G4?/S2), and twinleaf (*Jeffersonia diphylla*; rank G5S2). Access to Fern Cave itself is by special use permit only, due to the potential for disturbance of federally endangered Indiana and gray bats and threatened American Hart's-tongue fern. However, entrances to the cave exist off the refuge property.

Table 4. Overall viability rank for individual conservation targets and biodiversity health rank for the upper and lower divisions in the Paint Rock River watershed, Alabama and Tennessee. Overall viability ranks are based on individual ranks for size, condition and landscape context (Appendix B).

	Biodiversity Health at the Site (Division) Level	
Conservation Target	Upper Paint Rock River	Lower Paint Rock River
Riverine System	Very Good	Good
Matrix Forest Community	Very Good	Good
Endangered Bats	Good	Good
Riparian Vegetation	Good	Fair
Karst Communities	Good	Good
Critically Imperiled Mussels and Fish	Fair	Fair
Critically Imperiled Plants	Good	Good
Site Biodiversity Rank	Good	Good

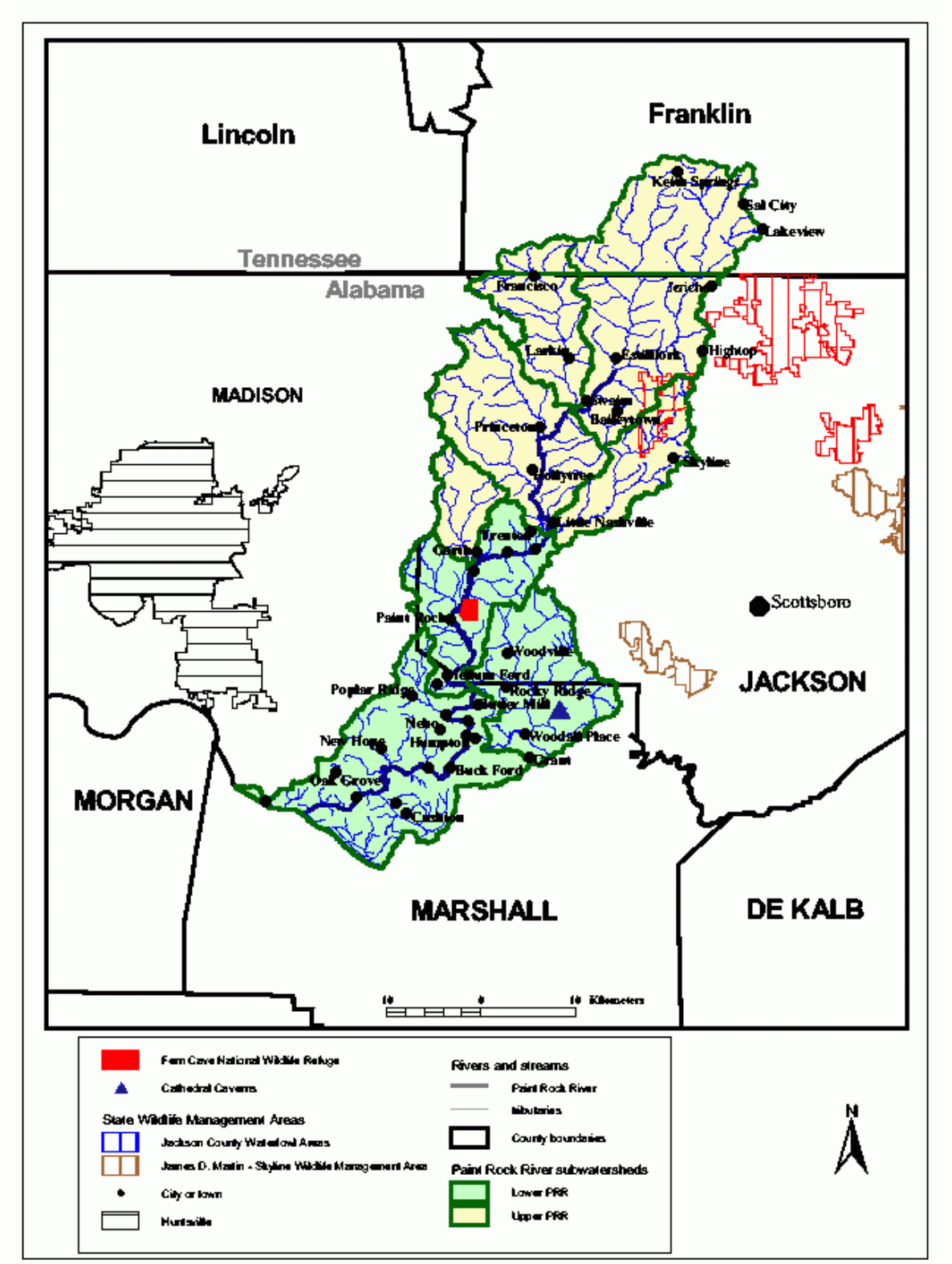

Figure 7. Managed areas and cities and towns within the Paint Rock River watershed; Jackson, Marshal and Madison counties, Alabama, and Franklin County Tennessee.

II. Cathedral Caverns State Park

Cathedral Caverns State Park (CCSP) is a 186.6 ha (461 ac) state park located in Marshall County, Alabama, between Grant and Woodville (Fig. 7). The main attraction is the cave. The cave was purchased by Jay Gurley in 1952, who worked to make it a show cave and opened it to visitors in 1959. The cave was purchased in 1987 by the state of Alabama, which began federally-funded restoration work in 1993 and opened the cave to the public in May 2000.

Cathedral Caverns is home to the federal endangered gray bat. Other species considered rare by the Natural Heritage Network documented within CCSP by ALNHP were yellow giant hyssop (*Agastache nepetoides*; rank G5/S1), *Litocampa valentinei* (rank G3G4/S?), a cave obligate spider (*Nesticus barri*; rank G3G4/S3), a cave obligate millipede (*Pseudotremia nyx*; rank G1G2/S?), and *Ptomaphagus valentinei* (rank G3S2).

III. James D. Martin - Skyline Wildlife Management Area

James D. Martin Wildlife - Skyline Wildlife Management Area is a 10,913.6 ha (26.968 ac) wildlife management area managed by the Alabama Department of Conservation and Natural Resources (ADCNR) located in Jackson County, Alabama, near Scottsboro (Fig. 7) (a map of the management area is available online at <http://www.dcnr.state.al.us/agfd/skyline_wma.jpg>). Only a small portion of the management area is located within the PRR watershed; a 2,197.9 ha (5,431.1 ac) section of the management area is located on the eastern edge of the watershed in the Estill Fork and Guess Creek subwatersheds (Fig. 7). There were no rare species documented by ALNHP within the borders of the management area in the watershed.

Land Use

The majority of the watershed is forested; 89.9% in the upper watershed in Alabama and 62.2% in the lower (Table 5). Agricultural land (rowcrop and pasture) is much more prevalent in the lower watershed (32.5%) than in the upper watershed (9.1%). In general, the land use practices surrounding the tributaries in the upper watershed were less intrusive than those along the PRR and tributaries in the lower watershed. Much of the land encompassing the tributaries in the upper watershed was forested, whereas rowcrop and pastures bordered the channel along the main stem and the major tributaries in the lower watershed. However, when agricultural land was present in the upper watershed, it was located adjacent to streams. Although the amount of total area considered to be urban was low throughout the watershed, urban development was more prevalent in the lower watershed. Overall road densities were relatively low in the watershed, but road densities were higher in the lower watershed compared to the upper watershed (Table 5).

Population & Demographics

All demographic information was obtained from the United States Census Bureau (2000a, 2000b). There were 40 cities and towns identified within the PRR watershed (United States Environmental Protection Agency 2001), with the majority (67.5%) in the lower watershed (Fig. 7). The largest town in the upper watershed was Skyline (population 828), with most towns having populations <300. The largest city in the watershed (New Hope; population 2,539) was located in the lower

Table 5. Land use, area (ha), and road density (km of road/km^2 of area) within the subwatersheds of the Paint Rock River watershed, Alabama.

Subwatershed		Total Area	Land Use (%)						Road Density
Name	HUC		Rowcrop	Pasture	Forest	Urban	Ponds & Lakes	Other	
Clear Creek	6030002080	4,636	0.4	12.0	85.5	0.0	0.0	2.0	0.79
Estill Fork	6030002020	15,166	1.3	5.7	92.0	0.0	0.0	1.0	1.12
Guess Creek	6030002060	8,922	2.0	14.1	82.9	0.0	0.0	1.0	1.10
Larkin Fork	6030002040	8,420	0.2	5.8	93.0	0.0	0.0	1.0	1.14
Lick Fork	6030002050	18,072	4.7	3.1	91.2	0.0	0.0	0.9	0.82
Upper		55,219	2.3	6.8	89.9	0.0	0.0	1.0	1.03
Little Paint Creek	6030002090	14,777.5	13.7	19.2	61.4	1.7	2.9	1.1	1.22
Lower Paint Rock River	6030002100	23,987.4	16.8	24.4	52.1	2.4	3.8	0.4	1.29
Upper Paint Rock River	6030002070	12,096.5	9.7	5.0	83.2	1.0	<1	1.0	1.02
Lower		50,861.4	14.2	18.3	62.2	1.9	2.6	0.7	1.20

watershed along with several of the other larger towns (Woodville -population 761, Grant – population 685). Although there were no large municipalities present within the watershed, Huntsville is close to the lower subwatersheds (Fig 7), and developmental encroachment from Huntsville is a threat to the watershed. In addition, Scottsboro (population 14,762) is close to the PRR watershed on the opposite side from Huntsville.

The portions of the counties within the PRR watershed remain largely rural, with little urban development. Although Madison County was the third most populated county in Alabama because of the presence of Huntsville (population 188, 253), population within the watershed was generally low. The 2000 population for Jackson, Madison, and Marshall counties were 53,926, 276,700, and 82,231; representing a 12.8%, 15.8%, and 10% growth, respectively, from 1990 figures. The 2000 population for the census tract group blocks encompassing the watershed were 8,790 (16.3% of county population), 9,872 (3.6%), and 5,529 (6.7% of county population) for Jackson, Madison, and Marshall counties, respectively.

Population density within the watershed was generally low, particularly in the upper watershed, with population densities estimated at 8.6 people/km^2 (22.2/mi^2), 31.8/km^2 (82.4/mi^2), and 20.3/km^2 (52.6/mi^2) within the census tract block groups encompassed by the watershed. Population density within the watershed was generally lower than in the rest of the county.

Median household income for census tract group blocks within the watershed was $33,125, similar to the statewide figure of $34,135 and to the counties except Madison County which had a higher median household income ($44,704). Average per capita income in 1999 for the census tract block groups in the watershed was $16,816, lower than per capita income for each county and statewide ($18,189). However, the average per capita income for the watershed block groups in Marshall County ($18,865) was higher than the county-wide per capita income ($17,089).

Potential Pollution Sources

ADEM (2000a) estimated the nonpoint source impairment potential in the upper subwatersheds was low, while the potential for the lower subwatersheds was low to moderate: low for Little Paint Creek and moderate for the Lower PRR and Upper PRR subwatersheds.

Godwin's 1995 Survey

Godwin (1995) documented 100 impacts at 85 sites throughout the watershed (Fig. 8; Appendix D). There were 12 impact types recorded throughout the watershed (Table 6), with the most prevalent being the lack of riparian vegetation. Other common impact types were livestock access to streams, vehicle fording sites, and sedimentation from a variety of sources. The most widespread apparent threat to continued water quality of the watershed was identified as siltation, with the most common cause being the sloughing of banks lacking riparian vegetation. The loss of riparian vegetation exposes bare soil to water action, producing a weakened point along the bank that may expand following repeated increased water flows. The loss of riparian vegetation was not site specific as it extended along the bank for up to hundreds of meters, whereas the other 2 dominant impacts (fording sites and livestock access points) were site specific.

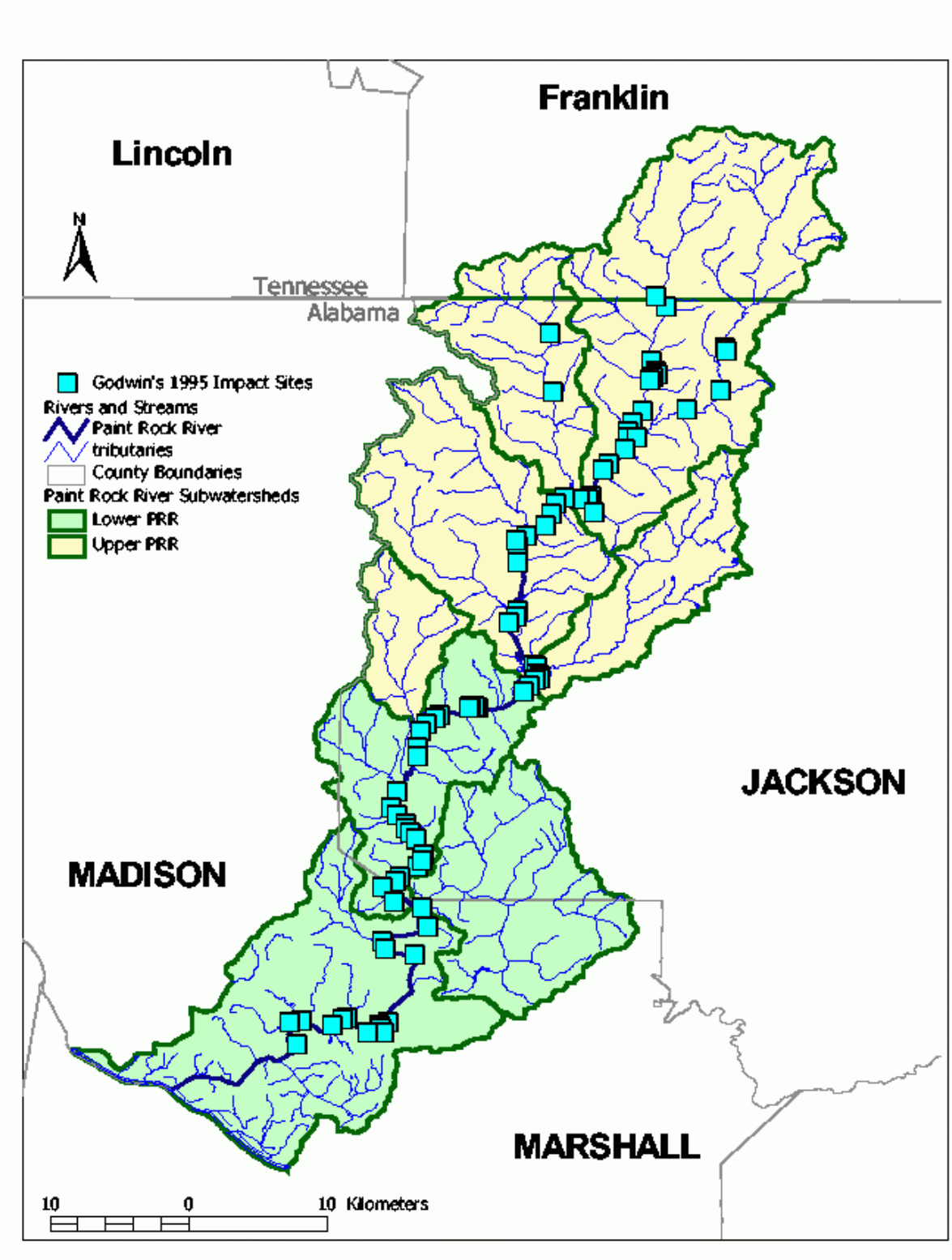

Figure 8. Nonpoint source impact sites identified by Godwin (1995) in the Paint Rock River watershed, Alabama.

Table 6. Number and type of nonpoint source pollution impacts documented in the Paint Rock River watershed, Alabama, March – September 1995; from Godwin (1995).

Impact	Reach				Total # of Impacts
	Main Stem	Estill Fork	Hurricane Creek	Larkin Fork	
Lack of riparian vegetation	41	6			47
Livestock	11	7	1		19
Vehicular use	11	2	1		14
Sedimentation: mining	4				4
Off-road vehicle	2	1		1	4
Cropland erosion	3				3
Timber Harvest		1	2		3
Dumping	1			1	2
Sewage	1				1
Logjam		1			1
Construction			1		1
Drainage Pipe	1				1
Total number of impacts per stream segment	75	18	5	2	100
Average number of impacts per river kilometer	0.53	1.38	*	*	

* Insufficient data available for analysis.

Agricultural and Animal Production

Cattle was the dominant animal produced in the watershed (Table 7), and was the only animal production present in the upper watershed with the exception of a small amount of catfish farming in the Guess Creek subwatershed. Animal production was more varied in the lower subwatersheds. Cattle was the only animal production facilities in the Upper Paint Rock River watershed, but dairy, swine, or poultry layers were present in the other 2 lower subwatersheds.

Septic Systems

The estimated number of septic systems and failing septic systems was low in all of the upper basin subwatersheds and the Upper Paint Rock watershed in the lower basin (Table 8). However, the number of estimated septic systems and failing septic systems was orders of magnitude higher for the Lower Paint Rock River and Little Paint Creek subwatersheds (Table 8).

Permitted Sites

There were 3 active and 2 inactive NPDES permitted discharge sites, 3 Industrial Facilities Discharge sites, 1 hazardous and solid waste site, and 3 mines identified in the watershed within BASINS (Table 9). All sites were in the lower subwatersheds (Fig. 9). There were no toxic release inventory facilities or Superfund sites within the watershed, but there were 2 TRI sites and 1 Superfund site adjacent to the watershed borders. There were no rare species documented within 1 km of any of these sites. ADEM (2000a) identified 3 additional construction/stormwater authorizations in the lower subwatersheds (Table 9).

303 (d) Listed Streams

Alabama's 2000 Final 303 (d) list of impaired streams included 4 stream reaches in the PRR watershed that currently are not supporting their water use classifications due to siltation, organic enrichment, and dissolved oxygen violations from agricultural and unknown sources: Cole Spring Branch, Guess Creek, Little Paint Rock Creek, and Yellow Bank Creek (Fig. 10) (Alabama Department of Environmental Management 2000c). There were no rare species associated with the listed stream reaches on Cole Spring Branch and Yellow Bank Creek. However, there were 24 occurrences of rare species or ecological features associated with the listed section of Guess Creek (Table 10), including 2 federal endangered species [shiny pigtoe (*Fusconaia cor*) and pale lilliput (*Toxolasma cylindrellus*)] and 1 state protected species [southern cavefish (*Typhlichthys subterraneus*)]. There also were 2 rare occurrences associated with the listed section of Little Paint Rock Creek (Table 10).

Threat Assessment

Twelve sources of stress were identified in the watershed: crop production practices, livestock production practices, forestry practices, roads, development, invasive/alien species, septic systems, recreational use, channelization, trash disposal, water withdrawal, and regulatory controls of prescribed fire. Although the sources were present in both the upper and lower watershed, the overall ranking of the sources and the source's level of threat for the conservation targets differed between the upper and lower watershed (Table 11, 12). In general, threats were greater in the lower watershed than in the upper watershed. There were no sources ranked as critical threats in the upper watershed, but agriculture practices (crop and livestock) were

Table 7. Number of animals and animal units for cattle, dairy, swine, poultry layer, and catfish production in the Paint Rock River watershed, Alabama. Estimates are from the Alabama Soil and Water Conservation Committee.

Subwatershed	Total Area	# of Cattle in Watershed	Cattle AU	Number of Dairies	Dairy AU	Number of swine	Swine AU	Number of Layers	Layer-Poultry AU	# of Catfish Acres
Clear Creek	4,636	546	546	0	0	0	0	0	0	0
Estill Fork	15,166	390	390	0	0	0	0	0	0	0
Guess Creek	8,922	520	520	0	0	0	0	0	0	25
Larkin Fork	8,420	390	390	0	0	0	0	0	0	0
Lick Fork	18,072	546	546	0	0	0	0	0	0	0
Upper watershed	55,219	2,392	2,392	0	0	0	0	0	0	25
Little Paint Creek	14,777.5	4,770	4,770	0	0	0	0	96,810	774	0
Lower Paint Rock River	23,987.4	12,600	12600	100	140	2,150	860	96,810	774	0
Upper Paint Rock River	12,096.5	1,350	1,350	0	0	0	0	0	0	0
Lower watershed	50,861.4	18,720	18,720	100	140	2,150	860	193,620	1548	0

Table 8. Estimated number of septic systems and failing septic systems within the subwatersheds of the Paint Rock River watershed, Alabama. Numbers are from estimates published by the Alabama Soil and Water Conservation Committee (1998).

Subwatershed name	Area (ha)	Estimated Number of Septic Systems	Estimated Number of Septic Systems Failing
Upper sub-basins			
Clear Creek	4,716	42	2
Estill Fork	15,217	60	3
Guess Creek	8,831	200	10
Larkin Fork	8,449	50	3
Lick Fork	17,745	167	8
Lower sub-basins			
Little Paint Creek	14,662	2267	1,513
Lower Paint Rock River	24,290	3500	2,100
Upper Paint Rock River	13,405	117	9

Table 9. Summary of the discharge sites identified from BASINS data in the Paint Rock River watershed, Tennessee and Alabama.

NPDES Permit Compliance System (PCS) sites

Facility Name	New Hope City Lagoon	Teledyne Firth Sterling Grant	Woodville Town of Wwtp	Grant Waste Water Treatment Plant	Apac Alabama Whitaker Pit
Name of Entity	New Hope Lagoon	Teledyne Firth Sterling	Woodville Wwtp	Grant Wwtp	Whitaker Pit
City	New Hope	Grant	Woodville	Grant	Madison County
County	Madison	Marshall	Jackson	Marshall	Madison
Subwatershed	Lower Paint Rock River	Little Paint Creek	Little Paint Creek	Little Paint Creek	Lower Paint Rock River
Status	active	inactive	active	inactive	active
Principal Activity Causing the Discharge	Sewerage systems	machine tool accessories	sewerage systems	sewerage systems	construction sand and gravel
Industrial Classification	municipal	on elg	municipal	municipal	on elg
Receiving Water	Paint Rock River	Old Union Branch Via Drainage Ditch	Yellow Branch	Little Paint Creek	Paint Rock River

Resource Conservation and Recovery Information System (RCRIS) for the United States

Facility name	Safety-Kleen Corporation (3-019-02)
Subwatershed	Upper Paint Rock River

Table 9. Continued.

Industrial Facilities Discharge Sites			
Facility Name	New Hope Lagoon	Grant Wtp	Woodville Wwtp
City	New Hope	Grant	Woodville
County	Madison	Marshall	Jackson
Subwatershed	Lower Paint Rock River	Little Paint Creek	Little Paint Creek
Receiving Water	Paint Rock River	Guntersville Reservoir	Yellow Branch

Table 10. Rare, threatened, and endangered species and ecological features associated with Alabama's 2000 303 (d) listed streams within the Paint Rock River watershed, Jackson, Madison, and Marshall counties, Alabama.

Major Group	Scientific name	Common Name	Global Rank[a]	State Rank[a]	Federal Status[a]	State Protected[a]	Number of Occurrences[b]
Guess Creek Alabama Jackson county cave							1
Arachnids	*Nesticus barri*	a cave obligate spider	G3G4	S3			1
Fish	*Typhlichthys subterraneus*	southern cavefish	G4	S3		SP	1
Mussels	*Amble plicate*	three-ridge	G5	S5			2
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	1
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			2
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			2
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			2
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			1
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			1
Mussels	*Ligumia recta*	black sandshell	G5	S2			1
Mussels	*Obliquaria reflexa*	threehorn wartyback	G5	S5			1
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			1
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			2
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			1
Mussels	*Toxolasma cylindrellus*	pale lilliput	G1	S1	LE	SP	1
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			1
Mussels	*Villosa iris*	rainbow	G5	S3			1
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			1
Vascular Plants	*Cheilanthes alabamensis*	Alabama lip-fern	G4G5	S3			1

Table 10. Continued.

Major Group	Scientific name	Common Name	Global Rank[a]	State Rank[a]	Federal Status[a]	State Protected[a]	Number of Occurrences[b]
Little Paint Rock Creek							
	Alabama Marshall county cave						1
Arachnids	*Nesticus barri*	a cave obligate spider	G3G4	S3			1

[a] See Help Box 1 and Appendix B for an explanation of Global and State Ranks and Federal and State Protection Status.
[b] Number of Element Occurrence Records in ALNHP's Biological Conservation Database as of December 2002 and TDNH's BCD as of 2000.

Table 11. Summary of active threats identified in the upper Paint Rock River subwatersheds, Alabama and Tennessee.

Active Threats Across Systems	Riverine System	Matrix Forest Community	Endangered Bats	Riparian Vegetation	Karst Communities	Critically Imperiled Mussels & Fish	Overall Threat Rank
Forestry Practices	Medium	Medium	Low	Low	Low	Medium	Medium
Livestock Production Practices	Medium	Low	-	Low	Low	Medium	Medium
Recreational Use	Medium	-	Low	-	Low	Medium	Medium
Invasive/Alien Species	Medium	Low	-	-	-	Medium	Medium
Roads	Low	Low	-	Low	Low	Medium	Low
Crop Production Practices	Low	Low	-	Low	Low	Low	Low
Development	Low	Low	-	Low	Low	Low	Low
Trash Disposal	Low	-	Low	-	Low	Low	Low
Channelization	Low	-	-	-	-	Low	Low
Septic Systems	Low	-	-	-	-	Low	Low
Regulatory Controls of Prescribed Fire	-	Low	-	-	-	-	Low
Water Withdrawal	Low	-	-	-	-	-	Low
Threat Status for Targets and Site	Medium	Low	Low	Low	Low	Medium	Medium

Table 12. Summary of active threats identified in the lower Paint Rock River subwatersheds, Alabama.

Active Threats Across Systems	Riverine System	Matrix Forest Community	Endangered Bats	Riparian Vegetation	Karst Communities	Critically Imperiled Mussels & Fish	Overall Threat Rank
Crop Production Practices	High	Medium	-	High	Low	High	High
Livestock Production Practices	High	Medium	-	High	-	High	High
Roads	High	Low	-	Low	Low	Medium	Medium
Forestry Practices	Medium	Medium	Low	Low	Low	Medium	Medium
Development	Low	Medium	-	Medium	Low	Low	Medium
Invasive/Alien Species	Medium	Low	-	-	-	Medium	Medium
Septic Systems	Medium	-	-	-	-	Medium	Medium
Recreational Use	Low	-	Low	-	Low	Low	Low
Channelization	Low	-	-	-	-	Low	Low
Trash Disposal	Low	-	Low	-	Low	Low	Low
Water Withdrawal	Low	-	-	-	-	Low	Low
Regulatory Controls of Prescribed Fire	-	Low	-	-	-	-	Low
Threat Status for Targets and Site	High	Medium	-	-	Low	High	High

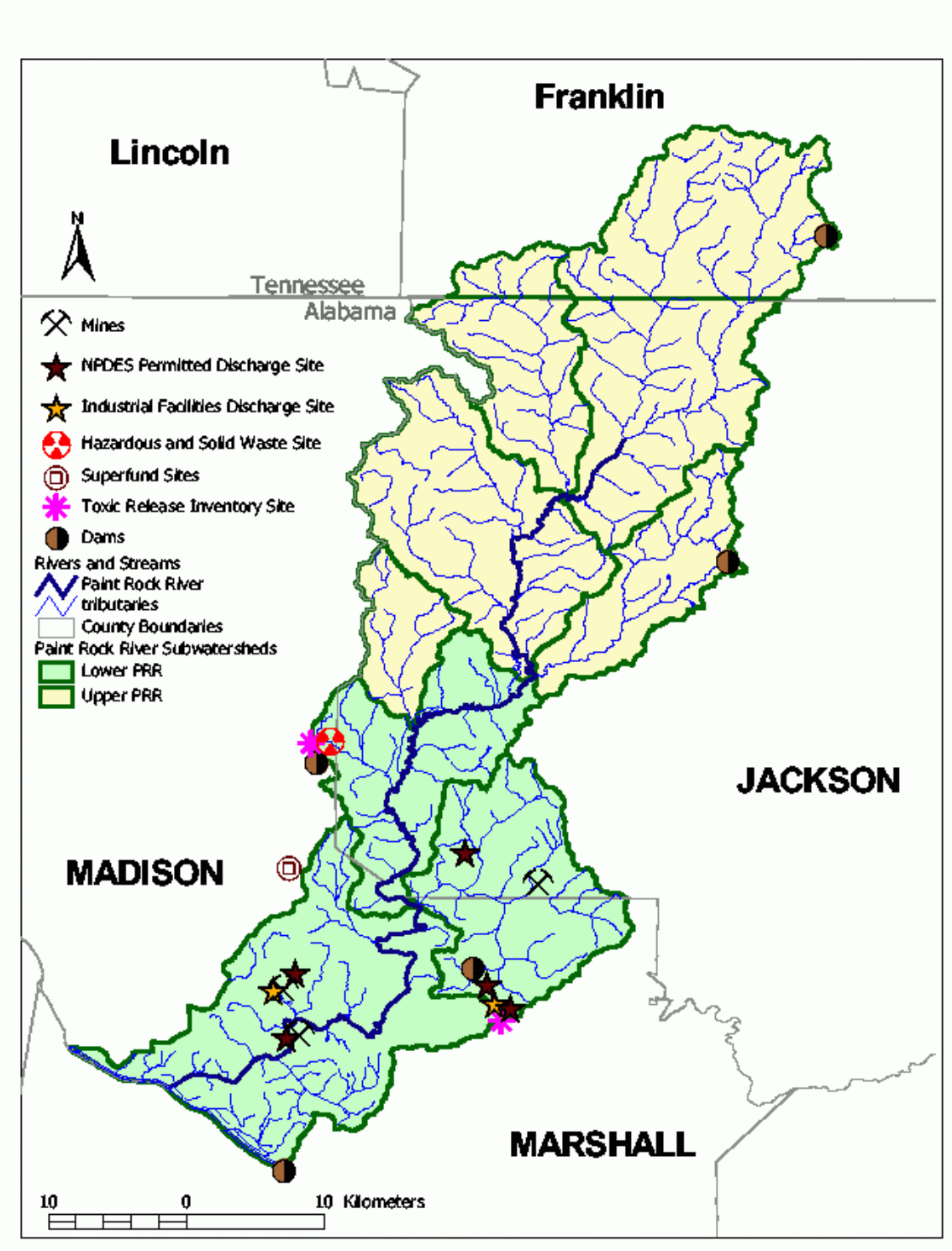

Figure 9. Discharge sites, mines, and dams identified from BASINS data in the Paint Rock River watershed, Alabama and Tennessee.

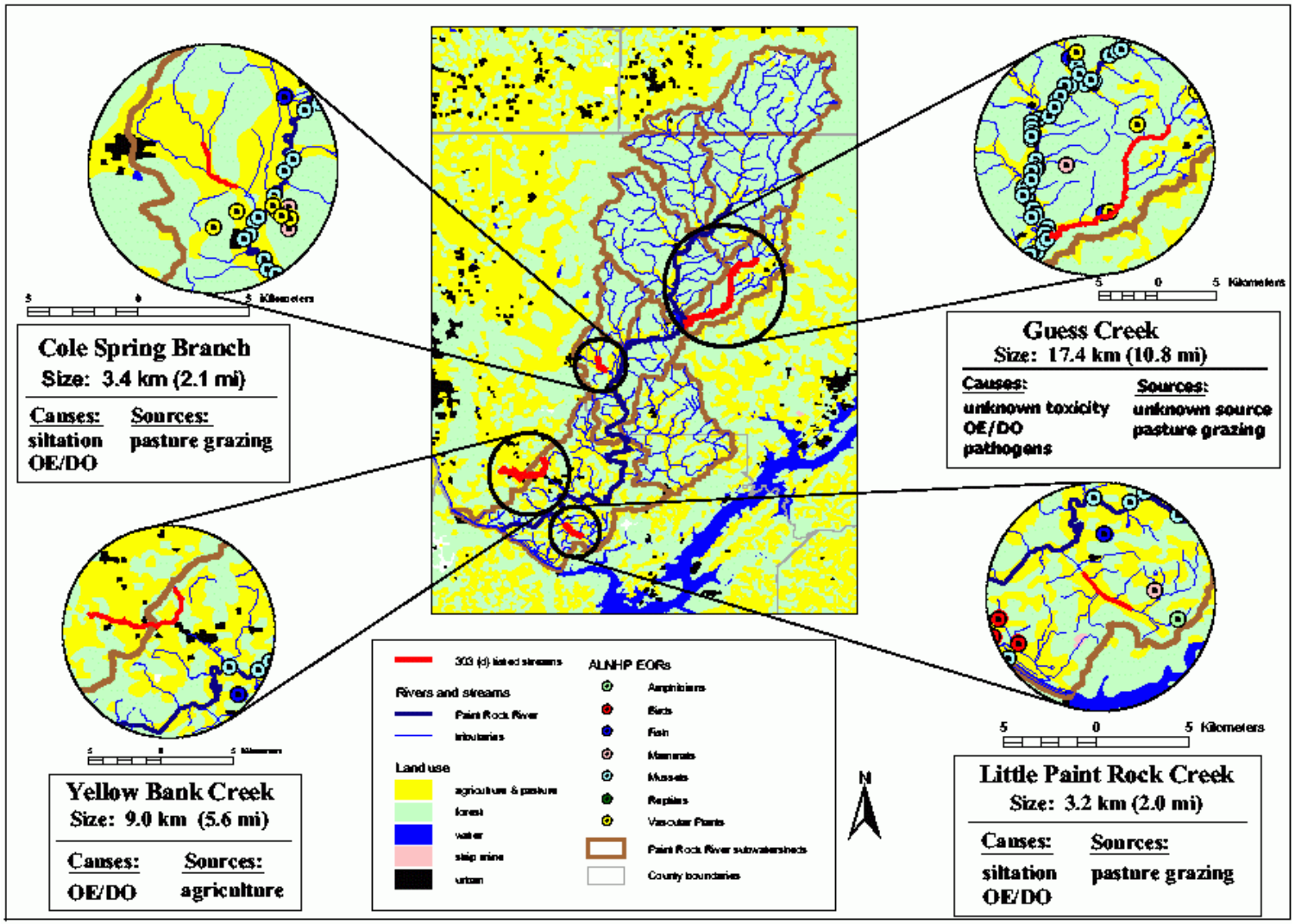

Figure 10. Stream reaches on Alabama's final 2000 303 (d) list streams in the Paint Rock River watershed, Jackson, Madison, and Marshall counties, Alabama.

considered to be critical threats in the lower watershed. There were 4 moderate threats in the upper watershed (forestry practices, livestock production practices, recreational use, and invasive/alien species), and 5 moderate threats in the lower watershed (roads, forestry practices, development, invasive/alien species, and septic systems). Overall, 6 major sources of stress were identified in the watershed: agriculture (crop and livestock production practices), forestry, development (including roads), invasive/alien species, recreational use, and waste disposal (trash and septic systems).

Agriculture

For the purpose of this project, the source Agriculture was defined as runoff from agricultural areas, both crop and livestock, resulting in fertilizers, pesticides, herbicides, organic materials and pathogens, and sedimentation entering into waterways as well as any practices that result in erosion, collapsed streambanks, and channelization of waterways, thereby altering the natural flow regime of water.

Agriculture was identified as a critical threat in the lower watershed and a moderate threat in the Upper watershed. Although there is limited agriculture in the upper watershed, when an agricultural use is present, it was located adjacent to a stream. Agriculture is much more prevalent in the lower watershed, and the resulting adverse impacts are much more pronounced. Agricultural runoff and sedimentation have been recognized as one of the leading adverse impacts to the mussel fauna of the PRR and nationwide (Ahlstedt 1986, 1991; Williams et al 1993; Neves et al. 1997).

Godwin (1995) identified livestock access to streams as one of the dominant impacts within the PRR watershed. Cattle access points are site specific, but cause several impacts to water quality. Where livestock have access to streams, riparian vegetation is generally lacking and cattle entering and leaving the stream adds to the instability of the stream bank. This can lead to increased erosion and sedimentation. In addition, the stream is contaminated from the cattle fecal material.

Agricultural practices have long been considered the most widespread and significant source of NPS pollution in the United States. In a 2000 Report to Congress, the EPA identified agriculture as the leading source of impairment to rivers and streams, with the most common types being nonirrigated crop production, animal feeding operations, and irrigated crop production (United States Environmental Protection Agency 2002a). The types of impairment from agricultural sources include sedimentation of streambeds due to accelerated soil erosion, nutrient loading (primarily nitrogen and phosphorus), pesticides and herbicides (and other toxins) contamination, and pathogens (Tim and Jolly 1994, Basnyat et al. 1999). Sedimentation resulting from agriculture generally is the single greatest pollutant by volume in U.S. waters (Basnyat 1998). However, the highest contribution by agriculture to NPS pollution in some U.S. watersheds may be nutrients due to the intensive use of pesticides or from animal manure (Puckett 1994, Basnyat 1998). In addition, more lake acres in the U.S. are affected by nutrients than any other pollutant or stressor (United States Environmental Protection Agency 2002a).

In Alabama, ADEM estimated that 40% of NPS problems originate from agriculture. Additionally, ADEM receives more water quality complaints associated with animal waste than

any other agricultural activities (Beck 1995). In the PRR, the source of impairment for the 303(d) listed streams was agriculture in almost all of the listed impairments. In addition, the majority of adverse impacts to water quality in the PRR reported by ADEM (2000b) were caused by agriculture, and the major sources of impacts documented by Godwin (1995) in the watershed were lack of riparian vegetation and livestock access into streams, with siltation caused by the lack of riparian vegetation being the most widespread threat to water quality in the watershed. In most instances, the lack of riparian vegetation was caused by removal of riparian vegetation for agricultural purposes. Siltation alters aquatic habitat, suffocates bottom-dwelling organisms and fish eggs, and can interfere with the recreational use of a river or stream (United States Environmental Protection Agency 2002a).

ADEM (2000b) reported adverse impacts to water quality in the PRR watershed caused by nutrient enrichment, with an agricultural use of adjacent land usually being the most likely source. The major environmental effect of excessive nutrients is eutrophication of surface waters (Puckett 1994). The primary nutrients included in NPS runoff are nitrogen and phosphorus. The presence of riparian forest vegetation significantly reduces the amount of nitrogen reaching streams from upland areas; several studies have reported the benefits of riparian vegetation in reducing nutrient inputs and bank erosion (Anderson and Ohmart 1985, Basnyat et al. 1999). The amount of riparian vegetation can be manipulated to affect the level of water quality in a stream, as the presence of a vegetated buffer around streams can greatly reduce the amount of sediment and nutrients reaching the stream (Schultz and Cruse 1992, Osbourne and Kovacic 1993). Wetland and other riparian vegetation also reduce the amount of phosphorus reaching waterbodies (Weller et al. 1996).

Forestry

For the purpose of this project, the source Forestry was defined as silvicultural activities resulting in NPS pollution as a result of negative silvicultural practices including inadequate Best Management Practices (BMP); lack of a streamside management zone (SMZ); timber road construction and use; timber harvesting; site preparation; and any other silvicultural activity resulting in disruption of surface hydrology, sedimentation, elevated water temperatures, and degradation of aquatic habitat.

Shifting patterns in land use are causing dramatic changes to the native forests of the southern United States. The Cumberland Plateau contains some of the largest remaining tracts of privately-owned, contiguous temperate deciduous forest in North America. These forest tracts represent important Neotropical migratory songbird habitat; serve as headwaters to some of the most biologically diverse, freshwater stream systems found in the world; and have some of the most diverse communities of woody plants in the eastern United States (Ricketts et al. 1999).

Forestry practices were identified as the top threat in the upper watershed and a moderate threat in the lower watershed. The vast majority of the watershed is forested, and much of this land is managed for forestry. One of the largest landowners is a timber company. Smurfit-Stone Container Corporation purchased approximately 33,184 ha (82,000 ac) from MeadWestvaco July 2002.

Approximately 202,343,100 ha of land is managed for timber production in the United States. Although only a small fraction of this is harvested yearly, forestry activities can cause major water quality problems if not managed properly. Nationwide, the EPA and state agencies estimated forestry practices were responsible for approximately 10% of the water quality impairment in rivers and streams (United States Environmental Protection Agency 2002a). Inadequate BMPs, SMZs, and road maintenance can be a significant source of sedimentation. Additionally, intense silvicultural practices such as clearcutting, mechanical site preparation and heavy herbicide use could also significantly impact the watershed. The potential impacts of silvicultural practices include increased riffle sediment, length of open stream, water temperature, snag volume, and algal cover; decreased riffle macroinvertebrates; compositional changes in forest avian communities; and chemical contamination from fuels and lubricants (Beck 1995, Wenger 1999, Haag and Dickinson 2000, Jackson et al. 2001).

Forestry road construction and use are a primary source of NPS pollution, contributing up to 90% of the sediment produced in forestry practices. Properly implementing forestry BMPs during road construction and maintenance is very important because surface erosion rates on roads often equal or exceed erosion rates reported on severely eroding agricultural lands. Increased sedimentation in streams results in higher turbidity which can lead to limited light penetration (adversely affecting aquatic vegetation), higher temperatures, and lower dissolved oxygen concentrations.

The use of streamside buffers and SMZs on forest lands are critical to the protection of water resources. Cutting without a riparian buffer results in immediate channel changes (Jackson et al. 2001) and can have a profoundly negative impact on stream biota. If SMZs are not used or are improperly used, timber harvest can result in destabilized soil leading to increased sedimentation, increased water temperatures from shade removal, and decreased dissolved oxygen.

Development

For the purpose of this project, the source Development was defined as stress from activities associated with rural development, urbanization, and commercial and industrial development, including roads and construction activities, which contribute to runoff, sedimentation, and other NPS pollution. This included contributions from sources such as sedimentation as a result of new construction; maintenance of roads; and contaminants from vehicular use of roads such as engine oil, antifreeze, rubber, and metal deposits from tire wear.

Development was identified as a moderate threat in the lower watershed and a low threat in the upper watershed. Both current and historic land uses in the watershed are rural, with the majority of non-forested land used for agriculture, especially in the lower watershed. Although development pressure in the watershed is relatively low, development has the potential to become a major concern in the watershed if the urban sprawl associated with the spread of Huntsville reaches the watershed.

Urban runoff has been identified as a major contributor to NPS pollution due to the highly polluted runoff from urbanized areas. Nationwide, the EPA and state agencies estimated urban runoff was responsible for approximately 12% of the water quality impairment in rivers and streams (United States Environmental Protection Agency 2002a).

Runoff that moves across natural terrain reaches receiving waters gradually because the surface is porous allowing water to percolate into the soil. However, urban areas have a much higher proportion of impervious surfaces, such as roads, parking lots, and other concrete surfaces, which increases the flow of runoff because these surfaces force the water to accumulate on the surface and flow to the receiving body in large amounts and storm sewer systems are designed to quickly channel this runoff from roads and other impervious surfaces to the receiving water. Once runoff enters the sewer system, it empties into streams with enough volume and speed to erode streambanks, strip streamside vegetation, alter the streambed, and widen stream channels (United States Environmental Protection Agency 2002b) resulting in fluctuating water levels, increased sediment loading, and higher water temperatures. Constituents in urban runoff include sediment and other suspended solids, toxins such as automotive fluids, pesticides from lawn and garden activities, bacteria and other pathogens, heavy metals, oxygen-demanding substances, and nutrients from fertilizers used in lawn and garden activities (Olivera et al. 1996).

Increased sedimentation has been recognized as one of the primary results of urban runoff. Construction, both buildings and roads, is one of the most significant contributors of suspended solids to urban runoff. Etnier (1997) recognized anthropogenic pollution from siltation as one of the most important anthropogenic factors responsible for fish imperilment in the southeast. Increased sedimentation may also interfere with the respiration and feeding of stream invertebrates, smother benthic organisms, and harm aquatic vegetation.

Increased housing, roads, and the associated construction activities puts pressure on the waterways, especially by the forced assimilation of additional stormwater runoff due to expanded impervious surfaces. Imperviousness is a very useful indicator with which to measure the impacts of land development on aquatic systems. Stream degradation occurs at relatively low levels of impervious (approximately 10%), leading to decreases in macroinvertebrate communities and shellfish beds and deleterious impacts on wetlands (Center for Watershed Protection 1994, Wegner 1999). Macroinvertebrates disappear from urban streams in areas with $\geq$25% impervious surface cover.

In recent years, urban sprawl has emerged as one of the dominant forces of change in land cover and has been predicted to be a major cause of native forest loss in the future (Wear and Greis 2001). In Madison County, development has increased dramatically in the past 2 decades. In their report "Greenprints for Growth", the Land Trust of Huntsville and North Alabama reported that the area of developed land in Madison County, excluding Huntsville and Redstone Arsenal, increased from 6% to 25% from 1984 to 2000.

Invasive/Alien Species

For the purpose of this project, the source Invasive/Alien Species was defined as any non-native species which can cause environmental harm.

Invasive species are species that are non-native (or alien) to the ecosystem under consideration that are likely to cause economic or environmental harm to the area in which they have been introduced (Executive Order 13112). Invasive non-native organisms are one of the greatest threats to the natural ecosystems of the U.S. They are the second greatest threat to imperiled

species in the U.S. after habitat destruction/degradation (Stein et al. 2000) and impact nearly half of the species currently listed as Threatened or Endangered under the U.S Federal Endangered Species Act. These unwelcome plants, insects, and other organisms disrupt the ecology of natural ecosystems, displace native plant and animal species, and degrade our nation's unique and diverse biological resources. Some of the known ecological impacts of invasive species are a reduction in the amount of light, water, nutrients and space available to native species; alteration of hydrological patterns, soil chemistry, moisture-holding capacity, erodibility, fire regimes, and natural ecological processes such as plant community succession; hybridization with native species; harboring of pathogens; loss of food sources for wildlife; loss of and encroachment upon endangered and threatened species and their habitat; and disruption of insect-plant associations necessary for seed dispersal of native plants (Randall and Marinelli 1996, Plant Conservation Alliance 2000). Invasive plants also cause great economic losses and expenditures each year, measured in billions of dollars, for agriculture, forestry, range lands, and roadways management (Westbrooks 1998). Invasive species are especially problematic in areas that have been disturbed by human activities such as road building, residential development, forest clearing, logging operations, grazing, mining, ditching of marshes for mosquito control, mowing, erosion control, and fire prevention and control activities.

Invasive/Alien Species was identified as a moderate threat throughout the watershed. The main invasive species of concern in the watershed is the Asian clam (*Corbicula fluminea*). The Asian clam is a known biofouler in power plant and industrial water systems and has also caused problems in irrigation canals and pipes. Ecologically, this species can alter benthic substrates and compete with native mussel species for food and space (Florida Caribbean Science Center 2001). In addition, Asian clams appear to be capable of tolerating polluted environments better than many native bivalves. The source of first introduction to North America is unknown, but it is suspected that this species was brought from China by immigrants as a food source and subsequently released. This species is found in fresh waters throughout the United States including all five Gulf states and northern Mexico. Estuarine populations have been reported for the San Francisco Bay, California, and Chesapeake Bay, Virginia, but none have been reported for the Gulf of Mexico ecosystem (Florida Caribbean Science Center 2001).

Recreational Use

For the purpose of this project, the source Recreational Use was defined as any outdoor recreational use which caused a disturbance to the flora or fauna of the watershed, including off-road all-terrain vehicles (ATV) or 4-wheel drive truck use and spelunking,

Recreational use was identified as a moderate threat in the upper watershed and a low threat in the lower watershed. The 2 main sources of impact from recreational use were off-road ATV or truck use, particularly in stream beds and near stream channels, and recreational uses of caves.

The recreational use of ATVs and 4-wheel drive vehicles has the potential to have a large negative impact on both terrestrial and aquatic communities. When these vehicles are operated off trails, they disturb the soil which can lead to increased erosion and sedimentation in the streams. The most adverse impact occurs from the operation of these vehicles in the stream channel itself. This not only increases sediments but disturbs or destroys the bottom substrate itself and could cause mortality of benthic organisms from crushing. ALNHP has identified a

site of particular concern in Jackson County along Estill Fork. The pale lilliput has consistently been found in this portion of Estill Fork. Traffic has been observed driving in the streambed, posing a significant threat to mussels at this site.

Recreational usage of caves was the most significant negative impact in the decline of gray bats and Indiana bats that led to their listing as endangered species. They are sensitive to noise, lights, and other human disturbance, and human intrusion into hibernacula can result in mortality due to increased energy expenditure (Tuttle 1979). Disturbance to summer colonies can cause bats to abandon caves. Although most of the caves of major importance to these 2 species in Alabama have protections in place to exclude or minimize human disturbance, human disturbance to cave communities remains a threat.

Waste Disposal

For the purpose of this project, the source Waste Disposal was defined as stress from disposal of human waste products not handled by a sewage treatment facility including trash dumping and faulty septic systems.

Waste disposal was identified as a moderate threat in the lower watershed and a low threat in the upper watershed. The 2 main problems with waste disposal were trash dumping and failing septic systems.

Septic systems are the most common on-site domestic waste disposal system in use in the U.S. The number of active septic systems in Alabama has been estimated at 670,000 with an unknown number of older, abandoned systems. If properly installed, used, and maintained, septic systems pose no threat to water quality, but if the system is improperly installed or fails, disease-causing pathogens, nitrates, or other pollutants may enter the water table and/or nearby streams. The Alabama Department of Public Health has estimated that 50% of all conventional, onsite septic systems in the state are failing or will fail in the future. The impacts from septic systems was very different between the upper and lower watershed. The upper watershed had few septic systems present (519) and only 5% were estimated to be failing (Alabama Soil and Water Conservation Committee 1998). Septic systems were much more numerous in the lower watershed (5,884), and a much larger proportion (61.5%) were estimated to be failing (Alabama Soil and Water Conservation Committee 1998).

In many rural areas, dead end roads, sinkholes, and streams commonly become disposal sites for garbage and other waste materials. These places are eyesores and pose a threat to ground and surface water quality as well as being a public health hazard. They can quickly contaminate surface and ground water with toxins and pathogens. When the disposal site is a sinkhole or cave, dumping can also cause disturbance to the habitat. Within the PRR watershed, several sites have been identified where dumping of trash into a stream or sinkhole is a problem.

Conservation Measures

The Alabama and Tennessee Field Offices of The Nature Conservancy, and the Chattowah Open Land Trust all have land protection activities underway within the PRR watershed. Protection activities include land acquisition, education, and restoration on private lands. In addition, the

Paint Rock River Initiative, in partnership with NRCS, TVA, and others recently completed a streambank stabilization project on a farm on Estill Fork. To demonstrate that protection efforts are successful, monitoring of the target species must be performed. Therefore, monitoring of mussels and other aquatic species should continue. In addition, inventory and survey of the terrestrial community needs further work.

Sediment has been documented as the most significant NPS contributor to many waterways. Vegetative buffers are effective in trapping sediment from runoff as well as reducing channel erosion. Buffers provide additional benefits in reducing other NPS stresses such as pathogens, toxins, and contaminants. However, to be effective, buffers must extend along all streams, including intermittent and ephemeral channels. In addition, buffers must be augmented with enforceable on-site sediment controls and a limited amount of impervious surfaces. Furthermore, it is crucial that these riparian corridors contain native vegetation, and should be maintained or, where necessary, restored. An intact naturally functioning riverine system, with riparian vegetation, in which native plant and animal communities can exist is a critical, measurable strategy to preserve water quality and abate NPS pollution.

A vital aspect of success measurement involves assessing the effect of conservation efforts on the biological resource. ALNHP identified numerous biological goals and strategies, within which lie the measures of biological success. Conservation will be deemed successful if the following results are seen. Inherent within some of these desired results are monitoring programs that gather more detailed information relevant to progress. To abate threats to the Paint Rock River watershed, the following goals and strategies were developed.

Goals

- Protect and maintain multiple, viable populations of all local scale conservation targets ensuring that, for each species, enough populations are protected to conserve their remaining natural range of ecological and genetic diversity.

- Maintain and, where possible, restore riparian vegetation along the main channel and tributaries.

- Maintain or improve water quality and hydrologic function within the watershed.

- Maintain or restore the natural ecological processes that maintain this ecosystem including fire and habitat connectivity to the extent possible.

- Maintain or restore the condition and long-term viability of the main stem and tributaries.

- Increase conservation awareness and promote a land ethic within the watershed.

- Conserve key parcels through easements or acquisitions. Smurfit-Stone plans on divesting itself of the property acquired from Mead-Westvaco, with current plans to have the state acquire the land through TNC. Acquisition of this property would play a vital role in protecting the watershed.

Strategies

- Promote and encourage proactive prevention of NPS pollution through installation and maintenance of BMPs for the following (also take action where necessary, when violations of water quality occur, by taking proper measures through ADEM and other enforcement agencies).
    - Forestry
    - Agriculture
    - Road Construction
    - Development
    - Sewage Systems

- Continue monitoring of aquatic species.

- Conduct a thorough biological inventory of the watershed.

- Restore or enhance streamside zones using federal or state agricultural incentive programs such as Conservation Reserve Program CRP, Wetlands Reserve Program (WRP), Environmental Quality Incentives Program (EQIP), Wildlife Habitat Incentives Program (WHIP), and Partners for Wildlife (PFW).

- Work with watershed volunteers, USGS, and the Geological Survey of Alabama to monitor water quality in the watershed.

- Initiate/continue cooperative projects with such groups as the Alabama Forestry Commission, USFWS, SAF, and others to promote and implement fire as a management tool.

- Work with TNC, Smurfit-Stone, and the appropriate state agencies to acquire key parcels that Smurfit-Stone wants to sell.

- Promote and educate citizens on the sensitivity of streambeds to eliminate traffic driving in them.

- Publicly recognize landowners and farmers who implement excellent BMPs.

- Attend meetings that involve local farm groups and other agricultural related events.

- Where agricultural BMPs fail or are not installed, encourage voluntary compliance (working with NRCS and others).

- Assess problem areas where cattle have access to streams and creeks; as necessary assist/cost share with removal of cattle from streams through such programs as CRP, WRP, EQIP, WHIP, and PFW.

- Encourage forestry landowners to follow the Sustainable Forestry Initiative guidelines.

- Identify the worst roads in the watershed and develop a runoff pollution control plan.

- Where conservation easements are not possible, work with forestry landowners to improve or extends Alabama's 35-ft SMZ to the following:
    - Where feasible, a minimum 98-ft buffer, with no tree harvesting within 25 ft of the stream (50 ft is preferable); where trees are harvest within the 25-50 ft zone, some mature and senescent trees should remain and native vegetation should be preserved wherever possible.

- Establish demonstration projects for forestry and agricultural BMPs.

- Develop relationships with all major forestry and agricultural landowners and stakeholders.

- Acquire key parcels or conservation easements on key parcels.

- Coordinate activities among the conservation organizations (TNC offices, Chattowah Land Trust, Paint Rock River Watershed Conservancy) and state and federal agencies (ADCNR, USFWS) to leverage resources for conservation in the watershed.

- Demonstrate and encourage use of native and noninvasive exotic species in food plots.

- Continue surface and groundwater monitoring in the watershed.

- Promote and educate citizens on proper car maintenance, trash disposal, disposal of by-products from home maintenance and automotive repairs, and disposal of hazardous chemicals.

- Identify and clean up illegal trash dumping sites.

- Educate citizens on the hazards of illegal dumping; where necessary, take appropriate enforcement actions.

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APPENDIX A. Definition Of Heritage Ranks And Federal And State Listed Species Status

Definition of Heritage Ranks

The Alabama Natural Heritage Program uses the Heritage ranking system developed by The Nature Conservancy. Each species is assigned three ranks; one representing its rangewide or global status (G) and one representing its subnational, or state, status (S). Species with a rank of 1 are most critically imperiled; those with a rank of 5 are most secure. Rank numbers may be combined when there is uncertainty over the status (e.g., an element may be given a G-rank of G2G3, indicating global status is somewhere between imperiled and vulnerable.

Global Ranking System

G1 Critically imperiled globally (5 or fewer occurrences)

G2 Imperiled globally (6 to 20 occurrences).

G3 Either very rare and local throughout its range or found locally in a restricted range (21 to 100 occurrences).

G4 Apparently secure globally.

G5 Demonstrably secure globally.

GH Of historical occurrence throughout its range.

GU Possibly in peril range-wide but status uncertain.

GX Believed to be extinct throughout range.

G? Not ranked to date.

G#T# Rank for subspecies or varieties where # is equal to 1, 2, 3, 4, 5, H, U, X, or ?.

HYB Hybrid

State Ranking System

S1 Critically imperiled in the state because of extreme rarity (5 or fewer occurrences of very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation from the state.

S2 Imperiled in state because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.

S3 Rare or uncommon in the state (on the order of 21 to 100 occurrences).

S4 Apparently secure in the state, with many occurrences.

S5 Demonstrably secure in the state and essentially "ineradicable" under present conditions.

SA Accidental in the state, including species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds or even thousands of miles outside their usual range; a few of these species may even have bred on the one or two occasions they were recorded.

SE An exotic established in state.

SH Of historical occurrence, perhaps not verified in the past 20 years, and suspected to be still extant.

SR Reported, but without persuasive documentation which would provide a basis for either accepting or rejecting the report (e.g. misidentified specimen). Some of these are very recent discoveries for which the program has not yet received first-hand information; others are old, obscure reports that are hard to dismiss because the habitat is now destroyed.

SRF Reported in error (falsely), but this error persisted in the literature.

SU Possibly in peril in the state but status uncertain; more information needed.

SX Apparently extirpated from the state.

S? Not ranked to date.

<u>Special state ranking for migrants:</u>

SZ Not of conservation concern in the state because species in this category are so widely and unreliably distributed during migration or in winter that no small set of sites could be set aside with the hope of significantly furthering their conservation. A rank of SZN indicates the species does not breed in the state. Species that have resident breeding populations that are augmented in winter by non-breeding migrants may have dual ranks, one each for the breeding (B) and non-breeding (N) components.

SB Regularly occurring, migratory and present only during the breeding season. A rank of S3B indicates a species uncommon during the breeding season (spring/summer) in the state.

SN Regularly occurring, usually migratory and typically non-breeding species in the state; this category includes migratory birds, bats, sea turtles, and cetaceans which do

not breed in the state but pass through twice a year or may remain in winter. A rank of S2B,S5N indicated a rare breeder but a common winter resident.

Rank Criteria, Relationship to Other Status Designations

Ranking is a qualitative process, with multiple factors going into rank decisions. For species elements, the following factors are applied:

1. total number and condition of occurrences (sightings/records) of that species
2. population size
3. range extent and area of occupancy
4. short and long-term trends in the first 3 factors
5. threats to the element
6. fragility of the element

Heritage Ranks are often, but not always comparable to statuses assigned by government agencies. For instance, the Heritage subnational ranking for an endangered species my not be S1. For this reason, Federal and State status is also give for species of conservation concern where possible.

Definitions of Federal and State Listed Species Status

Federal Listed – U.S. Fish and Wildlife Service:

Endangered Species (LE) – in danger of extinction throughout all or a significant portion of their range.

Threatened Species (LT) – likely to become an endangered species within the foreseeable future throughout all or a significant portion of their range.

Proposed Endangered (PE) – the species is proposed to be listed as endangered.

Proposed Threatened (PT) – the species is proposed to be listed as threatened.

Partial Status (PS) – an intraspecific taxon or population has federal status but the entire species does not-- status is in only a portion of the species range

Candidate (C) – Species for which the U.S. Fish and Wildlife Service has on file enough substantial information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened. Development and publication of proposed rules on Candidate taxa are anticipated, and USFWS encourages other agencies to give consideration to such taxa in environmental planning.

State Protected Status, Alabama – Alabama Dept. of Conservation & Natural Resources, Wildlife & Freshwater Fisheries:

> State Protected (SP) – Species with a state protected status are protected by the Nongame Species Regulation (Section 220-2-.92, page 74-77) and the Invertebrate Species Regulation (section 220-2-.98, pages 77-79) of the Alabama Regulations for 2002-2003 on Game, Fish, and Fur Bearing Animals. Copies of these regulations may be obtained from the Division of Wildlife & Freshwater Fisheries, Alabama Department of Conservation & Natural Resources, 64 North Union Street, Montgomery, AL 36104. They can also be obtained online at <http://www.dcnr.state.al.us/agfd/wildsec.html> and the list of protected species is posted at <http://www.dcnr.state.al.us/agfd/nongamereg.html>.

State Listed Status, Tennessee – Tennessee Department of Environment and Conservation

> State Status indicates which plants are formally listed as state Endangered, Threatened, or Special Concern under the authority of the Tennessee Department of Environment and Conservation. The Department has the valuable assistance of the State's best field botanists, twelve of whom serve on the Scientific Advisory Committee which periodically reviews the list.
>
> *Plants* (from <http://www.state.tn.us/environment/nh/tnplants.html>)
>
> E Endangered Species means any species or subspecies of plant whose continued existence as a viable component of the state's flora is determined by the Commissioner to be in jeopardy, including but not limited to all species of plants determined to be "endangered species" pursuant to the Endangered Species Act.
>
> PE Proposed Endangered means any species or subspecies of plant nominated by the Scientific Advisory Committee to be added to the list of Tennessee's endangered species. After approval by the commissioner of the Dept. of Environment & Conservation and the concurrence of the commissioner of Agriculture, these plants will formally become Endangered Species.
>
> E-PT Endangered Proposed Threatened refers to species which are currently on the state list of endangered plants, but are proposed to be downlisted to threatened. After approval by the commissioner of the Dept. of Environment & Conservation and the concurrence of the commissioner of Agriculture, these plants will formally become threatened species.
>
> T Threatened Species means any species or subspecies of plant which appears likely, within the foreseeable future, to become endangered throughout all or a significant portion of its range in Tennessee, including but not limited to all species of plants determined to be a "threatened species" pursuant to the Endangered Species Act.
>
> S Special Concern Species means any species or subspecies of plant that is uncommon in Tennessee, or has unique or highly specific habitat requirements or scientific value and therefore requires careful monitoring of its status.

State Status Modifiers follow State Status abbreviations.

P Possibly Extirpated, species or subspecies that have not been seen in Tennessee for the past 20 years. May no longer occur in Tennessee.
CE Commercially Exploited, due to large numbers being taken from the wild and propagation or cultivation insufficient to meet market demand. These plants are of long-term conservation concern, but the Division of Natural Heritage does not recommend they be included in the normal environmental review process.

(Adapted from Somers, Paul. 1989. Revised List of the Rare Plants of Tennessee. Journal of the Tennessee Academy of Sciences, 64(3): 179-184., and Rules of Tennessee Division of Ecological Services, Chap. 0400-6-2, Rare Plant Protection and Conservation Regulations.)

Animals (from <http://www.state.tn.us/environment/nh/tnanimal.html>)

In Tennessee, vertebrates, mollusks and crustaceans may be formally listed by the TWRA as Endangered, Threatened, or "Deemed in Need of Management" (T.C.A. 70-8-104, 70-8-105, 70-8-107). No insects or arachnids can be listed by the TWRA, but may be listed by the USFWS.

E Endangered Any species or subspecies of wildlife whose prospects of survival or recruitment within the state are in jeopardy or are likely to become so within the foreseeable future.
T Threatened Any species or subspecies of wildlife that is likely to become an endangered species within the foreseeable future.
D "Deemed in Need of Management" Any species or subspecies of nongame wildlife which the executive director of the TWRA believes should be investigated in order to develop information relating to populations, distribution, habitat needs, limiting factors, and other biological and ecological data to determine management measures necessary for their continued ability to sustain themselves successfully. This category is analogous to "Special Concern".
PE Proposed Endangered Proposed as Endangered by the TWRA for consideration by the Tennessee Wildlife Resources Commission
PT Proposed Threatened Proposed as Threatened by the TWRA for consideration by the Tennessee Wildlife Resources Commission
PD Proposed "Deemed" Proposed as Deemed in Need of Management by the TWRA for consideration by the Tennessee Wildlife Resources Commission

Note: Many species presented in this list may have neither a state nor federal designation, however are considered rare by the DNH and should be evaluated during the environmental review process. Information is collected on these species in order to minimize the necessity of listing these taxa as Endangered or Threatened.

Scales of Biodiversity and Geography

Two concepts of scale underlie the standard TNC approach (called the Five-S Framework) to site conservation applied in this study: (1) biodiversity scale - level of biological organization and (2) geographic or spatial scale. It is important to understand how biodiversity and spatial scale interact and the importance and effect of spatial scale.

Biodiversity can be examined at many levels of biological organization (genes, species, communities, ecosystems, and landscapes), which can occur and function at various spatial scales. The importance of working at the correct spatial scale (as well as temporal and other scales) in relation to the process or biological organizational level of interest has increasingly been emphasized.

The Five-S approach identifies 4 spatial scales (and the corresponding biological scale), with each scale corresponding to a characteristic range in area or stream length; regional, coarse, intermediate, and local scale.

- Regional Scale (Species) – > 404,686 hectares (>1,000,000 acres), migrating long distances

- Coarse Scale (Species, Matrix Communities and Systems) – 8,093 - 404,686 hectares (20,000 - 1,000,000 acres), $\geq 4^{th}$ order and larger river network, > 1,011 ha (> 2,500 ac) lake

- Intermediate Scale (Species, Large Patch Communities and Systems) – 404 - 20,234 hectares (1,000 - 50,000 acres), $1^{st} – 3^{rd}$ order stream network, 101 - 1,011 ha (250 - 2,500 ac) lake

- Local Scale (Species, Small Patch Communities and Systems, Aquatic Macrohabitats) - < 209 hectares (<2,000 acres), < 16 river kilometers (< 10 mi), < 101 ha lake (< 250 ac)

Site conservation planning primarily focuses on biodiversity at the coarse, intermediate, and local scales. Because of the small size of the PRR watershed, regional scale targets were not addressed in the context of this assessment.

Viability Ranking System

To assess biodiversity health, the viability of each element was evaluated, ranked, and the ranks aggregated to provide a biodiversity health rank for the conservation area. Conservation targets were graded on the basis of size, condition, and landscape context.

- ► Size was a measure of the area or abundance of the conservation target's occurrence. For ecological systems and communities, size was simply a measure of the occurrence's patch size or geographic coverage. For species, size took into account the area of occupancy and number of individuals. Minimum dynamic area, or the area needed to ensure survival or re-establishment of a target after natural disturbance, was another aspect of size.
- ► Condition was an integrated measure of the composition, structure, and biotic interactions that characterize the occurrence. This included factors such as reproduction, age

structure, biological composition, physical and spatial structure, and biotic interactions that directly involve the target.

► Landscape context was an integrated measure of 2 factors: connectivity and the dominant environmental regimes and processes that establish and maintain the target occurrence. Connectivity included such factors as species targets having access to habitats and resources needed for life cycle completion, fragmentation of ecological communities and systems, and the ability of any target to respond to environmental change through dispersal, migration, or re-colonization. Dominant environmental regimes and processes included hydrologic and water chemistry regimes, geomorphic processes, climatic regimes, fire regimes, and many kinds of natural disturbance.

The viability of the conservation targets was graded for each of these 3 factors based on the Natural Heritage Network's principles for ranking element occurrences using a 4-level scale. The *viability ranking system* used simple categorical ranks, as follow:

► **Very Good** = viability criteria at or above desired future status
► **Good** = viability criteria at or above minimum threshold for biological integrity
► **Fair** = viability criteria at or above minimum restorable level
► **Poor** = viability criteria below minimum restorable status (probably unrecoverable)

The ranks for size, condition, and landscape context are combined to form an overall viability ranking for the target. The rationale for the overall viability rank was as follows:

► **Very Good.** Excellent estimated viability. Generally, this reflects at least 2 "Very Good" and no "Fair" or "Poor" ranks for the 3 viability factors.
► **Good.** Good estimated viability. Various combinations of "Very Good" to "Poor" size, condition, and landscape context can result in "Good" viability. In general, "Good" viability reflects at least 2 "Good" or 1 "Very Good" and no "Poor" ranks among the 3 viability factors.
► **Fair.** Fair estimated viability. Various combinations rankings for the 3 factors can result in "Fair" viability. In general, "Fair" viability reflects at least 2 "Fair", or one "Poor" and no "Very Good" ranks among the 3 viability factors.
► **Poor.** Poor estimated viability, or not viable. Generally, "Poor" viability reflects at least 2 "Poor" and no "Good" or "Very Good" ranks for the 3 viability factors.

Threat Ranking Guidelines

Threats are a mix of stresses and sources of stress that may be scored by the frequency of stress occurrences; threats may also be weighted by urgency. It is important to understand the distinction between the *stresses* affecting the conservation targets and the *sources* of the stress in order to ensure the development of effective conservation strategies. A *stress* is a process or event with direct negative consequences for the conservation element (e.g., cessation of water flow in a fish-populated stream). A stress results in the impairment or degradation of the size, condition, or landscape context of a conservation target, and results in reduced viability of the target. Many or most stresses are caused directly by incompatible human uses of land, water, and natural resources; sometimes, incompatible human uses indirectly cause stress by

exacerbating natural phenomena. The *source of a stress* is the action or entity that produces that stress (e.g., water impoundments). The sources of stress may contribute to more than 1 stress.

Stresses

Stresses were identified by focusing on the destruction, degradation or impairment of conservation targets as a direct or indirect result from human causes. Stresses considered were those currently happening, or that had a high potential to occur in the near future, where the damage was either a direct impact to the target or an indirect impact through an impairment or exacerbation of a natural process.

The relative seriousness of each stress identified was assessed by assigning a 4-scale rank based on the severity of damage and scope of damage for each stress following the guidelines below.

► **Severity of Damage.** What level of damage to the conservation target over at least some portion of the target occurrence can reasonably be expected within 10 years under current circumstances? Total destruction, serious or moderate degradation, or slight impairment?

Stress Ranking

- **Very High** = The stress is likely to *destroy* or *eliminate* the conservation element over some portion of the element's occurrence at the conservation area.
- **High** = The stress is likely to *seriously degrade* the conservation element over some portion of the element's occurrence at the conservation site.
- **Medium** = The stress is likely to *moderately degrade* the conservation element over some portion of the element's occurrence at the conservation area.
- **Low** = The stress is likely to *only slightly impair* the conservation element over some portion of the element's occurrence at the conservation area.

► **Scope of damage.** What is the geographic scope of impact to the conservation target expected within 10 years under current circumstances? Is the stress pervasive throughout the target occurrences, or localized?

Stress Ranking

- **Very High** = The stress is likely to be *very widespread or pervasive* in its scope, and affect the conservation element *throughout the element's occurrences* at the conservation area.
- **High** = The stress is likely to be *widespread* in its scope, and affect the conservation element at *many of its locations* at the conservation area.
- **Medium** = The stress is likely to be *localized* in its scope, and affect the conservation element at a *some of the element's locations* at the conservation area.
- **Low** = The stress is likely to be *very localized* in its scope, and affect the conservation element at a *limited portion of the element's location* at the conservation area.

An overall Stress rank for the element was computed based on the ranks for severity and scope as depicted in the stress ranking table.

Stress Ranking Table

↓ Severity	Scope			
	Very High	**High**	**Medium**	**Low**
Very High	Very High	High	Medium	Low
High	High	High	Medium	Low
Medium	Medium	Medium	Medium	Low
Low	Low	Low	Low	-

Sources

For each Stress afflicting a given conservation target, Sources of Stress were identified and listed. There were 1 or more causes or Sources of the Stress. For example, nutrient loading is a stress to many aquatic systems; however, the nutrient loading might be caused by many different sources such as farm fertilizers, animal feed lots, septic systems, sewage treatment facilities, or suburban runoff.

Sources were ranked using a 4-scale rank based on the relative seriousness of the source for degree of contribution to the stress and irreversibility of the stress.

► **Degree of contribution to the stress.** The contribution of a source, acting alone, to the full expression of the stress assuming the continuation of the existing management or conservation situation. Did the particular source make a very large or substantial, moderate, or low contribution to causing the stress?

Source Ranking

- **Very High** = The source is a very large contributor of the particular stress.
- **High** = The source is a large contributor of the particular stress.
- **Medium** = The source is a moderate contributor of the particular stress.
- **Low** = The source is a low contributor of the particular stress.

► **Irreversibility of the stress.** The reversibility of the stress caused by the source. Did the source produce a stress that is irreversible, reversible at extremely high cost, or reversible with moderate or little investment?

Source Ranking

- **Very High** = The source produces a stress that is not reversible (e.g. wetlands converted to a shopping center).
- **High** = The source produces a stress that is reversible, but not practically affordable (e.g. wetland converted to agriculture).
- **Medium** = The source produces a stress that is reversible with a reasonable commitment of additional resources (e.g. ditching and draining of wetland).
- **Low** = The source produces a stress that is easily reversible at relatively low cost (e.g. ORVs trespassing in wetland).

An overall Source rank for the element was computed based on the ranks for severity and scope as depicted in the stress ranking table.

Source Ranking Table

↓ Severity	Scope			
	Very High	**High**	**Medium**	**Low**
Very High	Very High	High	High	Medium
High	Very High	High	Medium	Medium
Medium	High	Medium	Medium	Low
Low	High	Medium	Low	Low

Combined Threat Ranking

The Combined Threat Rank for a source of stress is determined in 2 steps:

1) A Threat rank for each stress-source combination was determined based on the individual Stress and Source ranks using the following rules:

		Stress			
		Very High	High	Medium	Low
Source	Very High	Very High	Very High	High	Medium
	High	High	High	Low	Low
	Medium	Medium	Medium	Low	Low
	Low	Low	Low	Low	-

The threat rank may be lower than or equal to, but not higher than, the Stress rank, i.e., the Stress rank serves as an upper limit for the Threat rank. For example, a "Very High" source of a "Medium" stress is only considered a "Medium" threat.

2) Determine the Combined Threat rank for a source by combining the individual Threat ranks for each stress-source combination. For sources that cause only one stress, the Combined Threat rank equals the individual threat rank. For sources that cause multiple stresses, the initial Combined Threat rank takes on the rank of the highest-ranked threat; this initial rank may then be adjusted upward by applying the rule of 3,4,5.

Rule of 3,4,5 – Three High threats are equivalent to one Very High threat; four Medium threats are equivalent to one High threat; and five Low threats are equivalent to one Medium threat.

For example, the Combined Threat rank of a source of stress that contributes to three High-ranked threats would be Very High, because the three High threats are equivalent to a Very High threat. Likewise, a source of stress that contributes to two High threats and four Medium threats

would have a Combined Threat rank of Very High because the four Medium threats are equivalent to a third High threat, which in turn are equivalent to one Very High threat.

The threat assessment process is a critical component of the site conservation planning process for TNC and the Natural Heritage Network. Once stresses are identified in conducting an assessment, a guideline is in place that provides the framework for identifying where more work is needed and leads to the final and most crucial stage of strategic planning. Strategies developed take into account not only the challenges (NPS pollution) to the health of the ecosystem, but also the cultural attitudes and economic pressures of the study area. By considering both the environmental and human components, strategies for addressing threats provide clear, focused, and 'on-the-ground' solutions that can be community based.

Appendix C. Alabama Natural Heritage Program and Tennessee Division of Natural Heritage Element Occurrence Records for the Paint Rock River watershed.

Table C-1. All occurrences of endangered, threatened, and rare species and natural communities occurring in the Little Paint Creek subwatershed (06030002-090) of the Paint Rock River (PRR) watershed documented by the Alabama Natural Heritage Program[SM] as of 31 December 2002. Coordinates given are rounded to the nearest minute.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Arachnids	*Nesticus barri*	a cave obligate spider	G3G4	S3			Paint Rock AL			343900N	0861500W		Peck (1989) reported the species from this cave; no date was given.
Arachnids	*Nesticus barri*	a cave obligate spider	G3G4	S3			Swearengin			343400N	0861300W		Peck (1989) reported the species from this cave; no date was given.
Diplopoda	*Pseudotremia nyx*	a cave obligate millipede	G1G2	S?			Swearengin			343400N	0861300W		Peck (1989) reported the species from this cave; no date was given.
Fish	*Erimystax insignis*	blotched chub	G3G4	S2			Grant	005S 003E	13	343600N	0861600W	1994	0
Insects	*Litocampa valentinei*		G3G4	S?			Paint Rock AL			343900N	0861500W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Litocampa valentinei*		G3G4	S?			Swearengin			343400N	0861300W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Ptomaphagus valentinei*	a beetle	G3	S2			Lim Rock			344100N	0861400W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Ptomaphagus valentinei*	a beetle	G3	S2			Paint Rock AL			343900N	0861500W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Ptomaphagus valentinei*	a beetle	G3	S2			Swearengin			343400N	0861300W		Peck (1995) reported the species from this cave; no date was given.

Table C-1. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mammals	*Myotis grisescens*	gray bat	G3	S2	LE	SP	Swearengin	005S 004E	29	343400N	0861300W	6/1/1993	Formerly a hibernaculum, according to data provided to TVA by M. Tuttle. 1991 ALNHP (Best, Miller, Sankaran) census data: 12 bats estimated exiting on August 16. On July 3, 1985, F. Bagley's (USFWS) field notes show that he visited the cave and reported a large guano pile measuring about 100 feet long and 50 feet wide at a point about 1500 feet into the cave. Depth could not be determined as the pile was over breakdown. Bagley noted that the pellets comprising the guano were extremely small. Keith Hudson (ADCNR) visited the cave in 1993, but no emergence estimate was attempted.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Grant	005S 003E	14	343600N	0861700W	3/27/1995	1 specimen.
Mussels	*Lasmigona holstonia*	Tennessee heelsplitter	G3	S1S2			Grant	005S 003E	14	343600N	0861700W	3/21/1995	2 specimens.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Grant	005S 003E	14	343600N	0861700W	3/21/1995	1 specimen.
Mussels	*Toxolasma lividus lividus*		G2T1	S2			Grant	005S 003E	14	343600N	0861700W	3/21/1995	8 specimens.
Mussels	*Villosa iris*	rainbow	G5	S3			Grant	005S 003E	14	343600N	0861700W	3/27/1995	2 specimens.

Table C-1. Continued

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Grant	005S 003E	14	343600N	0861700W	3/21/1995	49 specimens.
Vascular Plants	*Agastache nepetoides*	yellow giant hyssop	G5	S1			Swearengin	005S 004E	29	343400N	0861400W	8/28/1998	Approximately 25 flowering plants were observed.
Vascular Plants	*Agastache nepetoides*	yellow giant hyssop	G5	S1			Paint Rock	004S 003E		343900N	0861600W	6/28/2002	1 plant observed
Vascular Plants	*Trillium pusillum* var *1*	Alabama least trillium	G3T2Q	S2			Grant	005S 003E	14	343600N	0861600W	4/8/1979	Growing in "low damp woods with *Trillium stamineum* and *Trillium sessile*."
Vascular Plants	*Trillium pusillum* var *1*	Alabama least trillium	G3T2Q	S2			Grant	005N 003E	13	343700N	0861600W	4/4/1982	Common, on low sandy-silty rise in oak-hickory bottoms
Vascular Plants	*Trillium sessile*	toadshade	G4G5	S2			Grant	005S 003E	13	343600N	0861500W	4/8/1979	Growing in damp woods with *Trillium pusillum* and *Trillium stamineum*

Table C-2. All occurrences of endangered, threatened, and rare species and natural communities occurring in the Lower Paint Rock River subwatershed (06030002-100) of the Paint Rock River (PRR) watershed documented by the Alabama Natural Heritage Program[SM] as of 31 December 2002. Coordinates given are rounded to the nearest minute.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Amphibians	*Gyrinophilus palleucus*	Tennessee cave salamander	G2G3	S2		SP	Mt Carmel	007S 003E	5	342800N	0862000W	1900-00-00	
Arachnids	*Nesticus barri*	a cave obligate spider	G3G4	S3			Grant			343200N	0861600W		Peck (1989) reported the species from this cave; no date was given.
Arachnids	*Nesticus barri*	a cave obligate spider	G3G4	S3			Grant			343100N	0861700W		Peck (1989) reported the species from this cave; no date was given.
Arachnids	*Nesticus barri*	a cave obligate spider	G3G4	S3			Mt. Carmel			342800N	0862200W		Peck (1989) reported the species from this cave; no date was given.
Arachnids	*Nesticus barri*	a cave obligate spider	G3G4	S3			New Hope Al			343000N	0862300W		Peck (1989) reported the species from this cave; no date was given.
Birds	*Haliaeetus leucocephalus*	bald eagle	G4	S3B	PS:LT,PDL	SP	Guntersville Dam	006S 002E	30	342900N	0862800W	1994	Unsuccessful in 1993, possibly due to helicopter activity. One eaglet believed fledged in 1994.
Birds	*Haliaeetus leucocephalus*	bald eagle	G4	S3B	PS:LT,PDL	SP	Guntersville Dam	007S 002E	4	342800N	0862600W	1990	Eaglet seen being fed in 1987. Incubating adult in 1990.

Table C-2. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Birds	*Haliaeetus leucocephalus*	bald eagle	G4	S3B	PS:LT,PDL	SP	Guntersville Dam	007S 002E	9	342700N	0862500W	4/18/2001	2001: 3 successful nests with at least 5 fledged eaglets; 2000: 2 successful nests with 2 fledged and 1 abandoned nest; 1999: 3 successful nests with 5 eaglets fledged; 1998: 3 successful nests with 3 fledged; 1997: 1 successful nest with 1 fledged and 2 unsuccessful nesting attempts; 1996: 3 unsuccessful nests; 1995: 1 successful nest with 2 fledged and 2 unsuccessful nesting attempts; 1994: 2 successful nests with 3 fledged and 1 unsuccessful nest; 1993: 1 successful nest with 1 fledged and 1 unsuccessful nest.

Table C-2. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Birds	*Haliaeetus leucocephalus*	bald eagle	G4	S3B	PS:LT,PDL	SP	Guntersville Dam	007S 002E	4	342700N	0862600W	3/20/1995	State Nest GC3 produced 1 eaglet in 19932 eaglets in 1994. Platform in disrepair so GC4 built close, and had incubation, but no eaglets hatched in 1995. Platform GS2 at this site: juvenile sighted in 1988 and 1989. Young produced in 1991. Nest attempted, but unsuccessful in 1992. (Picks up as GS3 in 1993).
Fish	*Erimystax insignis*	blotched chub	G3G4	S2			Grant	006S 003E	27	343300N	0862000W	1994	
Fish	*Notropis leuciodus*	Tennessee shiner	G5	S1			Grant	006S 003E	27	343300N	0862000W	1994	
Fish	*Percina tanasi*	snail darter	G2G3	S1	LT	SP	Grant	006S 003E	4	343300N	0861900W	9/10/1981	
Fish	*Percina tanasi*	snail darter	G2G3	S1	LT	SP	Grant	005S 003E	28	343400N	0862000W	9/23/1981	
Fish	*Percina tanasi*	snail darter	G2G3	S1	LT	SP	Grant	005S 003E	34	343400N	0861800W	9/23/1981	
Fish	*Typhlichthys subterraneus*	southern cavefish	G4	S3		SP	New Hope	006S 002E	24	343000N	0862300W	4/12/1977	1 observed.
Insects	*Agapetus hessi*	caddisfly	G?	S1			Grant	006S 003E	4	343300N	0861900W		Collected May, June.
Insects	*Ceuthophilus stygius*		G?	S2			New Hope Al	006S 002E	20	343000N	0862700W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Hydropsyche simulans*	caddisfly	G?	S1			Grant	006S 003E	4	343300N	0861900W		Collected June, September.

Table C-2. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Insects	*Litocampa valentinei*		G3G4	S?			New Hope Al			343000N	0862300W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Litocampa valentinei*		G3G4	S?			Grant			343100N	0861700W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Litocampa valentinei*		G3G4	S?			Mt. Carmel			342900N	0862100W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Pseudosinella spinosa*	a cave obligate springtail	G3G4	S?			Grant			343200N	0861600W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Ptomaphagus longicornis*	a cave obligate beetle	G3	S2			Grant	005S 002E	12	343700N	0862200W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Ptomaphagus longicornis*	a cave obligate beetle	G3	S2			Grant	005S 002E	12	343700N	0862200W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Ptomaphagus longicornis*	a cave obligate beetle	G3	S2			Grant	005S 002E	12	343700N	0862200W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Ptomaphagus valentinei*	a beetle	G3	S2			Grant			343200N	0861600W		Peck (1995) reported the species from this cave; no date was given.

Table C-2. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Insects	*Ptomaphagus valentinei*	a beetle	G3	S2			Grant			343100N	0861700W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Subterrochus steevesi*	a cave obligate beetle	G1G2	S?			Grant			343200N	0861600W		Peck (1995) reported the species from this cave; no date was given.
Mammals	*Myotis grisescens*	gray bat	G3	S2	LE	SP	Mt Carmel	006S 003E	31	342900N	0862100W	8/12/1993	Cave was not surveyed 1994-1998. 1993-08-12: 33 bats counted. Ingress attempted but no bats or guano observed. 1992-09-09: 47 bats counted. 1991-06-27: ALHP (Best, Miller, Sankaran) census data: 22 bats observed exiting. No guano pile found.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Grant	006S 003E	17	343100N	0862000W	7/24/1991	5 specimens
Mussels	*Amblema plicata*	three-ridge	G5	S5			Grant	005S 003E	34	343400N	0861800W	7/25/1991	1 specimen (1981); 1 specimen (1991).
Mussels	*Amblema plicata*	three-ridge	G5	S5			Grant	006S 003E	27	343300N	0862000W	1991-07	9 specimens
Mussels	*Amblema plicata*	three-ridge	G5	S5			Grant	005S 003E	27	343500N	0861800W	3/27/1995	4 specimens.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Grant	006S 003E	20	343200N	0861900W	5/22/1995	1 specimen.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	4 specimens, 1995-05-25.

Table C-2. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Amblema plicata*	three-ridge	G5	S5			Grant	006S 003E	18	343100N	0862200W	5/25/1995	1 specimen.
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	6 specimens, 1991; 1 specimen, 1995.
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Grant	006S 003E	4	343300N	0861900W	1991-07	10 specimens
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Grant	005S 003E	34	343400N	0861800W	7/25/1991	47 specimens
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Grant	006S 003E	27	343300N	0862000W	1991-07	7 specimens
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Grant	005S 003E	27	343500N	0861800W	3/27/1995	6 specimens.
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Grant	005S 003E	33	343300N	0861900W	5/22/1995	1 specimen.
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Grant	006S 003E	20	343200N	0861900W	5/22/1995	1 specimen.
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	3 specimens, 1995-03-25.
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-03-25.
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	3 specimens, 1995-05-25.
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Grant	006S 003E	18	343100N	0862200W	5/25/1995	2 specimens.
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			New Hope	006S 002E	14	343100N	0862300W	5/25/1995	1 specimen.
Mussels	*Ellipsaria lineolata*	butterfly	G4	S3			Grant	006S 003E	17	343100N	0862000W	7/24/1991	1 specimen
Mussels	*Ellipsaria lineolata*	butterfly	G4	S3			Grant	005S 003E	34	343400N	0861800W	7/25/1991	2 specimens
Mussels	*Ellipsaria lineolata*	butterfly	G4	S3			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-05-25.
Mussels	*Elliptio crassidens*	elephant-ear	G5	S5			Grant	006S 003E	17	343100N	0862000W	7/24/1991	2 individuals
Mussels	*Elliptio crassidens*	elephant-ear	G5	S5			Grant	006S 003E	4	343300N	0861900W	1991-07	3 specimens
Mussels	*Elliptio crassidens*	elephant-ear	G5	S5			Grant	005S 003E	34	343400N	0861800W	7/25/1991	2 specimens
Mussels	*Elliptio crassidens*	elephant-ear	G5	S5			Grant	005S 003E	33	343300N	0861900W	5/22/1995	1 specimen.

Table C-2. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Elliptio crassidens*	elephant-ear	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-05-25.
Mussels	*Epioblasma triquetra*	snuffbox	G3	S1			Grant	006S 003E	17	343100N	0862000W	5/25/1995	2 specimens, 1991;5 specimens, 1995.
Mussels	*Epioblasma triquetra*	snuffbox	G3	S1			Grant	006S 003E	4	343300N	0861900W	7/23/1991	6 specimens
Mussels	*Epioblasma triquetra*	snuffbox	G3	S1			Grant	005S 003E	34	343400N	0861800W	7/25/1991	2 specimens
Mussels	*Epioblasma triquetra*	snuffbox	G3	S1			Grant	006S 003E	27	343300N	0862000W	1991-07	2 specimens
Mussels	*Epioblasma triquetra*	snuffbox	G3	S1			Grant	006S 003E	17	343100N	0862000W	5/25/1995	2 specimens.
Mussels	*Epioblasma triquetra*	snuffbox	G3	S1			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-03-25.
Mussels	*Epioblasma triquetra*	snuffbox	G3	S1			Grant	006S 003E	17	343100N	0862000W	5/25/1995	2 specimens, 1995-05-25.
Mussels	*Epioblasma triquetra*	snuffbox	G3	S1			Grant	006S 003E	18	343300N	0862100W	5/25/1995	3 specimens.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Grant	006S 003E	4	343300N	0861900W	7/23/1991	2 specimens
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Grant	005S 003E	27	343500N	0861800W	3/27/1995	1 specimen.
Mussels	*Fusconaia cuneolus*	fine-rayed pigtoe	G1	S1	LE,XN	SP	Grant	006S 003E	17	343100N	0862000W	7/24/1991	1 specimen
Mussels	*Fusconaia cuneolus*	fine-rayed pigtoe	G1	S1	LE,XN	SP	Grant	006S 003E	4	343300N	0861900W	7/23/1991	1 specimen
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Grant	006S 003E	4	343300N	0861900W	1991-07	5 specimens
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Grant	005S 003E	34	343400N	0861800W	7/25/1991	3 specimens
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Grant	006S 003E	27	343300N	0862000W	1991-07	2 specimens
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Grant	006S 003E	17	343100N	0862000W	5/25/1995	6 specimens, 1995.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-03-25.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Guntersville Dam	007S 002E	9	342700N	0862500W	1964-00-00	0.013 dead shells per square yard.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Grant	006S 003E	17	343100N	0862000W	7/24/1991	4 specimens

Table C-2. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Grant	006S 003E	4	343300N	0861900W	7/23/1991	4 specimens
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Grant	005S 003E	34	343400N	0861800W	7/24/1991	1 specimen
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Grant	006S 003E	27	343300N	0862000W	7/24/1991	5 specimens
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Grant	005S 003E	27	343500N	0861800W	3/27/1995	1 specimen.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Grant	006S 003E	20	343200N	0861900W	5/22/1995	2 specimens.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Grant	006S 003E	17	343100N	0862000W	5/25/1995	3 specimens.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Grant	006S 003E	17	343100N	0862000W	5/25/1995	2 specimens, 1995-03-25.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-03-25.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-05-25.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Grant	006S 003E	18	343300N	0862100W	5/25/1995	3 specimens.
Mussels	*Lampsilis teres*	yellow sandshell	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	2 specimens, 1991; 3 specimens, 1995.
Mussels	*Lampsilis teres*	yellow sandshell	G5	S5			Grant	006S 003E	27	343300N	0862000W	1991-07	2 specimens
Mussels	*Lampsilis teres*	yellow sandshell	G5	S5			Grant	006S 003E	20	343200N	0861900W	5/22/1995	4 specimens.
Mussels	*Lampsilis teres*	yellow sandshell	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen.
Mussels	*Lampsilis teres*	yellow sandshell	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-03-25.
Mussels	*Lampsilis teres*	yellow sandshell	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-05-25.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Grant	005S 003E	34	343400N	0861800W	7/25/1991	1 specimen
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Grant	006S 003E	27	343300N	0862000W	1991-07	1 specimen
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Grant	005S 003E	33	343300N	0861900W	5/22/1995	1 specimen.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Grant	006S 003E	18	343300N	0862100W	5/25/1995	1 specimen.

Table C-2. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Grant	006S 003E	4	343300N	0861900W	1991-07	3 specimens
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Grant	006S 003E	27	343300N	0862000W	1991-07	2 specimens
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Grant	005S 003E	33	343300N	0861900W	5/22/1995	1 specimen.
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Grant	006S 003E	20	343200N	0861900W	5/22/1995	6 specimens.
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995.
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	14 specimens.
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-03-25.
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	3 specimens, 1995-05-25.
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Grant	006S 003E	18	343100N	0862200W	5/25/1995	6 specimens.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Grant	006S 003E	17	343100N	0862000W	5/25/1995	10 specimens, 1991; 1 specimen, 1995.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Grant	006S 003E	4	343300N	0861900W	5/22/1995	53 specimens, 1991.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Grant	005S 003E	34	343400N	0861800W	7/24/1991	13 specimens
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Grant	006S 003E	27	343300N	0862000W	7/24/1991	21 specimens
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Grant	005S 003E	33	343400N	0861900W	5/22/1995	1 specimen.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Grant	006S 003E	17	343100N	0862000W	5/25/1995	2 specimens, 1995-03-25.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Grant	006S 003E	17	343100N	0862000W	5/25/1995	2 specimens, 1995-03-25.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Grant	006S 003E	17	343100N	0862000W	5/25/1995	4 specimens, 1995-05-25.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Grant	006S 003E	18	343300N	0862100W	5/25/1995	4 specimens.
Mussels	*Ligumia recta*	black sandshell	G5	S2			Grant	006S 003E	4	343300N	0861900W	1991-07	1 specimen

Table C-2. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Megalonaias nervosa*	washboard	G5	S5			Grant	006S 003E	17	343100N	0862000W	7/24/1991	3 specimens
Mussels	*Megalonaias nervosa*	washboard	G5	S5			Grant	006S 003E	4	343300N	0861900W	1991-07	7 specimens
Mussels	*Megalonaias nervosa*	washboard	G5	S5			Grant	005S 003E	34	343400N	0861800W	7/25/1991	16 specimens
Mussels	*Megalonaias nervosa*	washboard	G5	S5			Grant	006S 003E	27	343300N	0862000W	1991-07	16 specimens
Mussels	*Megalonaias nervosa*	washboard	G5	S5			Grant	006S 003E	20	343200N	0861900W	5/22/1995	1 specimen.
Mussels	*Megalonaias nervosa*	washboard	G5	S5			New Hope	006S 002E	14	343100N	0862300W	5/25/1995	1 specimen.
Mussels	*Obliquaria reflexa*	threehorn wartyback	G5	S5			Grant	006S 003E	17	343100N	0862000W	7/24/1991	4 specimens
Mussels	*Obliquaria reflexa*	threehorn wartyback	G5	S5			Grant	006S 003E	4	343300N	0861900W	5/22/1995	7 specimens, 1991; 2 specimens, 1995.
Mussels	*Obliquaria reflexa*	threehorn wartyback	G5	S5			Grant	005S 003E	34	343400N	0861800W	7/25/1991	1 specimen
Mussels	*Obliquaria reflexa*	threehorn wartyback	G5	S5			Grant	006S 003E	27	343300N	0862000W	1991-07	1 specimen
Mussels	*Obliquaria reflexa*	threehorn wartyback	G5	S5			Grant	005S 003E	29	343400N	0862000W	5/22/1995	1 specimen.
Mussels	*Obliquaria reflexa*	threehorn wartyback	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	2 specimens, 1995.
Mussels	*Obliquaria reflexa*	threehorn wartyback	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen.
Mussels	*Obliquaria reflexa*	threehorn wartyback	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-05-25.
Mussels	*Obliquaria reflexa*	threehorn wartyback	G5	S5			New Hope	006S 002E	14	343100N	0862300W	5/25/1995	1 specimen.
Mussels	*Plethobasus cooperianus*	orange-foot pimpleback	G1	SH	LE	SP	Guntersville Dam	007S 002E	5	342700N	0862600W	1978-00-00	0
Mussels	*Pleurobema cordatum*	Ohio pigtoe	G3	S2			Grant	006S 003E	4	343300N	0861900W	1991-07	Relictual specimen
Mussels	*Pleurobema cordatum*	Ohio pigtoe	G3	S2			Grant	005S 003E	34	343400N	0861800W	7/25/1991	7 specimens
Mussels	*Pleurobema cordatum*	Ohio pigtoe	G3	S2			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-05-25.
Mussels	*Pleurobema cordatum*	Ohio pigtoe	G3	S2			Grant	006S 003E	18	343100N	0862200W	5/25/1995	1 specimen.

Table C-2. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Pleurobema oviforme*	Tennessee clubshell	G3	S1			Grant	006S 003E	17	343100N	0862000W	5/25/1995	2 specimens, 1995.
Mussels	*Pleurobema oviforme*	Tennessee clubshell	G3	S1			Grant	006S 003E	17	343100N	0862000W	5/25/1995	5 specimens.
Mussels	*Pleurobema oviforme*	Tennessee clubshell	G3	S1			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-03-25.
Mussels	*Pleurobema oviforme*	Tennessee clubshell	G3	S1			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-05-25.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	8 specimens, 1991; 11 specimens, 1995.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Grant	006S 003E	4	343300N	0861900W	1991-07	4 specimens
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Grant	005S 003E	34	343400N	0861800W	7/25/1991	2 specimens
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Grant	006S 003E	27	343300N	0862000W	1991-07	14 specimens
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Grant	005S 003E	33	343300N	0861900W	5/22/1995	6 specimens.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Grant	006S 003E	20	343200N	0861900W	5/22/1995	12 specimens.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	8 specimens.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-03-25.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	4 specimens, 1995-05-25.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Grant	006S 003E	18	343100N	0862200W	5/25/1995	4 specimens.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			New Hope	006S 002E	14	343100N	0862300W	5/25/1995	1 specimen.
Mussels	*Pyganodon grandis*	giant floater	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen.
Mussels	*Pyganodon grandis*	giant floater	G5	S5			Grant	006S 003E	18	343300N	0862100W	5/25/1995	1 specimen.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Grant	006S 003E	17	343100N	0862000W	7/24/1991	2 specimens
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Grant	006S 003E	27	343300N	0862000W	7/24/1991	1 specimens

Table C-2. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Grant	005S 003E	27	343500N	0861800W	3/27/1995	1 specimen.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimens.
Mussels	*Quadrula metanevra*	monkeyface	G4	S3			Grant	006S 003E	17	343100N	0862000W	7/24/1991	2 individuals
Mussels	*Quadrula metanevra*	monkeyface	G4	S3			Grant	006S 003E	4	343300N	0861900W	1991-07	1 specimen
Mussels	*Quadrula nodulata*	wartyback	G4	S1S2			Grant	006S 003E	27	343300N	0862000W	7/24/1991	1 live or fresh dead specimen
Mussels	*Quadrula nodulata*	wartyback	G4	S1S2			Grant	006S 003E	17	343100N	0862000W	5/25/1995	2 specimens, 1995.
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			Grant	006S 003E	4	343300N	0861900W	5/22/1995	1 specimen, 1991; 1 specimen, 1995.
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			Grant	005S 003E	34	343400N	0861800W	7/25/1991	2 specimens
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			Grant	006S 003E	27	343300N	0862000W	1991-07	2 specimens
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			Grant	005S 003E	27	343500N	0861800W	3/27/1995	4 specimens.
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			Grant	005S 003E	33	343300N	0861900W	5/22/1995	1 specimen.
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	7 specimens, 1995.
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			Grant	006S 003E	17	343100N	0862000W	5/25/1995	18 specimens, 1995-05-25.
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			Grant	006S 003E	18	343300N	0862100W	5/25/1995	2 specimens.
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			Grant	006S 003E	18	343100N	0862100W	5/25/1995	1 specimen.
Mussels	*Quadrula quadrula*	mapleleaf	G5	S5			Grant	006S 003E	27	343300N	0862000W	1991-07	Relictual specimens
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Grant	006S 003E	17	343100N	0862000W	5/25/1995	18 specimens, 1991; 3 specimens, 1995.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Grant	006S 003E	4	343300N	0861900W	7/23/1991	4 specimens

Table C-2. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Grant	005S 003E	34	343400N	0861800W	7/24/1991	Ahlstedt (1991) reported 33 live or fresh dead specimens resulting from 6 man-hour TVA survey. Live mussels returned to river, shells at TVA Aquatic Biology Lab, Norris, TN.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Grant	006S 003E	27	343300N	0862000W	7/24/1991	3 specimens
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Grant	005S 003E	33	343300N	0861900W	5/22/1995	1 specimen.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Grant	006S 003E	17	343100N	0862000W	5/25/1995	4 specimens.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Grant	006S 003E	17	343100N	0862000W	5/25/1995	3 specimens, 1995-03-25.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Grant	006S 003E	17	343100N	0862000W	5/25/1995	3 specimens, 1995-05-25.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Grant	006S 003E	18	343300N	0862100W	5/25/1995	3 specimens.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Grant	006S 003E	18	343100N	0862100W	5/25/1995	68 specimens.
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Grant	006S 003E	27	343300N	0862000W	1991-07	1 specimen
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995.
Mussels	*Villosa iris*	rainbow	G5	S3			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-03-25.
Mussels	*Villosa iris*	rainbow	G5	S3			Grant	006S 003E	17	343100N	0862000W	5/25/1995	2 specimens, 1995-03-25.
Mussels	*Villosa iris*	rainbow	G5	S3			Grant	006S 003E	17	343100N	0862000W	5/25/1995	2 specimens, 1995-05-25.
Mussels	*Villosa nebulosa*	Alabama rainbow	G3	S3			Grant	005S 003E	34	343400N	0861800W	7/25/1991	1 specimen
Mussels	*Villosa nebulosa*	Alabama rainbow	G3	S3			Grant	006S 003E	27	343300N	0862000W	1991-07	1 specimen

Table C-2. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Grant	006S 003E	17	343100N	0862000W	5/25/1995	14 specimens, 1991; 3 specimens, 1995.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Grant	006S 003E	4	343300N	0861900W	5/22/1995	12 specimens, 1991; 1 specimen, 1995.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Grant	005S 003E	34	343400N	0861800W	7/25/1991	2 specimens
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Grant	006S 003E	27	343300N	0862000W	1991-07	5 specimens
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Grant	005S 003E	27	343500N	0861800W	3/27/1995	2 specimens.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Grant	005S 003E	33	343300N	0861900W	5/22/1995	1 specimen.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Grant	006S 003E	20	343200N	0861900W	5/22/1995	2 specimens.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Grant	006S 003E	17	343100N	0862000W	5/25/1995	4 specimens.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Grant	006S 003E	17	343100N	0862000W	5/25/1995	3 specimens, 1995-03-25.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-03-25.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Grant	006S 003E	17	343100N	0862000W	5/25/1995	1 specimen, 1995-05-25.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Grant	006S 003E	18	343300N	0862100W	5/25/1995	3 specimens.

Table C-2. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Vascular Plants	*Apios priceana*	Price's potato-bean	G2	S2	LT		Grant	006S 003E	12	343200N	0861600W	1990-09-?? ??	Flowers purple violet with green tips. Three plants found in 1979 (Tom Patrick). Revisited in 1980 by Max E. Medley and Tom Patrick; only one plant found. Plant appeared healthy, but somewhat etiolated due to shading (Medley, 1980). Visited in 9/1990 by Jarel Bartig - 5 plants; two in fruit. All five plants showed sign of insect predation on the foliage.
Vascular Plants	*Carex purpurifera*	purple sedge	G4?	S2			Grant	006S 003E	12	343200N	0861600W	4/29/1973	0
Vascular Plants	*Dicentra cucullaria*	Dutchman's breeches	G5	S2			Grant	006S 003E	12	343200N	0861600W	4/2/1969	Rather abundant
Vascular Plants	*Silphium brachiatum*	Cumberland rosinweed	G2	S2			Grant	006S 003E	12	343200N	0861600W	8/27/1998	Greater then 500 plants were observed encompassing approximately four acres. Flowers and immature fruit were apparent.

Table C-3. All occurrences of endangered, threatened, and rare species and natural communities occurring in the Upper Paint Rock River subwatershed (06030002-070) of the Paint Rock River (PRR) watershed documented by the Alabama Natural Heritage Program[SM] as of 31 December 2002. Coordinates given are rounded to the nearest minute.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Arachnids	*Nesticus barri*	a cave obligate spider	G3G4	S3			Paint Rock			344000N	0861900W		Peck (1989) reported the species from this cave; no date was given.
Arachnids	*Nesticus barri*	a cave obligate spider	G3G4	S3			Paint Rock			343900N	0861800W		
Fish	*Typhlichthys subterraneus*	southern cavefish	G4	S3		SP	Paint Rock	004S 003E	21	344000N	0861900W	9/15/1993	1993-09-15: 23 observed. 1977-04-12: 1 observed. Used as a hibernaculum for *Myotis* sodalis. Also used as hibernaculum by more than 50% of the entire gray bat population each winter.
Insects	*Litocampa valentinei*		G3G4	S?			Paint Rock			344000N	0861900W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Litocampa valentinei*		G3G4	S?			Paint Rock			344100N	0862000W		Peck (1995) reported this species from this cave; no date was given.
Insects	*Pseudosinella spinosa*	a cave obligate springtail	G3G4	S?			Paint Rock			344400N	0862000W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Pseudosinella spinosa*	a cave obligate springtail	G3G4	S?			Paint Rock			344000N	0862000W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Ptomaphagus longicornis*	a cave obligate beetle	G3	S2			Paint Rock			344100N	0862000W		Peck (1995) reported the species from this cave; no date was given.

Table C-3. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Insects	*Ptomaphagus longicornis*	a cave obligate beetle	G3	S2			Paint Rock			343900N	0862000W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Ptomaphagus longicornis*	a cave obligate beetle	G3	S2			Paint Rock			344000N	0862000W		Peck (1995) reported the species from this cave; no date was given.
Mammals	*Myotis grisescens*	gray bat	G3	S2	LE	SP	Paint Rock	004S 003W	28	344000N	0861900W	8/5/1991	Cave was not surveyed 1993-98. Cave was visited in 1995, but received no formal survey. 1992-08-11: One bat emerged. 1991-08-05: Three bats emerged. No guano pile was found. 1976: Data provided to TVA by Merlin Tuttle indicated the cave was used by 300 to 400 individuals, but kind of use not specified.

Table C-3. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mammals	*Myotis grisescens*	gray bat	G3	S2	LE	SP	Paint Rock	004S 003E	21	344000N	0861900W	8/10/1993	No summer emergence count was conducted during 1994, 1995, 1996, 1997, 1998. A possible winter hibernaculum count is planned for 1999. Used as hibernaculum by more than 50% of the entire gray bat population each winter. Estimate conducted from the top of The Morgue entrance on 1993-08-10. Estimate: 400. Milling in and out makes counting difficult. 1992-08-04: Hudson and others descended by rope into The Morgue entrance to a point where the entrance narrows and it can be illuminated with infrared lights and counted with night vision scope; Hudson's estimate: 1,550 bats at The Morgue entrance. 1991-07-31: Emergence estimate: 2,880 bats

Table C-3. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mammals	*Myotis sodalis*	Indiana bat	G2	S2	LE	SP	Paint Rock	004S 003E	21	344000N	0861900W	8/9/1976	Used as a hibernaculum for MYOTIS SODALIS. Also used as hibernaculum by more than 50% of the entire gray bat population each winter.
Mussels	*Actinonaias pectorosa*	pheasantshell	G4	SH			Lim Rock	003S 004E	32	344400N	0861400W	1965-00-00	
Mussels	*Amblema plicata*	three-ridge	G5	S5			Grant	005S 003E	17	343600N	0862000W	1991-07	6 specimens
Mussels	*Amblema plicata*	three-ridge	G5	S5			Grant	005S 003E	10	343700N	0861800W	7/24/1991	1 specimen
Mussels	*Amblema plicata*	three-ridge	G5	S5			Paint Rock	004S 003E	29	344000N	0862000W	3/21/1995	2 specimens, 1991; 1 specimen, 1995.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Paint Rock	004S 003E	21	344100N	0861900W	3/23/1995	2 specimens, 1995-03-23.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Paint Rock	004S 003E	2	344400N	0861600W	1991-00-00	14 specimens
Mussels	*Amblema plicata*	three-ridge	G5	S5			Grant	005S 003E	16	343700N	0861900W	3/27/1995	1 specimen.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Lim Rock	003S 004E	32	344500N	0861400W	5/23/1995	1 specimen, 1995-05-23.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Paint Rock	004S 003E	1	344400N	0861600W	5/23/1995	1 specimen, 1995-05-23.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Paint Rock	004S 003E	3	344300N	0861800W	5/23/1995	4 specimens.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Paint Rock	004S 003E	3	344300N	0861800W	5/23/1995	3 specimens.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Paint Rock	004S 003E	10	344300N	0861800W	5/23/1995	1 specimens, 1995-03-23.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Paint Rock	004S 003E	16	344200N	0861800W	5/23/1995	1 specimen, 1995-03-23.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Paint Rock	004S 003E	28	344000N	0861900W	5/23/1995	1 specimen.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	1 specimen, 1995-05-26.
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Grant	005S 003E	17	343600N	0862000W	1991-07	10 specimens

Table C-3. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Paint Rock	004S 003E	29	344000N	0862000W	1991-07	3 specimens
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Paint Rock	004S 003E	21	344100N	0861900W	5/23/1995	7 specimens, 1991; 3 specimens, 1995.
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Grant	005S 003E	16	343700N	0861900W	3/27/1995	1 specimen.
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Paint Rock	004S 003E	1	344400N	0861600W	5/23/1995	1 specimen, 1995-05-23.
Mussels	*Ellipsaria lineolata*	butterfly	G4	S3			Paint Rock	004S 003E	29	344000N	0862000W	1991-07	1 specimen
Mussels	*Elliptio crassidens*	elephant-ear	G5	S5			Paint Rock	004S 003E	21	344100N	0861900W	1991-07	1 specimen
Mussels	*Elliptio dilatata*	spike	G5	S1			Grant	005S 003E	17	343600N	0862000W	1991-07	1 specimen
Mussels	*Epioblasma triquetra*	snuffbox	G3	S1			Paint Rock	004S 003E	28	344000N	0861900W	5/23/1995	2 specimens.
Mussels	*Epioblasma triquetra*	snuffbox	G3	S1			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	1 specimen, 1995-05-26.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Lim Rock	003S 004E	32	344400N	0861400W	1965-00-00	
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Grant	005S 003E	17	343600N	0862000W	3/27/1995	6 specimens, 1991; 1 specimen, 1995.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Paint Rock	004S 003E	16	344200N	0861800W	5/23/1995	1 specimen, 1995-03-23.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Paint Rock	004S 003E	21	344100N	0861900W	3/28/1995	2 specimens, 1995-03-28.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Grant	005S 003E	10	343700N	0861800W	8/21/1991	1 fresh dead specimen, 5 years old, observed by Ahlstedt, Hickman, Saylor, and Koch in 1984. Ahlstedt (1991) reported 3 relicts.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Paint Rock	004S 003E	29	344000N	0862000W	1991-07	Relictual specimens
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Lim Rock	003S 004E	32	344500N	0861400W	5/23/1995	1 specimen, 1995-05-23.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Paint Rock	004S 003E	21	344100N	0861900W	3/28/1995	1 specimen, 1995-03-28.
Mussels	*Fusconaia cuneolus*	fine-rayed pigtoe	G1	S1	LE,XN	SP	Paint Rock	004S 003E	2	344400N	0861600W	1967-00-00	

Table C-3. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Grant	005S 003E	17	343600N	0862000W	3/27/1995	1 specimen, 1991; 2 specimens, 1995.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Grant	005S 003E	10	343700N	0861800W	7/24/1991	1 specimen
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Paint Rock	004S 003E	2	344400N	0861600W	1991-00-00	Relictual specimens
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Lim Rock	003S 004E	32	344500N	0861400W	5/23/1995	1 specimens, 1995-05-23.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Paint Rock	004S 003E	3	344300N	0861800W	5/23/1995	1 specimen.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Lim Rock	003S 004E	32	344400N	0861400W	1965-00-00	
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Lim Rock	003S 004E	31	344400N	0861400W	1980-00-00	One specimen.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Paint Rock	004S 003E	29	344000N	0862000W	7/25/1991	2 specimens
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Paint Rock	004S 003E	21	344100N	0861900W	1991-07	4 specimens
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Paint Rock	004S 003E	2	344400N	0861600W	1991-07-25-00-00	1 specimen
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Grant	005S 003E	16	343700N	0861900W	3/27/1995	2 specimens.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Lim Rock	003S 004E	32	344500N	0861400W	5/23/1995	4 specimens, 1995-05-23.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Paint Rock	004S 003E	16	344200N	0861800W	5/23/1995	1 specimen, 1995-03-23.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Paint Rock	004S 003E	21	344100N	0861900W	5/23/1995	1 specimen, 1995.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	1 specimen, 1995-05-26.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	2 specimens, 1995-05-26.
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	LE,XN	SP	Paint Rock	004S 003E	2	344400N	0861600W	1967-00-00	
Mussels	*Lasmigona complanata*	white heelsplitter	G5	S?			Paint Rock	004S 003E	28	344000N	0861900W	5/23/1995	1 specimen.
Mussels	*Lasmigona complanata*	white heelsplitter	G5	S?			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	1 specimen, 1995-05-26.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Grant	005S 003E	10	343700N	0861800W	7/24/1991	Relictual specimens
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Paint Rock	004S 003E	29	344000N	0862000W	1991-07	1 specimen

Table C-3. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Paint Rock	004S 003E	21	344100N	0861900W	1991-07	1 specimen
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Lim Rock	003S 004E	32	344500N	0861400W	5/23/1995	1 specimen, 1995-05-23.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Lim Rock	003S 004E	31	344400N	0861500W	2/23/1995	2 specimens.
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Paint Rock	004S 003E	29	344000N	0862000W	1991-07	1 specimen
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Paint Rock	004S 003E	21	344100N	0861900W	1991-07	2 specimens
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Paint Rock	004S 003E	16	344200N	0861800W	5/23/1995	2 specimens, 1995-03-23.
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Paint Rock	004S 003E	21	344100N	0861900W	5/23/1995	3 specimens, 1995.
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Paint Rock	004S 003E	28	344000N	0861900W	5/23/1995	6 specimens.
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Paint Rock	004S 003E	29	344000N	0862000W	5/26/1995	1 specimen, 1995-05-26.
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	1 specimen, 1995-05-26.
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	2 specimens, 1995-05-26.
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	2 specimens.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Paint Rock	004S 003E	2	344400N	0861600W	1967-00-00	
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Lim Rock	003S 004E	31	344400N	0861400W	1980-00-00	Three specimens.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Lim Rock	003S 004E	32	344400N	0861400W	1965-00-00	
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Grant	005S 003E	17	343600N	0862000W	3/27/1995	10 specimens, 1991; 4 specimens, 1995
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Paint Rock	004S 003E	21	344100N	0861900W	5/23/1995	1 specimen, 1991; 15 specimens, 1995.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Paint Rock	004S 003E	3	344300N	0861800W	5/23/1995	1 specimen.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Paint Rock	004S 003E	10	344300N	0861800W	5/23/1995	4 specimens, 1995-03-23.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Paint Rock	004S 003E	28	344000N	0861900W	5/23/1995	1 specimen.

Table C-3. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Paint Rock	004S 003E	29	344000N	0862000W	7/25/1991	Ortmann (1925) reported specimens collected by h. H. Smith and walker from this locality. Specimens at Carnegie Museum. Ahlstedt (1991) reported 3 live or fresh dead.
Mussels	*Ligumia recta*	black sandshell	G5	S2			Lim Rock	003S 004E	32	344500N	0861400W	5/23/1995	2 specimens, 1995-05-23.
Mussels	*Megalonaias nervosa*	washboard	G5	S5			Grant	005S 003E	17	343600N	0862000W	1991-07	3 specimens
Mussels	*Megalonaias nervosa*	washboard	G5	S5			Grant	005S 003E	10	343700N	0861800W	7/24/1991	1 specimen
Mussels	*Megalonaias nervosa*	washboard	G5	S5			Paint Rock	004S 003E	29	344000N	0862000W	1991-07	2 specimens
Mussels	*Megalonaias nervosa*	washboard	G5	S5			Paint Rock	004S 003E	21	344100N	0861900W	1991-07	5 specimens
Mussels	*Obliquaria reflexa*	threehorn wartyback	G5	S5			Paint Rock	004S 003E	29	344000N	0862000W	1991-07	4 specimens
Mussels	*Obliquaria reflexa*	threehorn wartyback	G5	S5			Paint Rock	004S 003E	21	344100N	0861900W	1991-07	Relictual specimens
Mussels	*Obliquaria reflexa*	threehorn wartyback	G5	S5			Lim Rock	003S 004E	32	344500N	0861400W	5/23/1995	1 specimen, 1995-05-23.
Mussels	*Obliquaria reflexa*	threehorn wartyback	G5	S5			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	1 specimen, 1995-05-26.
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Lim Rock	003S 004E	32	344400N	0861400W	1965-00-00	
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Paint Rock	004S 003E	29	344000N	0862000W	7/25/1991	1 relictual specimen
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Paint Rock	004S 003E	10	344300N	0861800W	5/23/1995	1 specimen, 1995-03-23.
Mussels	*Pleurobema cordatum*	Ohio pigtoe	G3	S2			Paint Rock	004S 003E	21	344100N	0861900W	1991-07	1 specimen
Mussels	*Pleurobema oviforme*	Tennessee clubshell	G3	S1			Lim Rock	003S 004E	32	344400N	0861400W	1965-00-00	
Mussels	*Pleurobema oviforme*	Tennessee clubshell	G3	S1			Paint Rock	004S 003E	21	344100N	0861900W	3/28/1995	6 specimens, 1995-03-28.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Grant	005S 003E	17	343600N	0862000W	1991-07	6 specimens

Table C-3. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Grant	005S 003E	10	343700N	0861800W	3/21/1995	15 specimens, 1991; 2 specimens, 1995.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Paint Rock	004S 003E	29	344000N	0862000W	3/21/1995	17 specimens, 1991; 2 specimens, 1995.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Grant	005S 003E	16	343700N	0861900W	3/27/1995	8 specimens.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Grant	005S 003E	16	343700N	0861900W	3/27/1995	1 specimen.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Lim Rock	003S 004E	32	344500N	0861400W	5/23/1995	10 specimens, 1995-05-23.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Lim Rock	003S 004E	31	344400N	0861500W	2/23/1995	1 specimen.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Paint Rock	004S 003E	2	344400N	0861600W	3/28/1995	2 specimens.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Paint Rock	004S 003E	2	344300N	0861700W	3/28/1995	1 specimen.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Paint Rock	004S 003E	10	344300N	0861800W	5/23/1995	3 specimens, 1995-03-23.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Paint Rock	004S 003E	16	344200N	0861800W	5/23/1995	3 specimens, 1995-03-23.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Paint Rock	004S 003E	21	344100N	0861900W	5/23/1995	4 specimens, 1995.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Paint Rock	004S 003E	28	344000N	0861900W	5/23/1995	3 specimens.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Paint Rock	004S 003E	29	344000N	0862000W	5/26/1995	1 specimen, 1995-05-26.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	6 specimens, 1995-05-26.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	7 specimens, 1995-05-26.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	8 specimens, 1995-05-26.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	2 specimens.
Mussels	*Potamilus purpuratus*	bleufer	G5	S5			Paint Rock	004S 003E	29	344000N	0862000W	3/21/1995	1 specimen, 1995.
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Grant	005S 003E	17	343600N	0862000W	1991-07	1 specimen
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Paint Rock	004S 003E	2	344400N	0861600W	1991-07-25-00-00	1 specimen

Table C-3. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Paint Rock	004S 003E	21	344100N	0861900W	7/25/1991	1 relictual specimen
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Paint Rock	004S 003E	21	344100N	0861900W	5/23/1995	1 specimen, 1995.
Mussels	*Pyganodon grandis*	giant floater	G5	S5			Grant	005S 003E	16	343700N	0861900W	3/27/1995	1 specimen.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Grant	005S 003E	17	343600N	0862000W	7/24/1991	Relictual specimen
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Paint Rock	004S 003E	2	344400N	0861600W	1967-00-00	
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Paint Rock	004S 003E	29	344000N	0862000W	3/21/1995	Ortmann (1991) reported specimens collected by H. H. Smith from this locality. Specimens at Carnegie Museum. Date of this earlier collection not given. Ahlstedt (1991) reported 3 live or fresh dead specimens. 5 specimens reported in 1995 by f95vit01alus.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Paint Rock	004S 003E	21	344100N	0861900W	5/23/1995	1 specimen, 1991; 3 specimens, 1995.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Lim Rock	003S 004E	32	344500N	0861400W	5/23/1995	5 specimens, 1995-05-23.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Paint Rock	004S 003E	2	344400N	0861600W	3/28/1995	1 specimen.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Paint Rock	004S 003E	3	344300N	0861800W	5/23/1995	1 specimen.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	1 specimen, 1995-05-26.

Table. C-3. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Quadrula metanevra*	monkeyface	G4	S3			Paint Rock	004S 003E	29	344000N	0862000W	1991-07	1 specimen
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			Grant	005S 003E	17	343600N	0862000W	1991-07	1 specimen
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			Grant	005S 003E	10	343700N	0861800W	7/24/1991	Relictual specimens
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			Paint Rock	004S 003E	21	344100N	0861900W	1991-07	2 specimens
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			Grant	005S 003E	16	343700N	0861900W	3/27/1995	1 specimen.
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			Paint Rock	004S 003E	1	344400N	0861600W	5/23/1995	1 specimen, 1995-05-23.
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			Paint Rock	004S 003E	29	344000N	0862000W	5/26/1995	1 specimen, 1995-05-26.
Mussels	*Toxolasma cylindrellus*	pale lilliput	G1	S1	LE	SP	Lim Rock	003S 004E	32	344500N	0861400W	5/23/1995	4 specimens, 1995-05-23.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Paint Rock	004S 003E	2	344400N	0861600W	1967-00-00	
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Grant	005S 003E	17	343600N	0862000W	7/24/1991	1 specimen
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Grant	005S 003E	10	343700N	0861800W	7/21/1991	1 specimen
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Paint Rock	004S 003E	29	344000N	0862000W	7/25/1991	2 specimens
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Lim Rock	003S 004E	32	344500N	0861400W	5/23/1995	1 specimen, 1995-05-23.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Paint Rock	004S 003E	10	344300N	0861800W	5/23/1995	2 specimens, 1995-03-23.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Paint Rock	004S 003E	16	344200N	0861800W	3/23/1995	1 specimen, 1995-03-23.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Paint Rock	004S 003E	21	344100N	0861900W	3/28/1995	2 specimens, 1995-03-28.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	2 specimens, 1995-05-26.
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Paint Rock	004S 003E	2	344400N	0861600W	3/28/1995	1 specimen.
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	1 specimen.
Mussels	*Truncilla donaciformis*	fawnsfoot	G5	S4			Grant	005S 003E	10	343700N	0861800W	7/24/1991	Relictual specimens
Mussels	*Truncilla truncata*	deertoe	G5	S1			Paint Rock	004S 003E	2	344400N	0861600W	1967-00-00	

Table C-3. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Truncilla truncata*	deertoe	G5	S1			Lim Rock	003S 004E	32	344400N	0861400W	1965-00-00	
Mussels	*Truncilla truncata*	deertoe	G5	S1			Paint Rock	004S 003E	21	344100N	0861900W	7/25/1991	1 specimen
Mussels	*Villosa iris*	rainbow	G5	S3			Paint Rock	004S 003E	21	344100N	0861900W	3/28/1995	1 specimen, 1995-03-28.
Mussels	*Villosa iris*	rainbow	G5	S3			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	1 specimen, 1995-05-26.
Mussels	*Villosa nebulosa*	Alabama rainbow	G3	S3			Grant	005S 003E	17	343600N	0862000W	1991-07	Relictual specimens
Mussels	*Villosa nebulosa*	Alabama rainbow	G3	S3			Grant	005S 003E	10	343700N	0861800W	7/24/1991	1 specimen
Mussels	*Villosa nebulosa*	Alabama rainbow	G3	S3			Paint Rock	004S 003E	21	344100N	0861900W	1991-07	1 specimen
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Grant	005S 003E	10	343700N	0861800W	7/24/1991	2 specimens
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Paint Rock	004S 003E	29	344000N	0862000W	3/21/1995	2 specimens, 1991; 1 specimen, 1995.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Paint Rock	004S 003E	21	344100N	0861900W	1991-07	2 specimens
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Grant	005S 003E	16	343700N	0861900W	3/27/1995	3 specimens.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Grant	005S 003E	17	343600N	0862000W	3/27/1995	6 specimens, 1991; 1 specimen, 1995.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Lim Rock	003S 004E	32	344500N	0861400W	5/23/1995	2 specimens, 1995-05-23.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Paint Rock	004S 003E	10	344300N	0861800W	5/23/1995	1 specimen, 1995-03-23.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Paint Rock	004S 003E	16	344200N	0861800W	5/23/1995	2 specimens, 1995-03-23.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	1 specimen, 1995-05-26.

Table C-3. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	2 specimens, 1995-05-26.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Paint Rock	004S 003E	33	343900N	0861900W	5/26/1995	1 specimen, 1995-05-26.
Vascular Plants	*Asplenium scolopendrium* var *americanum*	American Hart's-tongue fern	G4T3	S1	LT		Paint Rock	004S 003E	28	344000N	0861900W	8/14/1981	About 20 plants observed. Boulder-strewn talus slope at base of deep sinkhole - Freeman, 1979. Evans (1981) found that the population had dwindled to nine plants by July 1981. On July 12, 1988, Fred Bagley observed five distinct plants. The healthiest two plants were within a couple inches of one another. One of these had 17+ fronds, the other had 15. A third plant had 4 fronds and a fourth plant had one frond and 2 fiddleheads. A fifth had 3 fronds, one of these was brown and deteriorated. - Fred Bagley, 1988.
Vascular Plants	*Carex purpurifera*	purple sedge	G4?	S2			Paint Rock	004S 003E	28	344000N	0861900W	5/8/1980	Common
Vascular Plants	*Cheilanthes alabamensis*	Alabama lip-fern	G4G5	S3			Paint Rock	004S 003E	29	344000N	0862000W	6/22/1935	Crevices of limestone cliffs.

Table C-3. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Vascular Plants	*Clematis morefieldii*	Morefield's leather-flower	G1	S1	LE		Paint Rock	004S 003E	34	343900N	0861800W	6/26/2002	41 plants were observed, 3 of which were reproductively active (i.e. Fruit).
Vascular Plants	*Cotinus obovatus*	American smoke-tree	G4	S2			Paint Rock	004S 003E	21	344000N	0861900W	5/8/1980	Small tree, "growing in fissure of a limestone outcrop."
Vascular Plants	*Cotinus obovatus*	American smoke-tree	G4	S2			Paint Rock	004S 003E, 004S 003E	27, 34	343900N	0861800W	8/28/1998	Approximately 25-30 trees were observed scattered over and area of roughly five to eight acres. More trees likely exist elsewhere within the immediate area.
Vascular Plants	*Cystopteris tennesseensis*	Tennessee bladderfern	G5	S2			Paint Rock	004S 003E	21	344000N	0862000W	10/21/1978	
Vascular Plants	*Jeffersonia diphylla*	twinleaf	G5	S2			Paint Rock	004S 003E	21	344100N	0861900W	6/28/2002	Hundreds of plants encompassing several acres.
Vascular Plants	*Silphium brachiatum*	Cumberland rosinweed	G2	S2			Paint Rock	004S 003E, 004S 003E	27, 34	343900N	0861800W	8/28/1998	Approximately 300-350 plants were observed. Flowering was nearly completed. Population extends for roughly 0.8 along slopes bounding drainage course.

Table C-4. All occurrences of endangered, threatened, and rare species and natural communities occurring in the Clear Creek subwatershed (0603002-080) of the Paint Rock River (PRR) watershed documented by the Alabama Natural Heritage Program[SM] as of 31 December 2002. Coordinates given are rounded to the nearest minute.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
	AL Jackson County cave						Hollytree			344500N	0861900W		The cave has 2 entrances; both are large, walk-in entrances. One entrance has a flowing stream.
	AL Jackson County cave						Hollytree			344600N	0861800W		Cave has 3 entrances; the first and second are pit entrances. The third entrance, Mcfarland blo cave is plotted separately as gcaveal071*556*tv.
	AL Jackson County cave						Hollytree			344500N	0861800W		The cave has five entrances, three pits, one chimney, and a stoop or duck-walk entrance (cave stand entrance) that has an inflowing stream. The cave stand entrance is plotted separately as gcaveal071*677*tv.
	AL Jackson County cave						Hollytree			344600N	0861800W		The cave has a very large, 20 ft. Wide, walk-in entrance.
Amphibians	*Gyrinophilus palleucus*	Tennessee cave salamander	G2G3	S2		SP	Hollytree	003S 003E	22	344600N	0861800W	1900-00-00	
Fish	*Erimystax insignis*	blotched chub	G3G4	S2			Paint Rock	004S 003E	4	344300N	0861900W	1994	
Fish	*Typhlichthys subterraneus*	southern cavefish	G4	S3		SP	Hollytree	003S 003E	28	344500N	0861900W	4/12/1977	1 observed.
Insects	*Litocampa valentinei*		G3G4	S?			Hollytree			344500N	0861800W		Peck (1995) reported the species from this cave; no date was given.

Table C-4. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Insects	*Pseudosinella spinosa*	a cave obligate springtail	G3G4	S?			Hollytree			344600N	0861800W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Pseudosinella spinosa*	a cave obligate springtail	G3G4	S?			Hollytree			344600N	0861800W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Ptomaphagus laticornis*	a beetle	G3	S1			Hollytree			344500N	0861800W		Peck (1995) reported the species from this cave; no date was given.
Mammals	*Corynorhinus rafinesquii*	Rafinesque's big-eared bat	G3G4	S2		SP	Hollytree	003S 003E	16	344600N	0861900W	8/9/1976	Cave is utilized by a maternity colony.
Mammals	*Corynorhinus rafinesquii*	Rafinesque's big-eared bat	G3G4	S2		SP	Paint Rock	003S 003E	34	344400N	0861800W	6/16/1956	
Vascular Plants	*Cladrastis kentukea*	yellowwood	G4	S3			Hollytree	003S 003E	27	344500N	0861800W	8/16/1975	Ph = 7.5-8. Melanized, rocky loam.
Vascular Plants	*Diplazium pycnocarpon*	narrow-leaved glade fern	G5	S1S2			Hollytree	003S 003E	27	344500N	0861800W	8/16/1975	Ph = 7.5-8. Melanized, rocky loam.

Table C-5. All occurrences of endangered, threatened, and rare species and natural communities occurring in the Estill Fork subwatershed (0603002-020) of the Paint Rock River (PRR) watershed documented by the Alabama Natural Heritage Program[SM] as of 31 December 2002 and the Tennessee Division of Natural Heritage – The Natural Heritage Program. Coordinates given are rounded to the nearest minute.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
	AL Jackson County cave						Princeton			345200N	0861200W		The cave has a stoop or duck-walk entrance with a stream.
	AL Jackson County cave						Estill Fork			345300N	0861100W		The cave has a stoop or duck-walk entrance with a spring about 20 ft. Inside the cave.
	AL Jackson County cave						Princeton			345100N	0861100W		The cave has a crawl-type entrance.
Fish	*Notropis albizonatus*	palezone shiner	G2	S1	LE	SP	Estill Fork	002S 004E	2	345400N	0861000W	1981-07-00	Six specimens in June, 1981; nine specimens in July, 1981.
Fish	*Notropis albizonatus*	palezone shiner	G2	S1	LE	SP	Estill Fork	002S 004E	2	345400N	0861000W	5/17/1990	39 frozen for electrophoretic study; 3 others preserved
Fish	*Notropis albizonatus*	palezone shiner	G2	S1	LE	SP	Estill Fork	001S 004E	35	345500N	0861000W	1980-08-00	20 specimens 1990.
Fish	*Notropis albizonatus*	palezone shiner	G2	S1	LE	SP	Princeton	002S 004E	15	345200N	0861200W	1980-00-00	2 specimens. Geological survey of Alabama reported no specimens from this locality may, 1991.
Fish	*Notropis albizonatus*	palezone shiner	G2	S1	LE	SP	Hytop	001S 005E	29	345500N	0860700W	8/21/1997	1 specimen collected.
Insects	*Goera stylata*	caddisfly	G?	S2			Hytop	001S 005E	9	345800N	0860600W		1 collection, 1 specimen, collected June.
Insects	*Hydroptila coweetensis*	caddisfly	G?	S1			Hytop	001S 005E	9	345800N	0860600W		Collected May-June.

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Insects	*Litocampa valentinei*		G3G4	S?			Estill Fork			345300N	0861100W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Neophylax acutus*	caddisfly	G?	S1			Hytop	001S 005E	9	345800N	0860600W		Collected in October.
Insects	*Neophylax acutus*	caddisfly	G?	S1			Estill Fork	001S 004E	35	345500N	0861000W		Collected in October.
Insects	*Neophylax acutus*	caddisfly	G?	S1			Hytop	001S 005E	3	345900N	0860600W		Collected in October.
Insects	*Neophylax securis*	caddisfly	G?	S1			Hytop	001S 005E	3	345900N	0860600W		1 collection, 1 adult; collected in October.
Insects	*Nyctiophylax banksi*	caddisfly	G?	S1			Estill Fork	001S 004E	13	345700N	0860900W		Collected May.
Insects	*Ptomaphagus chromolithus*	a cave obligate beetle	G3G4	S?			Princeton			345100N	0861100W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Rhyacophila alabama*	caddisfly	G1	S1			Hytop	001S 005E	9	345800N	0860600W		1 collection, 116 specimens, collected June.
Insects	*Wormaldia shawnee*	caddisfly	G?	S1			Estill Fork	001S 004E	13	345700N	0860900W		Collected May, June.
Mammals	*Corynorhinus rafinesquii*	Rafinesque's big-eared bat	G3G4	S2		SP	Hytop	001S 005E	20	345700N	0860700W	11/18/1978	One individual observed.
Mussels	*Alasmidonta viridis*	slippershell mussel	G4G5	S1		SP	Estill Fork	001S 005E	31	345500N	0860800W	7/17/1991	2 specimens observed at site #24.
Mussels	*Alasmidonta viridis*	slippershell mussel	G4G5	S1		SP	Hytop	001S 005E	16	345700N	0860700W	3/29/1995	2 specimens, 1995-03-18; 1 specimen, 1995-03-29.
Mussels	*Alasmidonta viridis*	slippershell mussel	G4G5	S1		SP	Hytop	001S 005E	29	345500N	0860700W	10/6/1998	1998-10-1998 - 1 fd, 1 wd; 1998-10-06 - 1 wd.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Estill Fork	002S 004E	2	345400N	0861000W	3/20/1995	Relictual specimens site #17, 1991; 160 specimens, 1995.

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Amblema plicata*	three-ridge	G5	S5			Estill Fork	002S 004E	11	345300N	0861100W	1991-07-00	1 specimen at site #16.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Estill Fork	001S 004E	35	345500N	0861000W	7/16/1991	14 specimens observed at site #21.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Estill Fork	001S 004E	36	345500N	0860900W	7/17/1991	2 specimens observed at site #23.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Estill Fork	001S 005E	31	345500N	0860800W	3/18/1995	26 specimens observed at site #24.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Hytop	001S 005E	29	345500N	0860700W	10/6/1998	8 specimens 1991-07. 1998-07-09 - 25 live, 3 fd, 16 wd. 1998-10-09 - 15 live, wd abundant.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Princeton	002S 004E	15	345200N	0861200W	3/28/1995	155 specimens-all weathered, 1995.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Princeton	002S 004E	22	345200N	0861200W	3/28/1995	4 specimens.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Princeton	002S 004E	21	345200N	0861200W	3/28/1995	
Mussels	*Amblema plicata*	three-ridge	G5	S5			Estill Fork	001S 004E	12	345800N	0860900W	5/24/1995	8 specimens, 1994; 10 specimens, 1995.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Estill Fork	001S 004E	13	345700N	0861000W	5/24/1995	5 specimens.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Estill Fork	001S 004E	13	345700N	0860900W	5/24/1995	6 specimens.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Estill Fork	001S 004E	24	345700N	0860900W	5/24/1995	6 specimens.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Estill Fork	001S 004E	36	345500N	0861000W	5/24/1995	14 specimens.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Estill Fork	001S 004E	36	345500N	0861000W	5/24/1995	3 specimens.
Mussels	*Elliptio crassidens*	elephant-ear	G5	S5			Princeton	002S 004E	15	345200N	0861200W	3/28/1995	1 specimen, 1995.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Estill Fork	002S 004E	2	345400N	0861000W	1980-00-00	One specimen.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Estill Fork	002S 004E	10	345300N	0861100W	1980-00-00	One specimen.

Table C-5. Continued.

Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Estill Fork	001S 005E	31	345500N	0860800W	12/15/1994	One specimen.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Estill Fork	002S 004E	2	345400N	0861000W	5/24/1995	Five specimens, 1980; five specimens, 1995.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Estill Fork	002S 004E	2	345400N	0861000W	3/20/1995	1 specimen at site #17, 1991; 2 specimens, 1995-03-19; 8 specimens, 1995-03-20.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Hytop	001S 005E	16	345700N	0860700W	3/29/1995	8 specimens, 1995-03-18; 2 specimens, 1995-03-29.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Estill Fork	001S 005E	6	345900N	0860900W	5/9/1995	26 specimens, 1995-03-19; 14 specimens, 1995-05-09.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Estill Fork	001S 004E	12	345800N	0860900W	5/24/1995	16 specimens, 1994; 4 specimens, 1995.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Estill Fork	001S 004E	13	345700N	0861000W	5/24/1995	5 specimens.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Estill Fork	001S 004E	13	345700N	0860900W	5/24/1995	9 specimens.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Estill Fork	001S 004E	24	345700N	0860900W	5/24/1995	4 specimens.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Estill Fork	001S 004E	36	345500N	0861000W	5/24/1995	5 specimens.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Estill Fork	001S 004E	36	345500N	0861000W	5/24/1995	1 specimen.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Estill Fork	002S 004E	2	345300N	0861100W	5/24/1995	2 specimens.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Hytop	001S 005E	29	345500N	0860700W	10/6/1998	Collected 2 live.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	(LE,XN)	SP	Estill Fork	002S 004E	10	345300N	0861100W	1980-00-00	One specimen.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	(LE,XN)	SP	Princeton	002S 004E	15	345200N	0861200W	1967-00-00	
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	(LE,XN)	SP	Estill Fork	002S 004E	11	345300N	0861100W	1991-07-00	3 specimens at site #16.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	(LE,XN)	SP	Hytop	001S 005E	16	345700N	0860700W	3/29/1995	1 specimen, 1995-03-29.

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	(LE,XN)	SP	Estill Fork	002S 004E	2	345400N	0861000W	3/20/1995	Relictual specimens at site #17, 1991; 2 specimens, 1995.
Mussels	*Fusconaia cuneolus*	fine-rayed pigtoe	G1	S1	(LE,XN)	SP	Estill Fork	002S 004E	2	345400N	0861000W	7/16/1991	1 relictual specimen at site #17.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Estill Fork	002S 004E	11	345300N	0861100W	1991-07-00	3 specimens collected at site #16.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Estill Fork	002S 004E	2	345400N	0861000W	3/20/1995	1 specimen at site #17, 1991; 9 specimens, 1995.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Estill Fork	002S 004E	2	345400N	0861000W	1980-00-00	1 specimen site #20.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Estill Fork	001S 004E	35	345500N	0861000W	9/29/1966	Relictual specimens (site #21).
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Estill Fork	001S 004E	36	345500N	0860900W	7/17/1991	1 specimen observed at site #23.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Estill Fork	001S 005E	31	345500N	0860800W	7/17/1991	1 specimen observed at site #24.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Princeton	002S 004E	15	345200N	0861200W	3/28/1995	2 specimens, 1995.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Estill Fork	001S 004E	13	345700N	0860900W	5/24/1995	2 specimens.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Estill Fork	002S 004E	2	345300N	0861100W	5/24/1995	1 specimen.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Estill Fork	002S 004E	10	345300N	0861100W	1980-00-00	Three specimens.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Estill Fork	002S 004E	2	345400N	0861000W	5/24/1995	One specimen, 1980; one specimen, 1995.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Estill Fork	002S 004E	11	345300N	0861100W	1991-07-00	4 specimens collected at site #16.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Estill Fork	001S 004E	35	345500N	0861000W	9/29/1966	1 specimen at site #21.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Hytop	001S 005E	29	345500N	0860700W	7/15/1991	1 specimen

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Estill Fork	002S 004E	2	345400N	0861000W	3/20/1995	4 specimens at site #17, 1991; 1 specimen, 1995-03-19; 8 specimens, 1995-03-20.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	002S 004E	15	345200N	0861200W	3/28/1995	2 specimens, 1995.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Estill Fork	001S 004E	26	345600N	0860900W	5/24/1995	1 specimen.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Estill Fork	001S 004E	24	345600N	0860900W	5/24/1995	1 specimen.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Estill Fork	002S 004E	10	345300N	0861100W	5/24/1995	2 specimens.
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	(LE,XN)	SP	Estill Fork	001S 005E	31	345500N	0860800W	3/18/1995	One specimen, 1994.
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	(LE,XN)	SP	Estill Fork	002S 004E	2	345400N	0861000W	5/24/1995	One specimen, 1980; one specimen, 1995.
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	(LE,XN)	SP	Estill Fork	002S 004E	2	345400N	0861000W	1980-00-00	Seven specimens.
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	(LE,XN)	SP	Estill Fork	001S 004E	12	345800N	0860900W	12/15/1994	Four specimens.
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	(LE,XN)	SP	Estill Fork	001S 004E	35	345500N	0861000W	5/24/1995	Stansbery (1971) reported specimens in Ohio State Museum (cat. No. 18741.7) from this locality, probably collected by Athearn in 1966. Also, Ahlstedt et al. found 1 fresh dead (measurements taken) in 1991. 1 specimen , 1995.
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	(LE,XN)	SP	Estill Fork	002S 004E	2	345400N	0861000W	1980-00-00	Relictual specimens site #20.

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	(LE,XN)	SP	Estill Fork	001S 005E	6	345900N	0860900W	3/19/1995	1 specimen, 1995-03-19.
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	(LE,XN)	SP	Estill Fork	002S 004E	2	345400N	0861000W	3/20/1995	1 specimen, 1995-03-19; 1 specimen, 1995-03-20.
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	(LE,XN)	SP	Estill Fork	001S 004E	13	345700N	0860900W	5/24/1995	1 specimen.
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	(LE,XN)	SP	Estill Fork	001S 004E	13	345700N	0860900W	5/24/1995	3 specimens.
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	(LE,XN)	SP	Estill Fork	001S 004E	24	345700N	0860900W	5/24/1995	1 specimen.
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	(LE,XN)	SP	Estill Fork	001S 004E	36	345500N	0861000W	5/24/1995	3 specimens.
Mussels	*Lasmigona complanata*	white heelsplitter	G5	S?			Estill Fork	001S 004E	35	345500N	0861000W	5/24/1995	1 specimen.
Mussels	*Lasmigona complanata*	white heelsplitter	G5	S?			Estill Fork	002S 004E	2	345300N	0861100W	5/24/1995	1 specimen.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Estill Fork	002S 004E	11	345300N	0861100W	1991-07-00	2 specimens collected at site #16.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Estill Fork	002S 004E	2	345400N	0861000W	3/20/1995	2 specimens, 1995-03-20.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Princeton	002S 004E	15	345200N	0861200W	3/28/1995	2 specimens, 1995.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Estill Fork	001S 004E	13	345700N	0860900W	5/24/1995	2 specimens.
Mussels	*Lasmigona holstonia*	Tennessee heelsplitter	G3	S1S2			Hytop	001S 005E	29	345500N	0860700W	10/6/1998	1 specimen 1991-07-15. 1998-07-09 - 1 live, 2 fd. 1998-10-06 - 2 live, 2 fd.
Mussels	*Lasmigona holstonia*	Tennessee heelsplitter	G3	S1S2			Hytop	001S 005E	16	345700N	0860700W	3/29/1995	12 specimens, 1995-03-18; 3 specimens, 1995-03-29.
Mussels	*Lasmigona holstonia*	Tennessee heelsplitter	G3	S1S2			Estill Fork	001S 005E	31	345500N	0860800W	3/18/1995	One specimen.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Estill Fork	002S 004E	10	345300N	0861100W	1980-00-00	One specimen.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Estill Fork	002S 004E	11	345300N	0861100W	1991-07-00	124 specimens collected at site #16.

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Estill Fork	001S 005E	31	345500N	0860800W	1980-00-00	2 specimens found in 1980 (reported in Ahlstedt, 1986) at river mile 2.9. In 1991, 5 specimens were observed at river mile 3.0.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Estill Fork	002S 004E	2	345400N	0861000W	3/20/1995	10 specimens at site #17, 1991; 76 specimens, 1995.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Estill Fork	002S 004E	2	345400N	0861000W	1980-00-00	5 specimens observed at site #20.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Estill Fork	002S 004E	2	345400N	0861000W	7/17/1991	7 specimens observed at site 22.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Estill Fork	001S 004E	36	345500N	0860900W	7/17/1991	12 specimens located at site #23.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Hytop	001S 005E	29	345500N	0860700W	7/15/1991	2 specimens
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Princeton	002S 004E	15	345200N	0861200W	3/28/1995	3 specimens, 1995.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Princeton	002S 004E	21	345200N	0861200W	3/28/1995	
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Estill Fork	001S 004E	36	345500N	0861000W	5/24/1995	1 specimen.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Estill Fork	002S 004E	2	345300N	0861100W	5/24/1995	11 specimens.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Estill Fork	002S 004E	10	345300N	0861100W	5/24/1995	3 specimens.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Estill Fork	001S 004E	12	345800N	0860900W	12/15/1994	Three specimens.
Mussels	*Medionidus conradicus*	Cumberland moccasinshell	G3G4	S1			Estill Fork	002S 004E	2	345400N	0861000W	1980-00-00	Four specimens.
Mussels	*Medionidus conradicus*	Cumberland moccasinshell	G3G4	S1			Estill Fork	001S 005E	31	345500N	0860800W	12/15/1994	One specimen, 1980 and one in 1994.
Mussels	*Medionidus conradicus*	Cumberland moccasinshell	G3G4	S1			Estill Fork	002S 004E	2	345400N	0861000W	1980-00-00	One specimen.
Mussels	*Medionidus conradicus*	Cumberland moccasinshell	G3G4	S1			Estill Fork	002S 004E	2	345400N	0861000W	3/20/1995	1 specimen, 1995.

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Medionidus conradicus*	Cumberland moccasinshell	G3G4	S1			Estill Fork	001S 004E	35	345500N	0861000W	7/16/1991	1 relictual specimen at site #21.
Mussels	*Medionidus conradicus*	Cumberland moccasinshell	G3G4	S1			Estill Fork	002S 004E	2	345400N	0861000W	7/17/1991	1 specimen observed at site #22.
Mussels	*Medionidus conradicus*	Cumberland moccasinshell	G3G4	S1			Estill Fork	001S 004E	36	345500N	0860900W	7/17/1991	1 specimen observed at site #23.
Mussels	*Medionidus conradicus*	Cumberland moccasinshell	G3G4	S1			Estill Fork	001S 005E	6	345900N	0860900W	5/9/1995	1 specimen, 1995-03-19; 2 specimens, 1995-05-09.
Mussels	*Medionidus conradicus*	Cumberland moccasinshell	G3G4	S1			Estill Fork	001S 004E	35	345500N	0861000W	5/24/1995	4 specimens.
Mussels	*Medionidus conradicus*	Cumberland moccasinshell	G3G4	S1			Estill Fork	001S 004E	13	345700N	0861000W	5/24/1995	1 specimen.
Mussels	*Medionidus conradicus*	Cumberland moccasinshell	G3G4	S1			Estill Fork	001S 004E	13	345700N	0860900W	5/24/1995	3 specimens.
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Princeton	002S 004E	15	345200N	0861200W	1967-00-00	
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Estill Fork	002S 004E	11	345300N	0861100W	1991-07-00	7 fresh dead specimens observed by Ahlstedt et al. As a result of a 6 man-hour TVA survey at this locality in 1991.
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Estill Fork	002S 004E	2	345400N	0861000W	3/20/1995	3 specimens, 1995.
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Estill Fork	001S 004E	13	345700N	0860900W	5/24/1995	1 specimen.
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Estill Fork	001S 004E	36	345500N	0861000W	5/24/1995	1 specimen.
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Estill Fork	002S 004E	2	345300N	0861100W	9/9/1997	1997: 2 fresh dead. 1995: 1 specimen.
Mussels	*Pleurobema oviforme*	Tennessee clubshell	G3	S1			Princeton	002S 004E	15	345200N	0861200W	10/7/1998	1998: 1 fresh dead.
Mussels	*Pleurobema oviforme*	Tennessee clubshell	G3	S1			Estill Fork	002S 004E	10	345300N	0861100W	1980-00-00	One specimen.

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Pleurobema oviforme*	Tennessee clubshell	G3	S1			Estill Fork	002S 004E	2	345400N	0861000W	3/20/1995	1 specimen, 1995.
Mussels	*Pleurobema oviforme*	Tennessee clubshell	G3	S1			Estill Fork	001S 004E	13	345700N	0860900W	5/24/1995	1 specimen.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Estill Fork	001S 005E	31	345500N	0860800W	7/17/1991	1 specimen observed at site #24.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Princeton	002S 004E	15	345200N	0861200W	3/28/1995	14 specimens, 1995.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Princeton	002S 004E	22	345200N	0861200W	3/28/1995	2 specimens.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Estill Fork	001S 004E	13	345700N	0860900W	5/24/1995	1 specimen.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Estill Fork	001S 004E	26	345600N	0860900W	5/24/1995	2 specimens.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Estill Fork	001S 004E	24	345600N	0860900W	5/24/1995	1 specimen.
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Estill Fork	002S 004E	2	345400N	0861000W	1980-00-00	One specimen.
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Estill Fork	002S 004E	10	345300N	0861100W	1980-00-00	Two specimens.
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Estill Fork	001S 005E	31	345500N	0860800W	1980-00-00	One specimen.
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Princeton	002S 004E	15	345200N	0861200W	10/7/1998	1998: 1 fresh dead
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Estill Fork	002S 004E	11	345300N	0861100W	1991-07-00	11 specimens located at site #16.
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Estill Fork	002S 004E	2	345400N	0861000W	3/20/1995	7 specimens observed at site #17. 1 found in 1980 (rm 59.6), and 6 (5 live, 1 dead) found in 1991 (rm 59.6). 33 specimens, 95-03-19; 18 specimens, 95-03-20.
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Estill Fork	001S 004E	35	345500N	0861000W	7/16/1991	Ahlstedt reported 2 relict shells in 1991.

Table C-5. Continued.

Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Estill Fork	001S 004E	36	345500N	0861000W	5/24/1995	1 specimen.
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Estill Fork	002S 004E	2	345300N	0861100W	5/24/1995	3 specimens.
Mussels	*Pyganodon grandis*	giant floater	G5	S5			Princeton	002S 004E	22	345200N	0861200W	3/28/1995	1 specimen.
Mussels	*Pyganodon grandis*	giant floater	G5	S5			Estill Fork	001S 004E	36	345500N	0861000W	5/24/1995	2 specimens.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Estill Fork	002S 004E	11	345300N	0861100W	1991-07-00	13 specimens located at site #16.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Estill Fork	002S 004E	2	345400N	0861000W	3/20/1995	10 specimens located at site #17; 3 specimens, 1995-03-19; 8 specimens, 1995-03-20.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Estill Fork	001S 005E	31	345500N	0860800W	7/17/1991	4 specimens observed at site #24.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Princeton	002S 004E	15	345200N	0861200W	3/28/1995	1 specimen, 1995.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Princeton	002S 004E	22	345200N	0861200W	3/28/1995	1 specimen.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Estill Fork	002S 004E	2	345300N	0861100W	5/24/1995	1 specimen.
Mussels	*Toxolasma cylindrellus*	pale lilliput	G1	S1	LE	SP	Estill Fork	001S 005E	31	345500N	0860800W	1980-00-00	1 fresh dead specimen found in muskrat midden by Ahlstedt et al. 1980; also 1 relict specimen collected in 1966, 3.6 km ene of Estill Fork by Athearn, al. Collection number 14417. Also 1 relict found by Ahlstedt et al. As result of survey at river mile 3.0 in 1991.

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Toxolasma cylindrellus*	pale lilliput	G1	S1	LE	SP	Estill Fork	002S 004E	2	345400N	0861000W	1980-00-00	Two specimens.
Mussels	*Toxolasma cylindrellus*	pale lilliput	G1	S1	LE	SP	Estill Fork	002S 004E	2	345400N	0861000W	7/17/1991	1 freshly dead specimen found at site #22.
Mussels	*Toxolasma cylindrellus*	pale lilliput	G1	S1	LE	SP	Estill Fork	001S 005E	6	345900N	0860900W	5/9/1995	10 specimens, 1995-05-09; 4 specimens, 1995-03-19.
Mussels	*Toxolasma cylindrellus*	pale lilliput	G1	S1	LE	SP	Estill Fork	002S 004E	2	345400N	0861000W	3/19/1995	1 specimen, 1995.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Princeton	002S 004E	15	345200N	0861200W	1967-00-00	
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Estill Fork	002S 004E	11	345300N	0861100W	1991-07-00	4 specimens located at site #16.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Estill Fork	002S 004E	2	345400N	0861000W	7/16/1991	4 specimens found at site 17. One also found at river mile 60.0 during same survey.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Estill Fork	002S 004E	2	345400N	0861000W	3/20/1995	1 specimen at site #18, 1991; 1 specimen, 1995.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Estill Fork	002S 004E	2	345400N	0861000W	7/17/1991	1 specimen observed at site #20.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Estill Fork	002S 004E	2	345400N	0861000W	7/17/1991	1 specimen observed at site #22.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Estill Fork	001S 004E	36	345500N	0860900W	7/17/1991	2 specimens observed at site #23.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Estill Fork	001S 005E	31	345500N	0860800W	3/18/1995	4 specimens observed at site #24 in 1991; 3 specimens in 1995.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Hytop	001S 005E	16	345700N	0860700W	3/18/1995	1 specimen, 1995-03-18.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Estill Fork	001S 004E	13	345700N	0860900W	5/24/1995	5 specimens.

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Estill Fork	001S 005E	6	345900N	0860900W	5/9/1995	1 specimen, 1995-03-19; 2 specimens, 1995-05-09.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Estill Fork	001S 004E	24	345700N	0860900W	5/24/1995	1 specimen.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Estill Fork	001S 004E	24	345600N	0860900W	5/24/1995	1 specimen.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Estill Fork	001S 004E	12	345800N	0860900W	12/15/1994	Two specimens.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Hytop	001S 005E	29	345500N	0860700W	10/6/1998	1998-07-09 - 3 fd; 1998-10-06 - 1 wd.
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Estill Fork	002S 004E	2	345400N	0861000W	3/20/1995	1 specimen, 1995-03-19; 1 specimen, 1995-03-20.
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Princeton	002S 004E	15	345200N	0861200W	3/28/1995	10 specimens, 1995.
Mussels	*Villosa iris*	rainbow	G5	S3			Hytop	001S 005E	16	345700N	0860700W	3/29/1995	14 specimens, 1995-03-18;30 specimens, 1995-03-29.
Mussels	*Villosa iris*	rainbow	G5	S3			Estill Fork	001S 005E	31	345500N	0860800W	3/18/1995	Two specimens.
Mussels	*Villosa iris*	rainbow	G5	S3			Estill Fork	001S 005E	6	345900N	0860900W	5/9/1995	8 specimens, 1995-03-19; 4 specimens, 1995-05-09.
Mussels	*Villosa iris*	rainbow	G5	S3			Estill Fork	001S 004E	12	345800N	0860900W	5/24/1995	11 specimens, 1994; 3 specimens, 1995.
Mussels	*Villosa iris*	rainbow	G5	S3			Estill Fork	001S 004E	13	345700N	0861000W	5/24/1995	1 specimen.
Mussels	*Villosa iris*	rainbow	G5	S3			Estill Fork	001S 004E	13	345700N	0860900W	5/24/1995	3 specimens.
Mussels	*Villosa iris*	rainbow	G5	S3			Estill Fork	001S 004E	13	345700N	0860900W	5/24/1995	4 specimens.
Mussels	*Villosa iris*	rainbow	G5	S3			Estill Fork	001S 004E	24	345700N	0860900W	5/24/1995	3 specimens.
Mussels	*Villosa iris*	rainbow	G5	S3			Hytop	001S 005E	29	345500N	0860700W	10/6/1998	1998-07-09 - 5 live, 3 FD; 1998-10-06 - 6 live.

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Villosa iris*	rainbow	G5	S3			Estill Fork	002S 004E	2	345300N	0861100W	5/24/1995	1 specimen.
Mussels	*Villosa nebulosa*	Alabama rainbow	G3	S3			Estill Fork	002S 004E	11	345300N	0861100W	1991-07-00	17 specimens located at site #16.
Mussels	*Villosa nebulosa*	Alabama rainbow	G3	S3			Estill Fork	002S 004E	2	345400N	0861000W	7/16/1991	7 specimens found at site #17.
Mussels	*Villosa nebulosa*	Alabama rainbow	G3	S3			Estill Fork	002S 004E	2	345400N	0861000W	1991-07-00	3 specimens at site #18.
Mussels	*Villosa nebulosa*	Alabama rainbow	G3	S3			Estill Fork	002S 004E	2	345400N	0861000W	7/17/1991	2 specimens observed at site #20.
Mussels	*Villosa nebulosa*	Alabama rainbow	G3	S3			Estill Fork	002S 004E	2	345400N	0861000W	7/17/1991	15 specimens observed at site #22.
Mussels	*Villosa nebulosa*	Alabama rainbow	G3	S3			Estill Fork	001S 004E	36	345500N	0860900W	7/17/1991	2 specimens observed at site #23.
Mussels	*Villosa nebulosa*	Alabama rainbow	G3	S3			Estill Fork	001S 005E	31	345500N	0860800W	7/17/1991	22 specimens observed at site #24.
Mussels	*Villosa nebulosa*	Alabama rainbow	G3	S3			Hytop	001S 005E	29	345500N	0860700W	7/15/1991	23 specimens
Mussels	*Villosa taeniata*	painted creekshell	G3G4	S1			Estill Fork	002S 004E	2	345400N	0861000W	1980-00-00	Twenty specimens.
Mussels	*Villosa taeniata*	painted creekshell	G3G4	S1			Estill Fork	002S 004E	10	345300N	0861100W	1980-00-00	One specimen.
Mussels	*Villosa taeniata*	painted creekshell	G3G4	S1			Estill Fork	001S 005E	31	345500N	0860800W	1980-00-00	Two specimens.
Mussels	*Villosa taeniata*	painted creekshell	G3G4	S1			Princeton	002S 004E	15	345200N	0861200W	1967-00-00	
Mussels	*Villosa taeniata*	painted creekshell	G3G4	S1			Estill Fork	001S 005E	6	345900N	0860900W	5/9/1995	4 specimens, 1995-03-19; 2 specimens, 1995-05-09.
Mussels	*Villosa taeniata*	painted creekshell	G3G4	S1			Estill Fork	002S 004E	2	345400N	0861000W	3/20/1995	4 specimens, 1995-03-19; 27 specimens, 1995-03-20.
Mussels	*Villosa taeniata*	painted creekshell	G3G4	S1			Estill Fork	001S 004E	13	345700N	0860900W	5/24/1995	1 specimen.

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Villosa taeniata*	painted creekshell	G3G4	S1			Estill Fork	001S 004E	12	345800N	0860900W	12/15/1994	Thirteen specimens.
Mussels	*Villosa taeniata*	painted creekshell	G3G4	S1			Hytop	001S 005E	29	345500N	0860700W	10/6/1998	1998-07-09 - 7 live, 4 FD, 6 WD; 1998-10-06 - 1 live.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Estill Fork	002S 004E	11	345300N	0861100W	1991-07-00	8 specimens located at site #16.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Estill Fork	002S 004E	2	345400N	0861000W	3/20/1995	5 specimens observed at site #17; 1 specimen, 1995-03-19; 13 specimens, 1995-03-20.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Estill Fork	002S 004E	2	345400N	0861000W	7/17/1991	3 specimens collected at site #20.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Estill Fork	002S 004E	2	345400N	0861000W	5/24/1995	2 specimens observed at site #22, 1991; 1 specimen, 1995.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Estill Fork	001S 004E	36	345500N	0860900W	7/17/1991	1 specimen observed at site #23.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Estill Fork	001S 005E	31	345500N	0860800W	3/18/1995	8 specimens observed at site #24.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Hytop	001S 005E	29	345500N	0860700W	10/6/1998	2 specimens 1991-07-15. 1998-07-09 - 2 live, 4 fd, 6 wd. 1998-10-06 - 1 live, 2 fd, 2 wd.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Hytop	001S 005E	16	345700N	0860700W	3/29/1995	10 specimens, 1995.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Estill Fork	001S 005E	6	345900N	0860900W	3/19/1995	4 specimens, 1995-03-19.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Princeton	002S 004E	15	345200N	0861200W	3/28/1995	1 specimen, 1995.

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Estill Fork	001S 004E	13	345700N	0861000W	5/24/1995	3 specimens.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Estill Fork	001S 004E	13	345700N	0860900W	5/24/1995	2 specimens.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Estill Fork	001S 004E	13	345700N	0860900W	5/24/1995	5 specimens.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Estill Fork	001S 004E	24	345700N	0860900W	5/24/1995	5 specimens.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Estill Fork	001S 004E	26	345600N	0860900W	5/24/1995	1 specimen.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Estill Fork	001S 004E	24	345600N	0860900W	5/24/1995	1 specimen.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Estill Fork	001S 004E	24	345600N	0860900W	5/24/1995	1 specimen.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Estill Fork	002S 004E	2	345300N	0861100W	5/24/1995	5 specimens.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Estill Fork	001S 004E	12	345800N	0860900W	12/15/1994	Six specimens.
Snails	*Glyphyalinia latebricola*	stone glyph	G?	S?			Princeton			345200N	0861200W		Peck (1989) reported the species from this cave; no date was given.
Vascular Plants	*Blephilia subnuda*	smooth blephilia	G1G2	S1S2			Hytop	001S 005E	16	345800N	0860700W	5/19/1979	
Vascular Plants	*Carex austrocaroliniana*	sedge	G4	S2?			Hytop	001S 005E	4	345900N	0860600W	4/18/2000	2000-04-18: greater than 200 plants observed, most with fruit.

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Vascular Plants	*Carex eburnea*	ebony sedge	G5	S2			Hytop	001S 005E	4	345900N	0860600W	4/18/2000	2000-04-18: greater than 350 plants were observed along roughly a half mile stretch on both sides of Turkey Creek.
Vascular Plants	*Carex purpurifera*	purple sedge	G4?	S2			Hytop	001S 005E	4	345900N	0860600W	4/26/1995	51-100 clumps scattered on steep slope; mostly vegetative, some in fruit and flower.
Vascular Plants	*Cypripedium acaule*	pink lady's-slipper	G5	S3			Hytop	001S 005E	10,15	345800N	0860500W	9/30/1992	Approximately 100 plants observed.
Vascular Plants	*Dicentra cucullaria*	Dutchman's breeches	G5	S2			Estill Fork	001S 004E	1	345900N	0860900W	4/19/1997	Roughly 200-250 plants were observed. Plants were beginning to die-back for the season.
Vascular Plants	*Dicentra cucullaria*	Dutchman's breeches	G5	S2			Hytop	001S 005E	21	345700N	0860700W	4/18/2000	2000-04-18: several plants represented as sub-populations occur along a few miles of dirt road. Immature fruit was present during survey.
Vascular Plants	*Enemion biternatum*	false rue-anemone	G5	S2			Estill Fork	001S 004E	1	345900N	0860900W	4/19/1997	Roughly 125-150 plants, mostly with immature fruit, were observed.
Vascular Plants	*Frasera caroliniensis*	Carolina gentian	G5	S2			Estill Fork	015S 004E	12	345800N	0860900W	4/9/2000	Approximately 75-80 plants, of which 17 were producing flower stems.
Vascular Plants	*Galearis spectabilis*	showy orchis	G5	S3			Hytop	001S 005E	4	345900N	0860600W	4/26/1995	Nine plants in flower.

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Vascular Plants	*Hydrastis canadensis*	golden seal	G4	S2			Hytop	001S 005E	4	345900N	0860600W	4/18/2000	2000-04-18: 22 plants observed; 17 with immature fruit.
Vascular Plants	*Jeffersonia diphylla*	twinleaf	G5	S2			Estill Fork	001S 004E	1	345900N	0860900W	3/31/1973	
Vascular Plants	*Jeffersonia diphylla*	twinleaf	G5	S2			Hytop	001S 005E	3	345900N	0860600W	4/26/1995	11-50 individuals in dense stand in fruit.
Vascular Plants	*Jeffersonia diphylla*	twinleaf	G5	S2			Estill Fork	001S 004E	1	345900N	0860900W	4/19/1997	Approximately 700-900 plants with immature fruit were observed.
Vascular Plants	*Jeffersonia diphylla*	twinleaf	G5	S2			Hytop	001S 005E	21	345700N	0860700W	4/18/2000	Several thousand plants encountered likely encompassing more than 30 acres. Immature fruit was evident during survey.
Vascular Plants	*Monarda clinopodia*	basil bee-balm	G5	S2			Hytop	001S 005E	4	345900N	0860600W	4/18/2000	2000-04-18: roughly 40 non-flowering (too early) plants were observed. More plants are likely to occur. More easily detected in flower during June and July.
Vascular Plants	*Panax quinquefolius*	American ginseng	G3G4	S4			Hytop	001S 005E	4	345900N	0860600W	4/25/1995	Roughly 1 dozen plants.
Vascular Plants	*Platanthera integrilabia*	white fringeless orchid	G2G3	S2	C		Hytop	001S 005E	15	345800N	0860500W	9/30/1992	At least 6 plants observed in fruit in 1992. When plants were first observed in 1982, they were in flower (identity was unknown until 1992).

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Vascular Plants	*Polymnia laevigata*	Tennessee leafcup	G3	S2S3			Estill Fork	001S 004E	1	345900N	0860900W	7/28/1975	
Vascular Plants	*Silphium brachiatum*	Cumberland rosinweed	G2	S2			Hytop	001S 005E	3	345900N	0860500W	8/27/1980	
Vascular Plants	*Trillium flexipes*	nodding trillium	G5	S2S3			Hytop	001S 005E	3	345900N	0860600W	4/25/1995	<50 plants in flower.
Vascular Plants	*Trillium flexipes*	nodding trillium	G5	S2S3			Hytop	001S 005E	4	345900N	0860600W	4/25/1995	100-1000 plants mostly in flower; 50% in fruit.
Vascular Plants	*Valeriana pauciflora*	valerian	G4	S1			Estill Fork	001S 004E	1	345900N	0860900W	4/19/1997	Approximately 40 flowering plants were observed.
Vascular Plants	*Valeriana pauciflora*	valerian	G4	S1			Hytop	001S 005E	4	345900N	0860600W	4/18/2000	2000-04-18: approx. 65-75 reproductively active (i.e., Producing buds and flowers) plants were observed.
Vascular Plants	*Viburnum bracteatum*	limerock arrowwood	G1	S1			Hytop	001S 005E	4	345900N	0860600W	4/18/2000	2000-04-18: Greater than 300 shrubs were observed, often serving as the principal shrub species. 1995-04-25: probably one individual; >12 stems in clump; in bud.
Vascular Plants	*Viola canadensis*	Canada violet	G5	S2			Hytop	001S 005E	4	345900N	0860600W	4/18/2000	2000-04-18: roughly 250-300 flowering plants were observed.
Tennessee records													
Mussels	*Lampsilis ovata*	pocketbook	G5	S5			Estill Fork, Beans Creek			346000N	0860900W	1995-12	Shelton (1996) encountered specimens from efrm 7.25-7.75 during Jan. 1995-Dec. 1995.

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Medionidus conradicus*	Cumberland moccasinshell	G3G4	S3			Estill Fork, Beans Creek			346000N	0860900W	1995-12	Shelton (1996) encountered specimens from efrm 7.25-7.75 during Jan. 1995-Dec. 1995. Also, on May 5, 1995, Shelton encountered specimens at efrm 7.25-9.5.
Mussels	*Pleurobema oviforme*	Tennessee clubshell	G3	S2S3			Estill Fork, Beans Creek			346000N	0860900W	1995-12	Shelton (1996) encountered specimens from efrm 7.25-7.75 during Jan. 1995-Dec. 1995. Also, on May 5, 1995, Shelton encountered specimens at efrm 7.25-9.5.
Mussels	*Toxolasma lividum*	purple lilliput	G2	S1S2			Estill Fork, Beans Creek			346000N	0860900W	1995-12	Shelton (1996) encountered specimens from efrm 7.25-7.75 during Jan. 1995-Dec. 1995. Also, on May 5, 1995, Shelton encountered specimens at efrm 7.25-9.5.
Reptiles	*Anolis carolinensis*	green anole	G5	S3		D	Beans Creek			350000N	0860900W	5/9/1995	One individual seen @ 16:57.

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Vascular Plants	*Eleocharis equisetoides*	horse-tail spike-rush	G4	S1		E	Pitcher Ridge			350200N	0860200W	7/15/1996	1996: l. E. Mckinney - 1000's of plants scattered along edge of man-made lake mixed with *Eleocharis quadrangulata*. Plants in leaf and with mature fruit, in about 2+ acres, 50% 1st year, 50% mature, vigor normal.
Vascular Plants	*Helianthus eggertii*	Eggert's sunflower	G3	S3	LT	T	Pitcher Ridge			350200N	0860600W	10/9/1998	Approximately 200 stems, vigor excellent, past flowering
Vascular Plants	*Hydrastis canadensis*	goldenseal	G4	S3		S-CE	Pitcher Ridge			350100N	0860700W	4/19/1979	A small colony of 50-100 plants under mixed hardwoods & cedar.
Vascular Plants	*Melanthium woodii*	ozark bunchflower	G5	S1S2		E	Pitcher Ridge			350100N	0860600W	1989	25-50 plants, 3-4 in bloom or bud, flowers purple or wine-colored.
Vascular Plants	*Onosmodium molle ssp subsetosum*	smooth false gromwell	G4G5T?	S1		E	Pitcher Ridge			350100N	0860700W	5/19/1979	A few scattered individuals in open areas of a cutover limestone woods, (fls). Originally seen by P Somers, 24 May 1978, (yng fls).
Vascular Plants	*Platanthera integrilabia*	white fringeless orchid	G2G3	S2S3		E	Pitcher Ridge			350300N	0860600W	8/29/1996	10 individuals, none flowering. Identification not certain, but is likely *P. integrilabia*.
Vascular Plants	*Ponthieva racemosa*	shadow-witch	G4G5	S1		E	Pitcher Ridge			350100N	0860700W	9/27/1986	Plants upslope as well, sparse. (bud-flw).

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Vascular Plants	*Silphium brachiatum*	Cumberland rosinweed	G2	S2		E	Pitcher Ridge			350100N	0860700W	9/17/1996	1996: 20-30 plants scattered along ridge and slope. 1980:thru flowering by end of Aug, this is atypical because of drought.
Vascular Plants	*Silphium brachiatum*	Cumberland rosinweed	G2	S2		E	Pitcher Ridge			350000N	0860700W	8/28/1996	1996: less than 100 plants at edge of slope and floodplain. 1980:extensive population (extent not known). Thru flowering by end of Aug, but this is atypical due to drought. Associated with large patches of *Hydrastis canadensis* and *Polymnia laevigata*.
Vascular Plants	*Spiranthes lucida*	shining ladies'-tresses	G5	S1S2		T	Hytop			350000N	0860600W	5/19/1979	Lip yellowish towards center . Flowers otherwise white. Annotated by Dr. Garay. 11 June 1979.
Vascular Plants	*Talinum teretifolium*	roundleaf fameflower	G4	S2		T	Pitcher Ridge			350400N	0860300W	1985	Only 1 plant actually known from site and unknowingly collected by Clements with *Hypericum sentianoides*. Specimen was past flowering. No other plants observed in 1985 or 1986

Table C-5. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Vascular Plants	*Viburnum bracteatum*	limerock arrowwood	G1	S1		E	Pitcher Ridge			350000N	0860700W	8/28/1996	1996: (C. Nordman with S. Major) about 30 shrubs found (including some in fruit) along ne side of turkey creek from 0.1 to 0.6 mile nw of poplar hollow. 1985: only 1 shrub seen here (in flw) on a 1985 trip to Turkey Ck *Ponthieva racemosa* site
Vascular Plants	*Woodwardia virginica*	Virginia chainfern	G5	S2		S	Pitcher Ridge			350400N	0860700W	7/1/1987	Data incomplete
Vascular Plants	*Zigadenus leimanthoides*	death-camas	G4Q	S2		T	Pitcher Ridge			350600N	0860700W	8/7/1987	

Table C-6. All occurrences of endangered, threatened, and rare species and natural communities occurring in the Guess Creek subwatershed (0603002-060) of the Paint Rock River (PRR) watershed documented by the Alabama Natural Heritage Program[SM] as of 31 December 2002. Coordinates given are rounded to the nearest minute.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
	AL Jackson county cave						Princeton			344600N	0861100W		The cave has a large, walk-in entrance.
Arachnids	*Nesticus barri*	a cave obligate spider	G3G4	S3			Princeton			344600N	0861100W		Peck (1989) reported the species from this cave; no date was given.
Fish	*Typhlichthys subterraneus*	southern cavefish	G4	S3		SP	Princeton	003S 004E	22	344600N	0861100W	6/24/1993	1993-06-24: 1 observed. 1981-12-18: 1 observed.
Vascular Plants	*Carex purpurifera*	purple sedge	G4?	S2			Princeton	002S 004E	36	345000N	0861000W	5/9/1980	
Vascular Plants	*Cheilanthes alabamensis*	Alabama lip-fern	G4G5	S3			Princeton	003S 004E	22	344600N	0861100W		
Vascular Plants	*Polymnia laevigata*	Tennessee leafcup	G3	S2S3			Mud Creek	002S 005E	20	345100N	0860700W	5/5/1971	

Table C-7. All occurrences of endangered, threatened, and rare species and natural communities occurring in the Larkin Fork subwatershed (0603002-040) of the Paint Rock River (PRR) watershed documented by the Alabama Natural Heritage Program[SM] as of 31 December 2002. Coordinates given are rounded to the nearest minute.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
	AL Jackson county cave						Estill Fork			345600N	0861500W		The cave has two entrances, the second entrance is plotted separately as GCAVEAL071*554*TV. The entrance to doodlebug hole is a pit with a 390 ft. Drop.
	AL Jackson county cave						Estill Fork			345600N	0861500W		The cave has a very large sink entrance that is over 20 ft. Wide.
	AL Jackson county cave						Estill Fork			345300N	0861300W		Stoop or duck-walk entrance with an outflowing stream.
Fish	*Notropis albizonatus*	palezone shiner	G2	S1	LE	SP	Princeton	002S 004E	16	345200N	0861300W	5/20/1991	1 spec captured/released 1981; 1 taken by AGS May 1991 (#5381.08)
Fish	*Notropis leuciodus*	Tennessee shiner	G5	S1			Estill Fork	002S 004E	9	345300N	0861300W	1994	
Fish	*Percina burtoni*	blotchside darter	G2	S1			Estill Fork	002S 004E	9	345300N	0861300W	1994	
Insects	*Nyctiophylax banksi*	caddisfly	G?	S1			Estill Fork	002S 004E	4	345400N	0861300W		Collected May.
Insects	*Ptomaphagus chromolithus*	a cave obligate beetle	G3G4	S?			Estill Fork			345600N	0861500W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Ptomaphagus chromolithus*	a cave obligate beetle	G3G4	S?			Estill Fork			345300N	0861300W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Ptomaphagus chromolithus*	a cave obligate beetle	G3G4	S?			Estill Fork			345600N	0861500W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Wormaldia shawnee*	caddisfly	G?	S1			Estill Fork	002S 004E	4	345400N	0861300W		Collected May, June.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Princeton	002S 004E	16	345200N	0861200W	1991-07-00	Relictual specimens

Table C-7. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Princeton	002S 004E	16	345200N	0861200W	1991-07-00	Relictual specimens
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	LE,XN	SP	Princeton	002S 004E	16	345200N	0861300W	1967-00-00	0
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Princeton	002S 004E	16	345200N	0861200W	7/16/1991	2 specimens.
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Princeton	002S 004E	16	345200N	0861300W	1967-00-00	0
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Princeton	002S 004E	16	345200N	0861200W	7/16/1991	1 specimen.
Mussels	*Pyganodon grandis*	giant floater	G5	S5			Princeton	002S 004E	16	345200N	0861200W	1991-07-00	1 specimen observed.
Mussels	*Toxolasma cylindrellus*	pale lilliput	G1	S1	LE	SP	Princeton	002S 004E	16	345200N	0861300W	9/29/1966	Twenty-six shells taken from midden.
Mussels	*Toxolasma cylindrellus*	pale lilliput	G1	S1	LE	SP	Estill Fork	001S 004E	33	345500N	0861300W	10/11/1966	7 specimens collected
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Princeton	002S 004E	16	345200N	0861300W	9/29/1966	Forty-five shells taken from midden.
Mussels	*Villosa nebulosa*	alabama rainbow	G3	S3			Princeton	002S 004E	16	345200N	0861200W	7/16/1991	5 specimens.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Princeton	002S 004E	16	345200N	0861200W	7/16/1991	4 specimens.
Snails	*Glyphyalinia latebricola*	stone glyph	G?	S?			Estill Fork			345300N	0861300W		Peck (1989) reported the species from this cave; no date was given.
Vascular Plants	*Blephilia subnuda*	smooth blephilia	G1G2	S1S2			Estill Fork	001S 004E	17	345700N	0861300W	6/4/1975	
Vascular Plants	*Blephilia subnuda*	smooth blephilia	G1G2	S1S2			Estill Fork	001S 004E	17	345700N	0861300W	6/1/1983	Occasional
Vascular Plants	*Carex purpurifera*	purple sedge	G4?	S2			Estill Fork	001S 004E	16	345800N	0861300W	5/5/1971	
Vascular Plants	*Carex purpurifera*	purple sedge	G4?	S2			Estill Fork	001S 004E	17	345700N	0861300W	4/28/1972	
Vascular Plants	*Dicentra cucullaria*	Dutchman's breeches	G5	S2			Estill Fork	001S 004E	20	345600N	0861300W	3/28/1976	Plants in flower, fruit.
Vascular Plants	*Euonymus atropurpureus*	wahoo	G5	S3			Estill Fork	001S 004E	20	345600N	0861300W	10/15/1975	
Vascular Plants	*Hydrophyllum appendiculatum*	appendage waterleaf	G5	S2?			Estill Fork	001S 004E	17	345700N	0861300W	4/28/1989	Common along entire slope.

Table C-7. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Vascular Plants	*Jeffersonia diphylla*	twinleaf	G5	S2			Estill Fork	001S 004E	20	345600N	0861300W	3/28/1975	
Vascular Plants	*Neviusia alabamensis*	Alabama snow-wreath	G2	S2			Estill Fork	001S 004E	20	345700N	0861300W	4/29/1996	Approximately 500-750 stems were observed on a small limestone outcrop. Plants were in flower. -Schotz, 1997.
Vascular Plants	*Neviusia alabamensis*	Alabama snow-wreath	G2	S2			Estill Fork	002S 004E	4	345300N	0861300W	5/10/1971	Shrubs to 2 meters tall.
Vascular Plants	*Neviusia alabamensis*	Alabama snow-wreath	G2	S2			Estill Fork	001S 004E	6	345900N	0861400W	4/26/1996	Several small clones encompassing about 400-500 stems were observed. Shrubs were in flower during survey.
Vascular Plants	*Neviusia alabamensis*	Alabama snow-wreath	G2	S2			Estill Fork	001S 004E	20	345600N	0861300W	5/2/1939	
Vascular Plants	*Oxalis grandis*	giant wood-sorrel	G4G5	S1			Estill Fork	001S 004E	20	345600N	0861300W	4/25/1973	
Vascular Plants	*Populus heterophylla*	swamp cottonwood	G5	S2			King Cove	001S 003E	4	345900N	0861900W	7/5/1980	Trees to 50 ft. Tall; abundant.
Vascular Plants	*Stylophorum diphyllum*	celandine poppy	G5	S1			Estill Fork	001S 004E	17	345700N	0861300W	4/28/1989	Ten plants observed along slope, flowers yellow. Locally abundant along ridge.
Vascular Plants	*Stylophorum diphyllum*	celandine poppy	G5	S1			Estill Fork	001S 004E	20	345600N	0861300W	3/28/1976	
Vascular Plants	*Synandra hispidula*	guyandotte beauty	G4	S1			Estill Fork	001S 004E	17	345700N	0861300W	4/12/1989	Plants common (ca. 100-200 plants) along creekbank on lower slope. Flowers almost white.
Vascular Plants	*Trillium sessile*	toadshade	G4G5	S2			Estill Fork	001S 004E	20	345600N	0861300W		

Table C-8. All occurrences of endangered, threatened, and rare species and natural communities occurring in the Lick Fork subwatershed (0603002-050) of the Paint Rock River (PRR) watershed documented by the Alabama Natural Heritage Program[SM] as of 31 December 2002. Coordinates given are rounded to the nearest minute.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
	AL Jackson county cave						King Cove			345300N	0861900W		The cave has a chimney or climb-down entrance located in a large sinkhole.
	AL Jackson county cave						Princeton Al			344800N	0861300W		The cave has an obscure, stoop or duck-walk entrance.
	AL Jackson county cave						Princeton Al			344900N	0861300W		The cave has a chimney or climb-down entrance.
	AL Jackson county cave						Princeton Al			344800N	0861400W		The cave has a stoop or duck-walk entrance with a stream.
	AL Jackson county cave						Hollytree			344700N	0861600W		The cave has a crawl-type entrance.
Fish	*Notropis albizonatus*	palezone shiner	G2	S1	LE	SP	Princeton	002S 004E	20	345100N	0861300W	1981	6 specimens.
Insects	*Agapetus hessi*	caddisfly	G?	S1			Princeton	002S 004E	31	344900N	0861500W		Collected May, June.
Insects	*Pseudanophthalmus profundus*	a cave obligate beetle	G3	S2			Princeton Al	002S 004E	33	345000N	0861300W		Peck (1995) reported the species in this cave; no date was given.
Insects	*Pseudosinella spinosa*	a cave obligate springtail	G3G4	S?			King Cove			345300N	0861900W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Ptomaphagus chromolithus*	a cave obligate beetle	G3G4	S?			Princeton Al			344900N	0861300W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Ptomaphagus chromolithus*	a cave obligate beetle	G3G4	S?			Princeton Al			344800N	0861400W		Peck (1995) reported the species from this cave; no date was given.

Table C-8 Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Insects	*Ptomaphagus chromolithus*	a cave obligate beetle	G3G4	S?			Hollytree			344700N	0861600W		Peck (1995) reported the species from this cave; no date was given.
Insects	*Ptomaphagus chromolithus*	a cave obligate beetle	G3G4	S?			Princeton Al			344800N	0861300W		Peck (1995) reported the species from this cave; no date was given.
Mammals	*Corynorhinus rafinesquii*	Rafinesque's big-eared bat	G3G4	S2		SP	Princeton	003S 004E	9	344800N	0861300W	8/9/1976	Probably a maternity site. Possibly inhabited by *Myotis* sp.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Lim Rock	003S 004E	29	344500N	0861400W	1991-07-00	68 specimens
Mussels	*Amblema plicata*	three-ridge	G5	S5			Hollytree	003S 004E	18	344700N	0861500W	1991-07-00	Relictual specimens
Mussels	*Amblema plicata*	three-ridge	G5	S5			Princeton	003S 004E	7	344800N	0861500W	1980-00-00	1 specimen
Mussels	*Amblema plicata*	three-ridge	G5	S5			Princeton	002S 004E	31	344900N	0861500W	1991-07-00	6 specimens.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Princeton	002S 004E	31	345000N	0861500W	1991-07-00	1 specimen.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Princeton	002S 004E	21	345200N	0861300W	9/9/1997	1997: 10 relic. 1995: 7 specimens.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Princeton	002S 004E	31	345000N	0861500W	3/28/1995	3 specimens, 1995.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Princeton	003S 004E	7	344800N	0861400W	3/28/1995	Six specimens.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Princeton	003S 004E	7	344800N	0861500W	1995-03-20, 1995-03-28	6 specimens, 1995.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Princeton	003S 004E	30	344600N	0861500W	1995-00-00	4 specimens, 1995.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Princeton	003S 004E	29	344500N	0861400W	5/23/1995	3 specimens, 1995.
Mussels	*Amblema plicata*	three-ridge	G5	S5			Lim Rock	003S 004E	29	344500N	0861400W	5/23/1995	5 specimens.
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Lim Rock	003S 004E	29	344500N	0861400W	1991-07-00	7 specimens
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Hollytree	003S 004E	18	344700N	0861500W	1991-07-00	Relictual specimens

Table C-8. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Princeton	002S 004E	31	344900N	0861500W	7/18/1991	2 specimens.
Mussels	*Cyclonaias tuberculata*	purple wartyback	G5	S5			Princeton	003S 004E	30	344600N	0861500W	1995-00-00	1 specimen, 1995.
Mussels	*Elliptio crassidens*	elephant-ear	G5	S5			Lim Rock	003S 004E	29	344500N	0861400W	1991-07-00	2 specimens
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Princeton	003S 004E	18	344700N	0861500W	1967-00-00	
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Princeton	003S 004E	06,07	344800N	0861400W	1965-00-00	
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Princeton	003S 004E	30	344600N	0861500W	1980-00-00	One specimen.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Princeton	002S 004E	21	345200N	0861300W	9/9/1997	1 specimen.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Princeton	002S 004E	21	345200N	0861300W	3/28/1995	1 specimen, 1995-03-28.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Princeton	003S 004E	47	344700N	0861500W	3/28/1995	1 specimen, 1995.
Mussels	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3	S1			Princeton	003S 004E	18	344700N	0861500W	3/28/1995	1 specimen, 1995.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Princeton	003S 004E	7	344800N	0861400W	3/28/1995	Three specimens, 1980; one specimen, 1995.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Princeton	003S 004E	19,30	344600N	0861400W	1980-00-00	Two specimens.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Princeton	002S 004E	31	344900N	0861500W	7/18/1991	Two specimens were observed in 1980. One specimen was observed in 1991.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Princeton	003S 004E	30	344600N	0861500W	7/25/1991	1 specimen (1980); 1 specimen (1991).
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Princeton	003S 004E	19	344600N	0861400W	1980-00-00	One specimen.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Princeton	003S 004E	7	344800N	0861500W	1991-07	6 specimens in 1980; 1 in 1991.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Princeton	003S 004E	18	344700N	0861500W	1967-00-00	
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Princeton	003S 004E	19	344600N	0861500W	1978-08-00	Seven freshly dead specimens found in muskrat middens.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Lim Rock	003S 004E	29	344500N	0861400W	1991-07-00	21 specimens

Table C-8. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Hollytree	003S 004E	18	344700N	0861500W	1991-07-00	Relictual specimens
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Princeton	002S 004E	31	345000N	0861500W	1991-07-00	1 specimen.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Princeton	002S 004E	20	345100N	0861300W	1995	1 specimen, 1995.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Princeton	002S 004E	31	344900N	0861500W	3/28/1995	2 specimens, 1995.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Princeton	003S 004E	7	344800N	0861400W	3/28/1995	One specimen.
Mussels	*Fusconaia cor*	shiny pigtoe	G1	S1	LE,XN	SP	Princeton	003S 004E	7	344800N	0861500W	1995-03-201995-03-28	1 specimen, 1995.
Mussels	*Fusconaia cuneolus*	fine-rayed pigtoe	G1	S1	LE,XN	SP	Princeton	003S 004E	7	344800N	0861400W	1980-00-00	One specimen.
Mussels	*Fusconaia cuneolus*	fine-rayed pigtoe	G1	S1	LE,XN	SP	Princeton	003S 004E	18	344700N	0861500W	1967-00-00	
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Lim Rock	003S 004E	29	344500N	0861400W	1991-07-00	5 specimens
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Princeton	003S 004E	7	344800N	0861500W	1991-07	Relic specimens
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Princeton	002S 004E	31	344900N	0861500W	7/18/1991	1 specimen.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Princeton	002S 004E	31	345000N	0861500W	1991-07-00	1 specimen.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Princeton	002S 004E	20	345100N	0861300W	1995	1 specimen, 1995.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Princeton	002S 004E	29	345100N	0861400W	3/28/1995	4 specimens, 1995.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Princeton	002S 004E	31	344900N	0861500W	3/28/1995	1 specimen, 1995.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Princeton	003S 004E	7	344800N	0861400W	3/28/1995	Three specimens, 1995.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Princeton	003S 004E	7	344800N	0861400W	3/28/1995	Two specimens.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Princeton	003S 004E	7	344800N	0861500W	1995-03-201995-03-28	1 specimen, 1995.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Princeton	003S 004E	47	344700N	0861500W	3/28/1995	7 specimens, 1995.
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Princeton	003S 004E	30	344600N	0861500W	1995-00-00	2 specimens, 1995.

Table C-8. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Lampsilis fasciola*	wavy-rayed lampmussel	G4	S1S2			Lim Rock	003S 004E	29	344500N	0861400W	5/23/1995	3 specimens.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	003S 004E	18	344700N	0861500W	1967-00-00	
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	003S 004E	19	344600N	0861400W	1980-00-00	Seven specimens.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	003S 004E	7	344800N	0861400W	1965-00-00	
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	003S 004E	30	344600N	0861500W	7/25/1991	1 specimen (1980); 1 specimen (1991).
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	003S 004E	7	344800N	0861400W	3/28/1995	One specimen, 1980; three specimens, 1995.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Hollytree	003S 004E	18	344700N	0861500W	1980-00-00	Two specimens.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	002S 004E	31	344900N	0861500W	1991-07	Three specimens
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	003S 004E	19	344600N	0861500W	1980-00-00	One specimen.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	002S 004E	30	345000N	0861400W	1980-00-00	One specimen.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	002S 004E	29	345100N	0861300W	1980-00-00	Two specimens.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	002S 004E	29	345000N	0861400W	1980-00-00	Two specimens.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Lim Rock	003S 004E	29	344500N	0861400W	1991-07-00	16 specimens
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Hollytree	003S 004E	18	344700N	0861500W	1991-07-00	2 specimens
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	003S 004E	7	344800N	0861500W	1991-07	2 specimens
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	002S 004E	31	345000N	0861500W	1991-07-00	5 specimens.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	002S 004E	21	345200N	0861300W	9/9/1997	1997: 2 alive. 1995: 3 specimens.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	002S 004E	20	345100N	0861300W	1995	2 specimens, 1995.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	002S 004E	20	345100N	0861300W	3/28/1995	1 specimen, 1995.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	002S 004E	31	344900N	0861500W	3/28/1995	1 specimen, 1995.

Table C-8. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	003S 004E	7	344800N	0861400W	3/28/1995	One specimen.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	003S 004E	47	344700N	0861500W	3/28/1995	2 specimens, 1995.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Princeton	003S 004E	18	344700N	0861500W	3/28/1995	2 specimens, 1995.
Mussels	*Lampsilis ovata*	pocketbook	G5	S1			Lim Rock	003S 004E	29	344500N	0861400W	5/23/1995	3 specimens.
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	LE,XN	SP	Princeton	003S 004E	18	344700N	0861500W	1967-00-00	
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	LE,XN	SP	Princeton	002S 004E	29	345100N	0861400W	3/28/1995	1 specimen, 1995.
Mussels	*Lampsilis virescens*	Alabama lampmussel	G1	S1	LE,XN	SP	Princeton	002S 004E	31	344900N	0861500W	3/28/1995	1 specimen, 1995.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Lim Rock	003S 004E	29	344500N	0861400W	1991-07-00	23 specimens
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Princeton	003S 004E	7	344800N	0861500W	1991-07	1 specimen.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Princeton	002S 004E	31	344900N	0861500W	7/18/1991	2 specimens
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Princeton	002S 004E	31	345000N	0861500W	1991-07-00	1 specimen.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Princeton	002S 004E	21	345200N	0861300W	9/9/1997	1997: 1 alive. 1995: 2 specimens.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Princeton	002S 004E	21	345200N	0861300W	3/28/1995	1 specimen, 1995-03-28.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Princeton	002S 004E	20	345100N	0861300W	9/9/1997	1997: 1 alive. 1995: 1 specimen.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Princeton	002S 004E	29	345100N	0861400W	3/28/1995	3 specimens, 1995.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Princeton	002S 004E	31	344900N	0861500W	3/28/1995	1 specimen, 1995.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Princeton	003S 004E	7	344800N	0861400W	3/28/1995	One specimen.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Princeton	003S 004E	7	344800N	0861500W	1995-03-201995-03-28	1 specimen, 1995.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Princeton	003S 004E	47	344700N	0861500W	3/28/1995	1 specimen, 1995.
Mussels	*Lasmigona costata*	fluted-shell	G5	S2			Lim Rock	003S 004E	29	344500N	0861400W	5/23/1995	2 specimens.

Table C-8. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Princeton	003S 004E	7	344800N	0861400W	3/28/1995	One specimen.
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Princeton	003S 004E	47	344700N	0861500W	3/28/1995	1 specimen, 1995.
Mussels	*Leptodea fragilis*	fragile papershell	G5	S5			Lim Rock	003S 004E	29	344500N	0861400W	5/23/1995	4 specimens.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Princeton	003S 004E	7	344800N	0861400W	1980-00-00	One specimen.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Princeton	003S 004E	7	344800N	0861500W	1980-00-00	Two specimens.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Princeton	003S 004E	30	344600N	0861500W	1980-00-00	One specimen.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Princeton	003S 004E	06,07	344800N	0861400W	1965-00-00	
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Princeton	002S 004E	29	345100N	0861300W	1980-00-00	One specimen.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Princeton	003S 004E	7	344800N	0861400W	3/25/1995	Seven specimens.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Princeton	003S 004E	19	344600N	0861500W	1980-00-00	One specimen.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Hollytree	003S 004E	18	344700N	0861500W	1980-00-00	Two specimens.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Lim Rock	003S 004E	29	344500N	0861400W	1991-07-2500	Isom and Yokley (1978) reported the species from the Paint Rock River at Trenton in 1965; also Ahlstedt (1991) reported 26 live or fresh dead specimens at river mile 43.1. Live mussels were returned to the river.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Hollytree	003S 004E	18	344700N	0861500W	1991-07-00	2 specimens
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Princeton	002S 004E	31	345000N	0861500W	7/18/1991	3 specimens.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Princeton	002S 004E	21	345200N	0861300W	9/9/1997	1997: 2 alive. 1995: 2 specimens.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Princeton	002S 004E	21	345200N	0861300W	3/28/1995	1 specimen, 1995-03-28.

Table C-8. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Princeton	002S 004E	31	344900N	0861500W	3/28/1995	2 specimens, 1995.
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	G2	S1	C	SP	Princeton	002S 004E	31	344900N	0861500W	3/28/1995	1 specimen, 1995.
Mussels	*Megalonaias nervosa*	washboard	G5	S5			Lim Rock	003S 004E	29	344500N	0861400W	1991-07-2500	2 specimens
Mussels	*Obliquaria reflexa*	threehorn wartyback	G5	S5			Lim Rock	003S 004E	29	344500N	0861400W	1991-07-00	26 specimens
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Princeton	003S 004E	18	344700N	0861500W	1967-00-00	
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Princeton	003S 004E	06,07	344800N	0861400W	1965-00-00	
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Lim Rock	003S 004E	29	344500N	0861400W	1991-07-2500	Isom and Yokley (1973) reported the species at Trenton (specimens in Carnegie Museum) from 1965 collection. Also, Ahlstedt (1991) reported 1 live or fresh dead specimen from river mile 43.1 (returned to river).
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Princeton	003S 004E	7	344800N	0861500W	1991-07	Relictual specimens.
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Princeton	002S 004E	21	345200N	0861300W	3/28/1995	1 specimen.
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Princeton	002S 004E	29	345100N	0861400W	3/28/1995	1 specimen, 1995.
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Princeton	003S 004E	7	344800N	0861400W	3/28/1995	1 specimen.
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Princeton	003S 004E	7	344800N	0861500W	1995-03-201995-03-28	1 specimen, 1995.
Mussels	*Obovaria subrotunda*	round hickorynut	G4	S2			Princeton	003S 004E	47	344700N	0861500W	3/28/1995	2 specimens, 1995.
Mussels	*Pleurobema oviforme*	Tennessee clubshell	G3	S1			Princeton	003S 004E	18	344700N	0861500W	1967-00-00	
Mussels	*Pleurobema oviforme*	Tennessee clubshell	G3	S1			Princeton	003S 004E	06,07	344800N	0861400W	1965-00-00	
Mussels	*Pleurobema oviforme*	Tennessee clubshell	G3	S1			Hollytree	003S 004E	18	344700N	0861500W	1980-00-00	1 specimen.

Table C-8. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Pleurobema oviforme*	Tennessee clubshell	G3	S1			Princeton	003S 004E	7	344800N	0861500W	1991-07	1 specimen.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Lim Rock	003S 004E	29	344500N	0861400W	1991-07	31 specimens
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Hollytree	003S 004E	18	344700N	0861500W	1991-07-00	1 specimen.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Princeton	003S 004E	7	344800N	0861500W	1991-07	1 specimen.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Princeton	002S 004E	31	344900N	0861500W	7/18/1991	1 specimen.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Princeton	002S 004E	31	345000N	0861500W	1991-07-00	1 specimen.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Princeton	002S 004E	21	345200N	0861300W	9/9/1997	1997: 1 alive, 5 fresh dead. 1995: 1 specimen.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Princeton	002S 004E	21	345200N	0861300W	3/28/1995	2 specimens, 1995-03-28.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Princeton	003S 004E	7	344800N	0861400W	3/28/1995	Five specimens.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Princeton	003S 004E	7	344800N	0861500W	1995-03-201995-03-28	3 specimens, 1995.
Mussels	*Potamilus alatus*	pink heelsplitter	G5	S5			Princeton	003S 004E	30	344600N	0861500W	1995-00-00	5 specimens, 1995.
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Princeton	003S 004E	18	344700N	0861500W	1967-00-00	
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Princeton	003S 004E	19	344600N	0861400W	1980-00-00	Two specimens.
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Princeton	003S 004E	30	344600N	0861500W	1980-00-00	One specimen.
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Princeton	003S 004E	7	344800N	0861500W	1980-00-00	Two specimens.
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Princeton	003S 004E	7	344800N	0861400W	3/28/1995	One specimen, 1980.
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Princeton	002S 004E	31	344900N	0861500W	1991-07-00	One specimen (1980); 1 specimen (1991).
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Princeton	002S 004E	29	345100N	0861300W	1980-00-00	One specimen.
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Lim Rock	003S 004E	29	344500N	0861400W	1991-07	6 specimens

Table C-8. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Hollytree	003S 004E	18	344700N	0861500W	1991-07-00	1 specimen
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Princeton	002S 004E	29	345100N	0861400W	3/28/1995	1 specimen, 1995.
Mussels	*Ptychobranchus fasciolaris*	kidneyshell	G4G5	S1			Princeton	002S 004E	31	345000N	0861500W	3/28/1995	1 specimen, 1995.
Mussels	*Pyganodon grandis*	giant floater	G5	S5			Princeton	003S 004E	30	344600N	0861500W	1995-00-00	1 specimen, 1995.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Princeton	003S 004E	18	344700N	0861500W	1967-00-00	
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Princeton	003S 004E	30	344600N	0861500W	1980-00-00	One specimen.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Lim Rock	003S 004E	29	344500N	0861400W	7/25/1991	Ortmann (1919) reported specimens collected by H. Smith from Paint Rock River at Trenton (date of collection unclear), specimens at Carnegie Museum. Also, Ahlstedt (1991) reported 1 live or fresh dead specimen from river mile 43.1.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Hollytree	003S 004E	18	344700N	0861500W	1991-07-00	4 specimens
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Princeton	002S 004E	31	344900N	0861500W	7/18/1991	1 specimen.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Princeton	002S 004E	29	345100N	0861400W	3/28/1995	1 specimen, 1995.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Princeton	002S 004E	31	344900N	0861500W	3/28/1995	1 specimen, 1995.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Princeton	003S 004E	7	344800N	0861400W	3/28/1995	One specimen.

Table C-8. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Princeton	003S 004E	47	344700N	0861500W	3/28/1995	4 specimens, 1995.
Mussels	*Quadrula cylindrica cylindrica*	rabbitsfoot	G3T3	S1			Lim Rock	003S 004E	29	344500N	0861400W	5/23/1995	1 specimen.
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			Lim Rock	003S 004E	29	344500N	0861400W	1991-07	3 specimens
Mussels	*Quadrula pustulosa*	pimpleback	G5	S5			Lim Rock	003S 004E	29	344500N	0861400W	5/23/1995	1 specimen.
Mussels	*Toxolasma cylindrellus*	pale lilliput	G1	S1	LE	SP	Princeton	002S 004E	21	345200N	0861300W	9/9/1999	1999: 1 fresh dead. 1998: 1 specimen.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Princeton	003S 004E	18	344700N	0861500W	1967-00-00	
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Hollytree	003S 004E	18	344700N	0861500W	1991-07-00	2 specimens
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Princeton	002S 004E	31	345000N	0861500W	1991-07-00	1 specimen.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Princeton	002S 004E	31	344900N	0861500W	3/28/1995	1 specimen, 1995.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Princeton	003S 004E	7	344800N	0861400W	3/28/1995	One specimen.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Princeton	003S 004E	18	344700N	0861500W	3/28/1995	1 specimen, 1995.
Mussels	*Toxolasma lividus lividus*	purple lilliput	G2T1	S2			Princeton	003S 004E	29	344500N	0861400W	5/23/1995	1 specimen, 1995.
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Hollytree	003S 004E	18	344700N	0861500W	1991-07-00	2 specimens
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Princeton	003S 004E	7	344800N	0861500W	1991-07	2 specimens
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Princeton	002S 004E	31	344900N	0861500W	7/18/1991	2 specimens.
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Princeton	002S 004E	31	345000N	0861500W	1991-07-00	1 specimen.
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Princeton	002S 004E	20	345100N	0861300W	1995	1 specimen, 1995.
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Princeton	002S 004E	20	345100N	0861300W	3/28/1995	1 specimen, 1995.
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Princeton	002S 004E	29	345100N	0861400W	3/28/1995	1 specimen, 1995.
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Princeton	002S 004E	31	345000N	0861500W	3/28/1995	1 specimen, 1995.

Table C-8. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Princeton	002S 004E	31	344900N	0861500W	3/28/1995	1 specimen, 1995.
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Princeton	003S 004E	7	344800N	0861400W	3/28/1995	One specimen.
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Princeton	003S 004E	7	344800N	0861500W	1995-03-20, 1995-03-28	1 specimen, 1995.
Mussels	*Tritogonia verrucosa*	pistolgrip	G4	S4			Princeton	003S 004E	18	344700N	0861500W	3/28/1995	1 specimen, 1995.
Mussels	*Truncilla truncata*	deertoe	G5	S1			Princeton	003S 004E	06,07	344800N	0861400W	1965-00-00	
Mussels	*Truncilla truncata*	deertoe	G5	S1			Lim Rock	003S 004E	29	344500N	0861400W	7/25/1991	Isom and Yokley (1973) reported the species from the Paint Rock river at Tenton in 1965; also Ahlstedt (1991) reported 2 live or fresh dead specimens at river mile 43.1.
Mussels	*Villosa iris*	rainbow	G5	S3			Princeton	002S 004E	21	345200N	0861300W	3/28/1995	2 specimens, 1995-03-28.
Mussels	*Villosa iris*	rainbow	G5	S3			Princeton	002S 004E	29	345100N	0861400W	3/28/1995	2 specimens, 1995.
Mussels	*Villosa iris*	rainbow	G5	S3			Princeton	002S 004E	31	344900N	0861500W	3/28/1995	1 specimen, 1995.
Mussels	*Villosa iris*	rainbow	G5	S3			Princeton	003S 004E	7	344800N	0861400W	3/28/1995	Two specimens, 1995.
Mussels	*Villosa iris*	rainbow	G5	S3			Princeton	003S 004E	7	344800N	0861500W	1995-03-20, 1995-03-28	1 specimen, 1995.
Mussels	*Villosa iris*	rainbow	G5	S3			Princeton	003S 004E	47	344700N	0861500W	3/28/1995	5 specimens, 1995.
Mussels	*Villosa iris*	rainbow	G5	S3			Princeton	003S 004E	18	344700N	0861500W	3/28/1995	1 specimen, 1995.
Mussels	*Villosa iris*	rainbow	G5	S3			Lim Rock	003S 004E	29	344500N	0861400W	5/23/1995	1 specimen.
Mussels	*Villosa nebulosa*	Alabama rainbow	G3	S3			Lim Rock	003S 004E	29	344500N	0861400W	1991-07	2 specimens
Mussels	*Villosa nebulosa*	Alabama rainbow	G3	S3			Hollytree	003S 004E	18	344700N	0861500W	1991-07-00	1 specimen

Table C-8. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Villosa nebulosa*	Alabama rainbow	G3	S3			Princeton	003S 004E	7	344800N	0861500W	1991-07	3 specimens
Mussels	*Villosa nebulosa*	Alabama rainbow	G3	S3			Princeton	002S 004E	31	344900N	0861500W	7/18/1991	1 specimen.
Mussels	*Villosa taeniata*	painted creekshell	G3G4	S1			Princeton	003S 004E	18	344700N	0861500W	1967-00-00	
Mussels	*Villosa taeniata*	painted creekshell	G3G4	S1			Princeton	003S 004E	7	344800N	0861500W	1980-00-00	One specimen.
Mussels	*Villosa taeniata*	painted creekshell	G3G4	S1			Princeton	003S 004E	18	344700N	0861500W	3/28/1995	1 specimen, 1995.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Lim Rock	003S 004E	29	344500N	0861400W	1991-07	4 specimens
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Princeton	003S 004E	30	344600N	0861500W	1991-07-00	1 specimen at site #11.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Hollytree	003S 004E	18	344700N	0861500W	1991-07-00	68 specimens
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Princeton	003S 004E	7	344800N	0861500W	1991-07	1 specimens
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Princeton	002S 004E	21	345200N	0861300W	3/28/1995	4 specimens, 1995-03-28.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Princeton	002S 004E	20	345100N	0861300W	1995	6 specimens, 1995.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Princeton	002S 004E	29	345100N	0861400W	3/28/1995	1 specimen, 1995.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Princeton	002S 004E	31	344900N	0861500W	3/28/1995	3 specimens, 1995.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Princeton	003S 004E	7	344800N	0861400W	3/28/1995	One specimen.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Princeton	003S 004E	7	344800N	0861500W	1995-03-20, 1995-03-28	7 specimens, 1995.

Table C-8. Continued.

Major Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Quad	Town Range	Section	Latitude	Longitude	Date Last Observed	EO Data
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Princeton	003S 004E	47	344700N	0861500W	3/28/1995	2 specimens, 1995.
Mussels	*Villosa vanuxemensis umbrans*	Coosa creekshell	G4T2	S2			Princeton	003S 004E	30	344600N	0861500W	1995-00-00	1 specimen.
Vascular Plants	*Jeffersonia diphylla*	twinleaf	G5	S2			Hollytree	002S 003E	28	345000N	0861900W	3/10/1974	

APPENDIX D. Nonpoint source pollution impact sites documented by Godwin (1995).

Table D-1. Type of impact, date of observance, stream segment, subwatershed, county, township, and photograph documentation for nonpoint source impacts documented in the Paint Rock River watershed; Jackson, Madison, and Marshall counties March – September 1995. [from Godwin (1995)]

Site	Date	County	Watershed Segment	Subwatershed	Township Range Section	Impact	Photo
01	25 May 1995	Madison, Marshall	Main stem	Lower Paint Rock River	T6S R2E Sec 23	Drainage pipe	yes
02	25 May 1995	Madison, Marshall	Main stem	Lower Paint Rock River	T6S R2E Sec 14	Bank erosion: lack of riparian vegetation	yes
03	25 May 1995	Madison, Marshall	Main stem	Lower Paint Rock River	T6S R2E Sec 14	Sewage	yes
04	25 May 1995	Madison, Marshall	Main stem	Lower Paint Rock River	T6S R2E & 3E Sec 13 & 18	Bank erosion: lack of riparian vegetation	yes
05	25 May 1995	Madison, Marshall	Main stem	Lower Paint Rock River	T6S R3E Sec 18	Bank erosion: livestock use	yes
06	25 May 1995	Madison, Marshall	Main stem	Lower Paint Rock River	T6S R3E Sec 18	Sedimentation from mining	yes
07	25 May 1995	Madison, Marshall	Main stem	Lower Paint Rock River	T6S R3 E Sec 17 & 18	Bank erosion: livestock use Bank erosion: lack of riparian vegetation	yes
08	25 May 1995	Madison, Marshall	Main stem	Lower Paint Rock River	T6S R3E Sec 17	Bank erosion: lack of riparian vegetation	yes
09	25 May 1995	Madison, Marshall	Main stem	Lower Paint Rock River	T6S R3E Sec 17	Bank erosion: livestock use Bank erosion: lack of riparian vegetation	yes
10	25 May 1995	Madison, Marshall	Main stem	Lower Paint Rock River	T6S R3E Sec 17	Bank erosion: lack of riparian vegetation	yes
11	22 May 1995	Madison, Marshall	Main stem	Lower Paint Rock River	T6S R3E Sec 17	Bank erosion: lack of riparian vegetation	yes

Table D-1. Continued.

Site	Date	County	Watershed Segment	Subwatershed	Township Range Section	Impact	Photo
12	22 May 1995	Madison, Marshall	Main stem	Lower Paint Rock River	T5S R3E Sec 33	Bank erosion: livestock use Bank erosion: lack of riparian vegetation	yes
13	22 May 1995	Madison, Marshall		Lower Paint Rock River	T5S R3E Sec 32	Bank erosion: lack of riparian vegetation	
14	22 May 1995	Madison, Marshall	Main stem	Lower Paint Rock River	T5S R3E Sec 29	Bank erosion: vehicular use	yes
15	27 March 1995	Madison, Marshall	Main stem	Lower Paint Rock River	T5S R3E Sec 27	Bank erosion: vehicular use	yes
16	27 March 1995	Madison, Marshall	Main stem	Upper Paint Rock River	T5S R3E Sec 22	Bank erosion: livestock use Bank erosion: vehicular use	yes
17	27 March 1995	Madison, Marshall	Main stem	Upper Paint Rock River	T5S R3E Sec 21	Bank erosion from lack of riparian vegetation	no
18	27 March 1995	Jackson	Main stem	Upper Paint Rock River	T5S R3E Sec 17	Bank erosion: vehicular use	yes
19	27 March 1995	Jackson	Main stem	Upper Paint Rock River	T5S R3E Sec 16	Bank erosion: lack of riparian vegetation	yes
20	27 March 1995	Jackson	Main stem	Upper Paint Rock River	T5S R3E Sec 16	Cropland erosion	yes
21	27 March 1995	Jackson	Main stem	Upper Paint Rock River	T5S R3E Sec 9	None	yes
22	26 May 1995	Jackson	Main stem	Upper Paint Rock River	T5S R3E Sec 9	Bank erosion: lack of riparian vegetation	yes
23	26 May 1995	Jackson	Main stem	Upper Paint Rock River	T5S R3E Sec 3	Bank erosion: lack of riparian vegetation	yes

Table D-1. Continued.

Site	Date	County	Watershed Segment	Subwatershed	Township Range Section	Impact	Photo
24	26 May 1995	Jackson	Main stem	Upper Paint Rock River	T5S R3E Sec 4	Bank erosion: lack of riparian vegetation	yes
25	26 May 1995	Jackson	Main stem	Upper Paint Rock River	T5S R3E Sec 4	Bank erosion: lack of riparian vegetation	yes
26	26 May 1995	Jackson	Main stem	Upper Paint Rock River	T5S R3E Sec 4	Cropland erosion Bank erosion: lack of riparian vegetation	yes
27	26 May 1995	Jackson	Main stem	Upper Paint Rock River	T4S R3E Sec 33	Bank erosion: lack of riparian vegetation	yes
28	26 May 1995	Jackson	Main stem	Upper Paint Rock River	T4S R3E Sec 33	Cropland erosion Bank erosion: lack of riparian vegetation	yes
29	26 May 1995	Jackson	Main stem	Upper Paint Rock River	T4S R3E Sec 33	Bank erosion: lack of riparian vegetation	yes
30	26 May 1995	Jackson	Main stem	Upper Paint Rock River	T4S R3E Sec 29	Bank erosion: lack of riparian vegetation	yes
31	23 May 1995	Jackson	Main stem	Upper Paint Rock River	T4S R3E Sec 28	Bank erosion: livestock use Bank erosion: lack of riparian vegetation	yes
32	23 May 1995	Jackson	Main stem	Upper Paint Rock River	T4S R3E Sec 16 & 21	Bank erosion: lack of riparian vegetation	no
33	23 May 1995	Jackson	Main stem	Upper Paint Rock River	T4S R3E Sec 9 & 16	Bank erosion: lack of riparian vegetation	yes
34	23 May 1995	Jackson	Main stem	Upper Paint Rock River	T4S R3E Sec 9	Bank erosion: lack of riparian vegetation	yes

Table D-1. Continued.

Site	Date	County	Watershed Segment	Subwatershed	Township Range Section	Impact	Photo
35	23 May 1995	Jackson	Main stem	Upper Paint Rock River	T4S R3E Sec 10	Bank erosion: lack of riparian vegetation	yes
36	23 May 1995	Jackson	Main stem	Upper Paint Rock River	T4S R3E Sec 3	Bank erosion: vehicular use Bank erosion: lack of riparian vegetation	yes
37	23 May 1995	Jackson	Main stem	Upper Paint Rock River	T4S R3E Sec 3	Bank erosion: lack of riparian vegetation	yes
38	23 May 1995	Jackson	Main stem	Upper Paint Rock River	T4S R3E Sec 2	Bank erosion: lack of riparian vegetation	yes
39	23 May 1995	Jackson	Main stem	Upper Paint Rock River	T4S R3E Sec 2	Bank erosion: livestock use	no
40	23 May 1995	Jackson	Main stem	Upper Paint Rock River	T4S R3E Sec 2	Bank erosion: vehicular use	yes
41	23 May 1995	Jackson	Main stem	Upper Paint Rock River	T4S R3E Sec 1	Bank erosion: vehicular use	yes
42	23 May 1995	Jackson	Main stem	Upper Paint Rock River	T3S & 4S R4E Sec 31 & 6	None: good riparian vegetation	yes
43	23 May 1995	Jackson	Main stem	Upper Paint Rock River	T3S R4E Sec 31	Bank erosion: lack of riparian vegetation	yes
44	23 May 1995	Jackson	Main stem	Upper Paint Rock River	T3S R4E Sec 31	Bank erosion: vehicular use	yes
45	23 May 1995	Jackson	Main stem	Upper Paint Rock River	T3S R4E Sec 32	Bank erosion: lack of riparian vegetation	yes
46	23 May 1995	Jackson	Main stem	Upper Paint Rock River	T3S R4E Sec 32	None, excellent riparian vegetation	yes

Table D-1. Continued.

Site	Date	County	Watershed Segment	Subwatershed	Township Range Section	Impact	Photo
47	23 May 1995	Jackson	Main stem	Upper Paint Rock River	T3S R4E Sec 29	Bank erosion: lack of riparian vegetation	yes
48	23 May 1995	Jackson	Main stem	Lick Fork	T3S R4E Sec 29	Bank erosion: lack of riparian vegetation	yes
49	23 May 1995	Jackson	Main stem	Lick Fork	T3S R4E Sec 29	Bank erosion: lack of riparian vegetation Off-road vehicle	yes
50	23 May 1995	Jackson	Main stem	Lick Fork	T3S R4E Sec 29	Bank erosion: lack of riparian vegetation	yes
51	28 March 1995	Jackson	Main stem	Lick Fork	T3S R4E Sec 18	Bank erosion: lack of riparian vegetation	yes
52	28 March 1995	Jackson	Main stem	Lick Fork	T3S R4E Sec 18	Bank erosion: lack of riparian vegetation	yes
53	28 March 1995	Jackson	Main stem	Lick Fork	T3S R4E Sec 18	Bank erosion: vehicular use	yes
54	28 March 1995	Jackson	Main stem	Lick Fork	T2S R4E Sec 31	Sedimentation from mining	yes
55	28 March 1995	Jackson	Main stem	Lick Fork	T2S R4E Sec 31	Bank erosion: livestock use	yes
56	28 March 1995	Jackson	Main stem	Lick Fork	T2S R4E Sec 31	Bank erosion: vehicular use	no
57	28 March 1995	Jackson	Main stem	Lick Fork	T2S R4E Sec 29	Off-road vehicle	yes
58	28 March 1995	Jackson	Main stem	Lick Fork	T2S R4E Sec 29	Sedimentation from mining	no

Table D-1. Continued.

Site	Date	County	Watershed Segment	Subwatershed	Township Range Section	Impact	Photo
59	28 March 1995	Jackson	Main stem	Lick Fork	T2S R4E Sec 20	Bank erosion: livestock use	yes
60	28 March 1995	Jackson	Main stem	Lick Fork	T2S R4E Sec 21	Bank erosion: lack of riparian vegetation	yes
61	28 March 1995	Jackson	Main stem	Lick Fork	T2S R4E Sec 21	Bank erosion: lack of riparian vegetation Sedimentation from mining	yes
62	28 March 1995	Jackson	Main stem	Estill Fork	T2S R4E Sec 21	Dumping	no
63	28 March 1995	Jackson	Main stem	Estill Fork	T2S R4E Sec 22	Bank erosion: lack of riparian vegetation	yes
64	28 March 1995	Jackson	Main stem	Estill Fork	T2S R4E Sec 15	None	yes
65	24 May 1995	Jackson	Main stem	Estill Fork	T2S R4E Sec 15	Bank erosion: livestock use	no
66	24 May 1995	Jackson	Main stem	Estill Fork	T2S R4E Sec 10	Bank erosion: livestock use Bank erosion: lack of riparian vegetation	yes
67	24 May 1995	Jackson	Main stem	Estill Fork	T2S R4E Sec 10	Bank erosion: lack of riparian vegetation	yes
68	24 May 1995	Jackson	Main stem	Estill Fork	T2S R4E Sec 2	Bank erosion: vehicular use	yes
69	24 May 1995	Jackson	Estill Fork	Estill Fork	T2S R4E Sec 2	Bank erosion: lack of riparian vegetation	no
70	24 May 1995	Jackson	Estill Fork	Estill Fork	T2S R4E Sec 2	Bank erosion: livestock use	yes

Table D-1. Continued.

Site	Date	County	Watershed Segment	Subwatershed	Township Range Section	Impact	Photo
71	24 May 1995	Jackson	Estill Fork	Estill Fork	T1S R4E Sec 35	Bank erosion: lack of riparian vegetation	yes
72	24 May 1995	Jackson	Estill Fork	Estill Fork	T1S R4E Sec 35	Bank erosion: lack of riparian vegetation	yes
73	24 May 1995	Jackson	Estill Fork	Estill Fork	T1S R4E Sec 36	Logjam (potential problem?)	yes
74	24 May 1995	Jackson	Estill Fork	Estill Fork	T1S R4E Sec 24	Bank erosion: livestock use Bank erosion: lack of riparian vegetation	yes
75	24 May 1995	Jackson	Estill Fork	Estill Fork	T1S R4E Sec 24	Bank erosion: livestock use Bank erosion: vehicular use	yes
76	24 May 1995	Jackson	Estill Fork	Estill Fork	T1S R4E Sec 24	Bank erosion: livestock use	yes
77	24 May 1995	Jackson	Estill Fork	Estill Fork	T1S R4E Sec 24	Bank erosion: livestock use Bank erosion: vehicular use Bank erosion: lack of riparian vegetation	yes
78	24 May 1995	Jackson	Estill Fork	Estill Fork	T1S R4E Sec 13	Bank erosion: lack of riparian vegetation	yes
79	19 March 1995	Jackson	Estill Fork	Estill Fork	T1S R5E Sec 6	Livestock Off-road vehicle	no
79	19 March 1995	Jackson	Estill Fork	Estill Fork	T1S R4E Sec 1	Livestock Timber harvest	no
80	19 March 1995	Jackson	Larkin Fork	Larkin Fork	T1S R4E Sec 29	Dumping	no

Table D-1. Continued.

Site	Date	County	Watershed Segment	Subwatershed	Township Range Section	Impact	Photo
81	19 March 1995	Jackson	Larkin Fork	Larkin Fork	T1S R4E Sec 8	Off-road vehicle	no
82	29 March 1995	Jackson	Hurricane Creek	Estill Fork	T1S R5E Sec 30	Construction sites and roadbank erosion	yes
83	29 March 1995	Jackson	Hurricane Creek	Estill Fork	T1S R5E Sec 28	Bank erosion: livestock use	yes
84	29 March 1995	Jackson	Hurricane Creek	Estill Fork	T1S R5E Sec 16	Bank erosion: vehicular use Timber harvest	no
85	18 March 1995	Jackson	Hurricane Creek	Estill Fork	T1S R5E Sec 9 & 16	Timber harvest	yes

APPENDIX E. Threat Assessment Charts

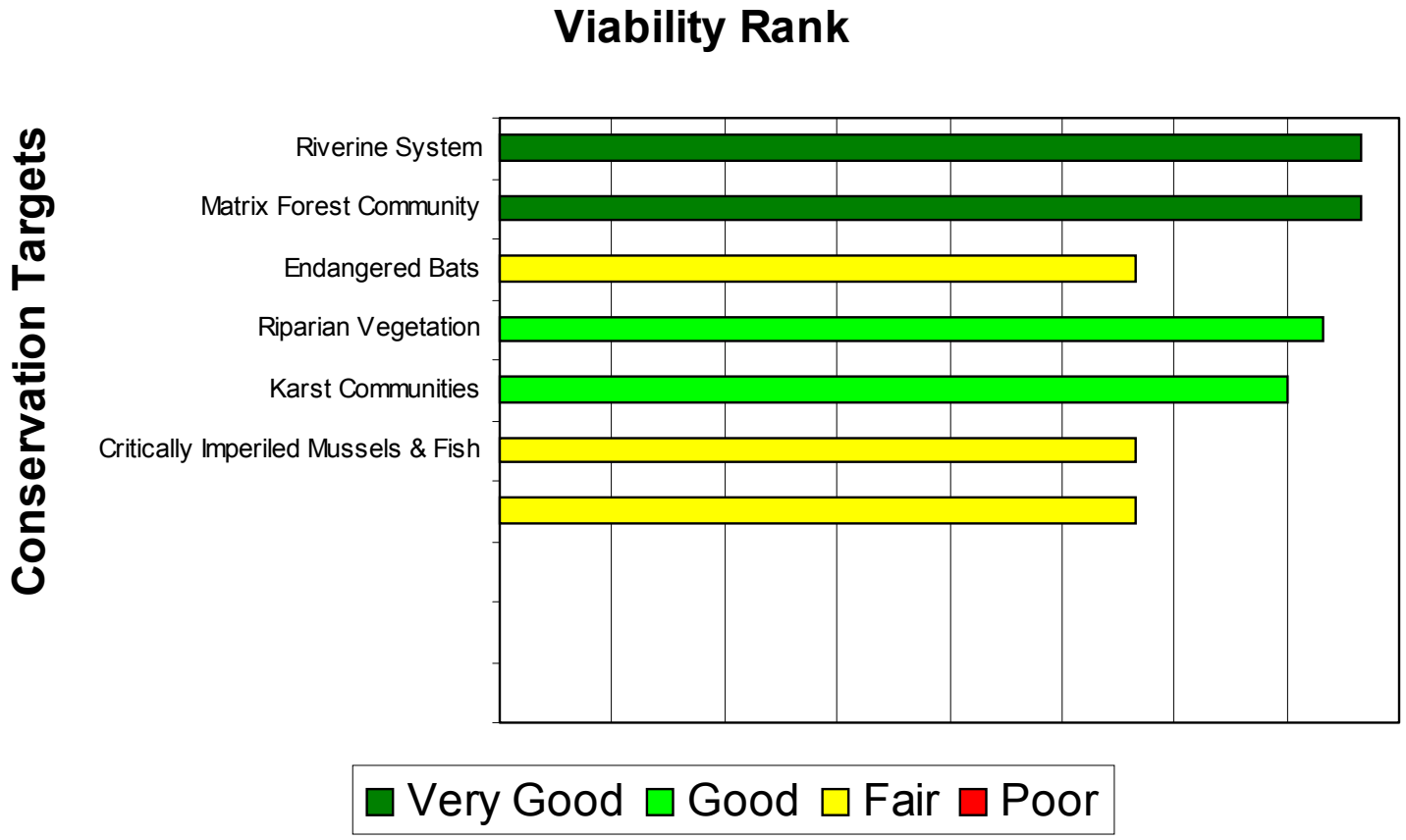


Figure E-1. Biodiversity viability ranks for conservation targets selected for the upper Paint Rock River watersheds.

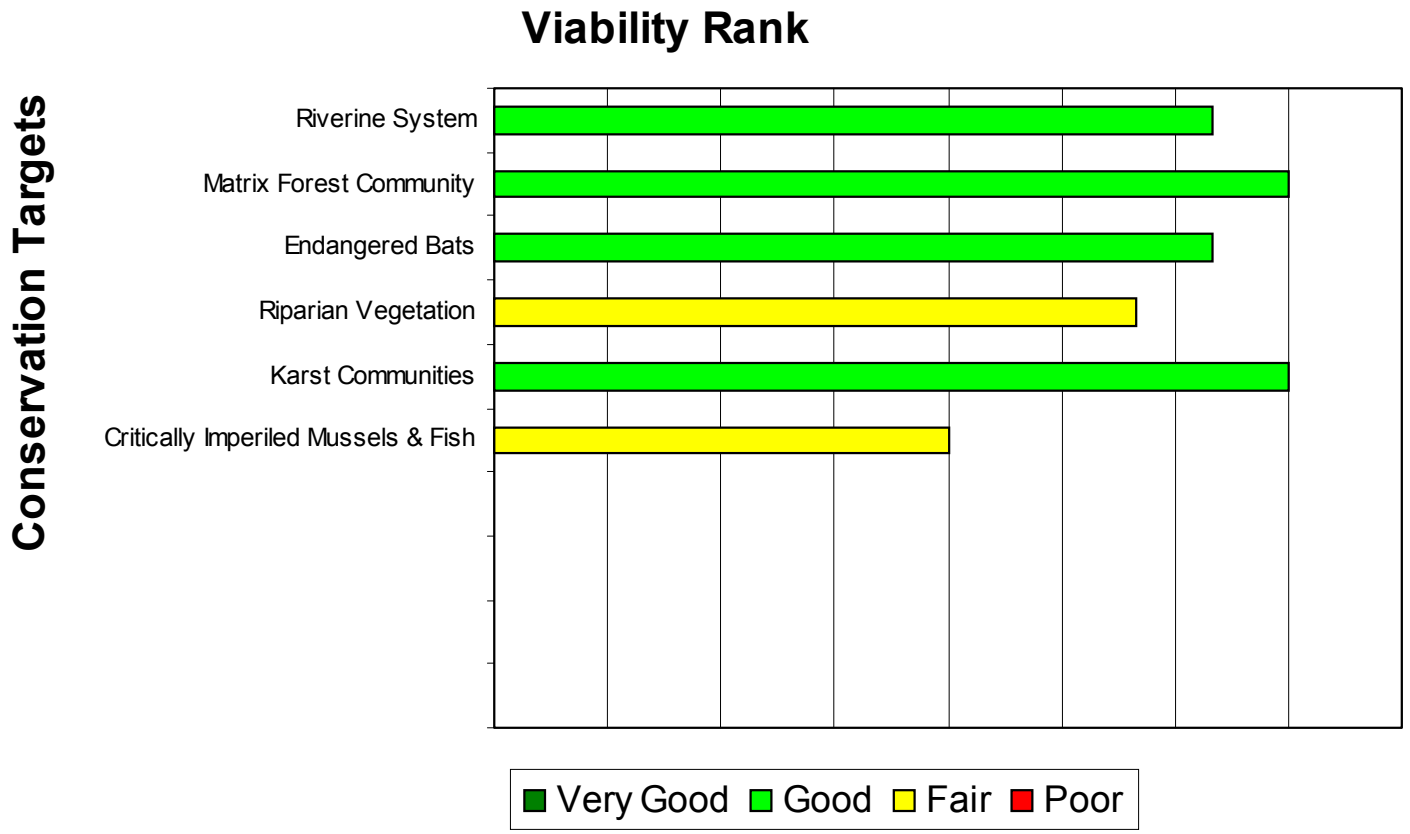


Figure E-2. Biodiversity Viability ranks for conservation targets selected for the lower Paint Rock River watershed.

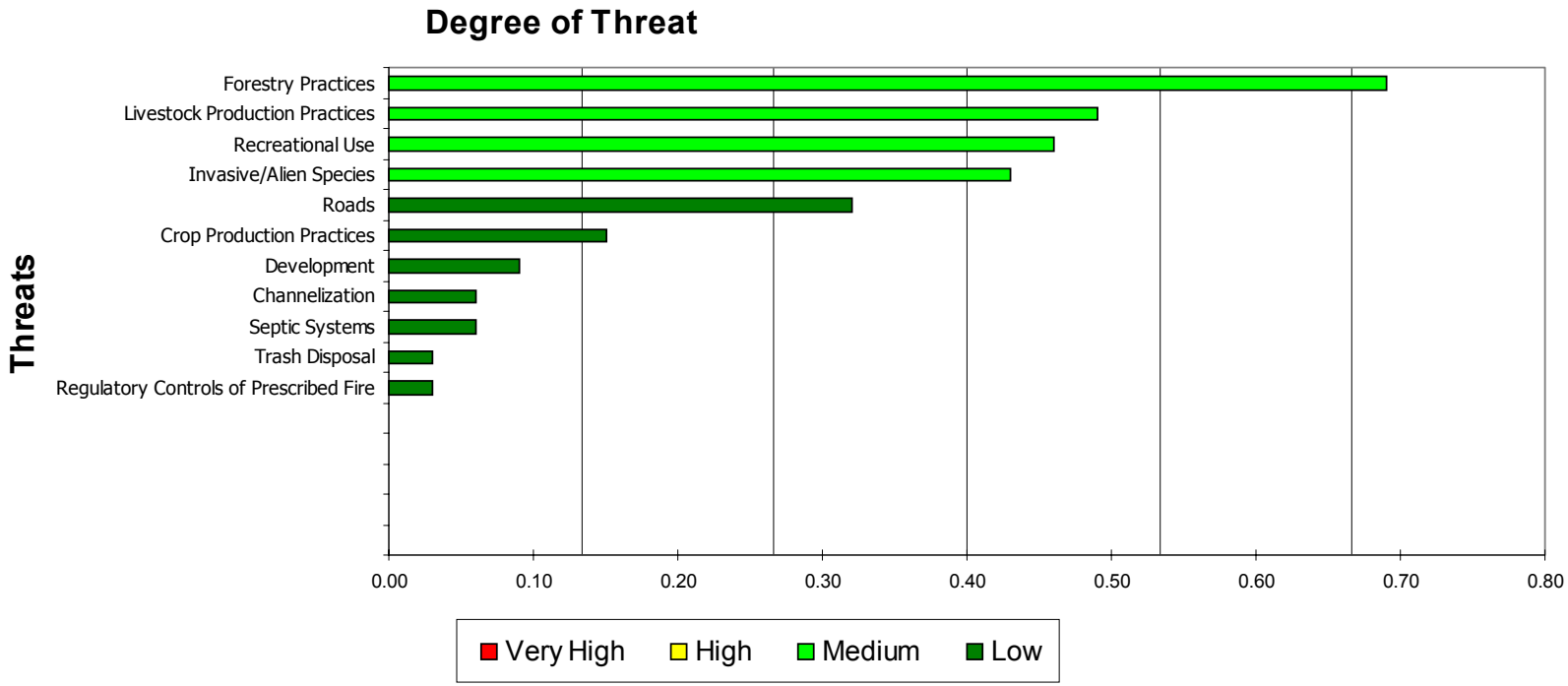


Figure E-3. Overall threat rankings for threats to conservation targets identified in the upper Paint Rock River watershed.

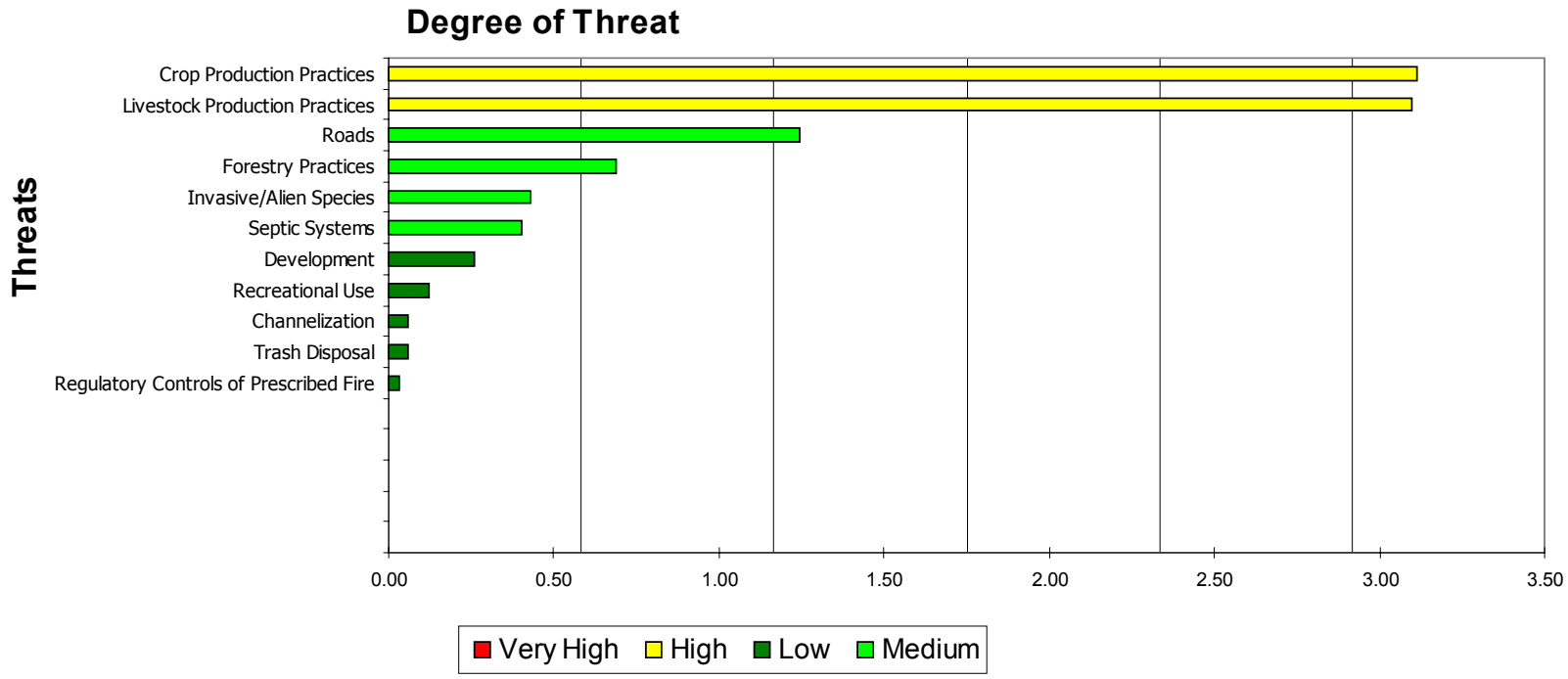


Figure E-4. Overall threat rankings for threats to conservation targets identified in the lower Paint Rock River watershed.

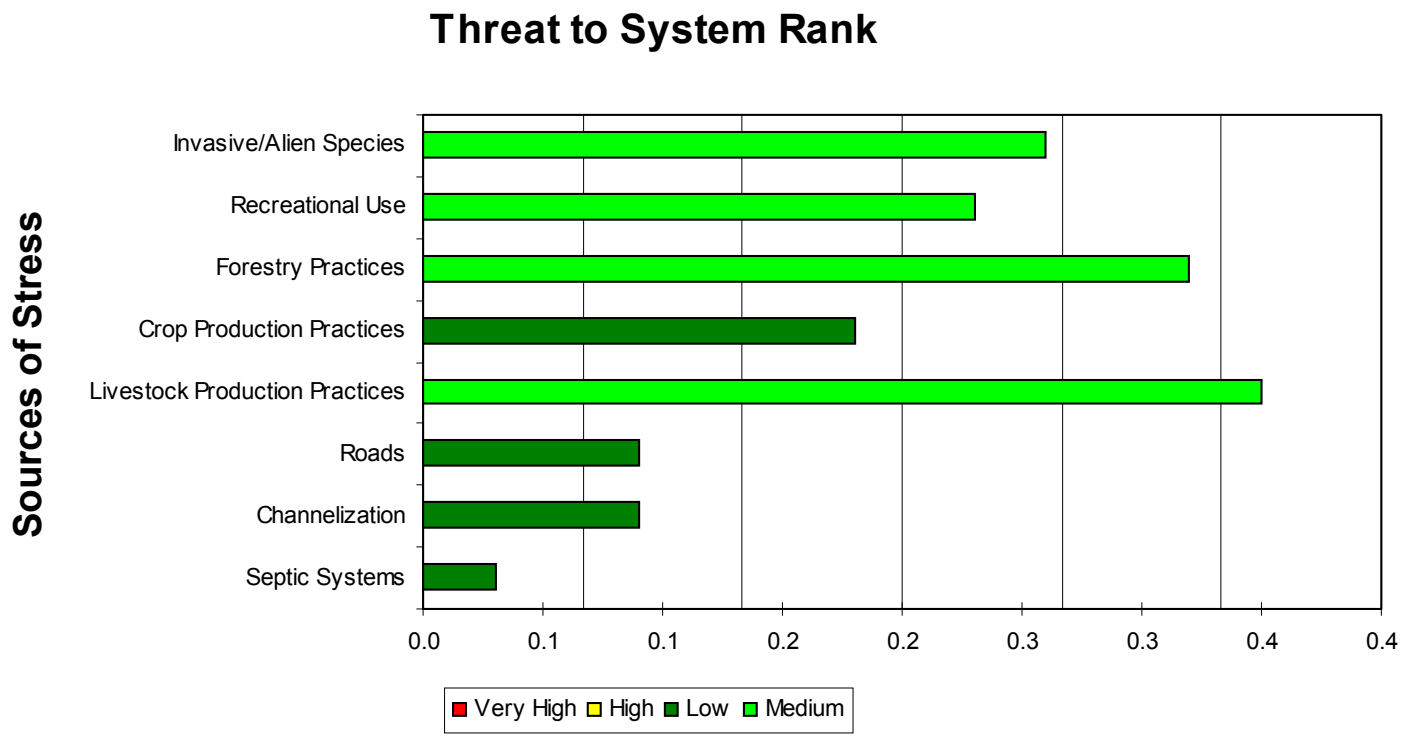


Fig E-5. Threat to system rank for sources of stress to the riverine system conservation target identified in the upper Paint Rock River watershed.

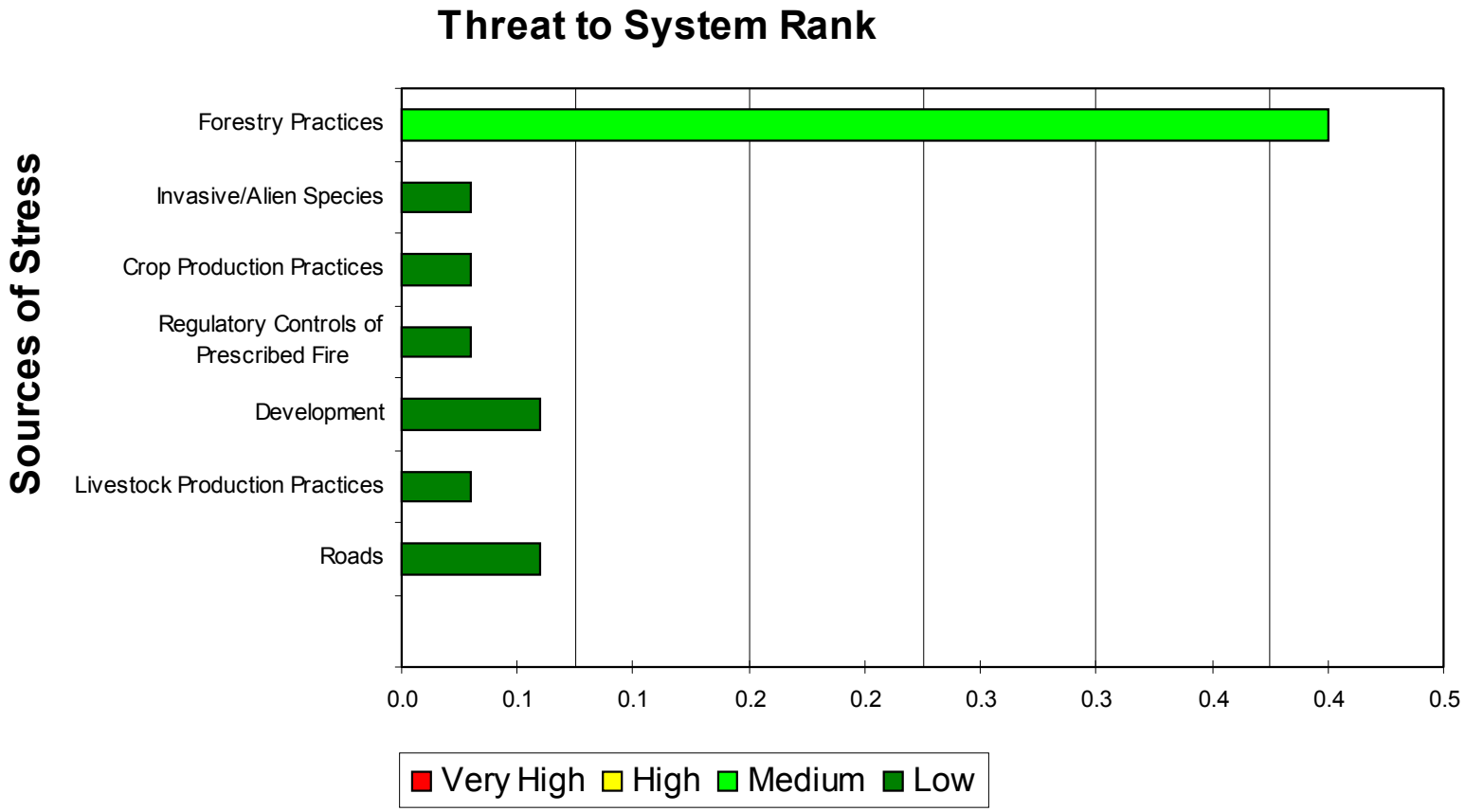


Fig E-6. Threat to system rank for sources of stress to the matrix forest community conservation target identified in the upper Paint Rock River watershed.

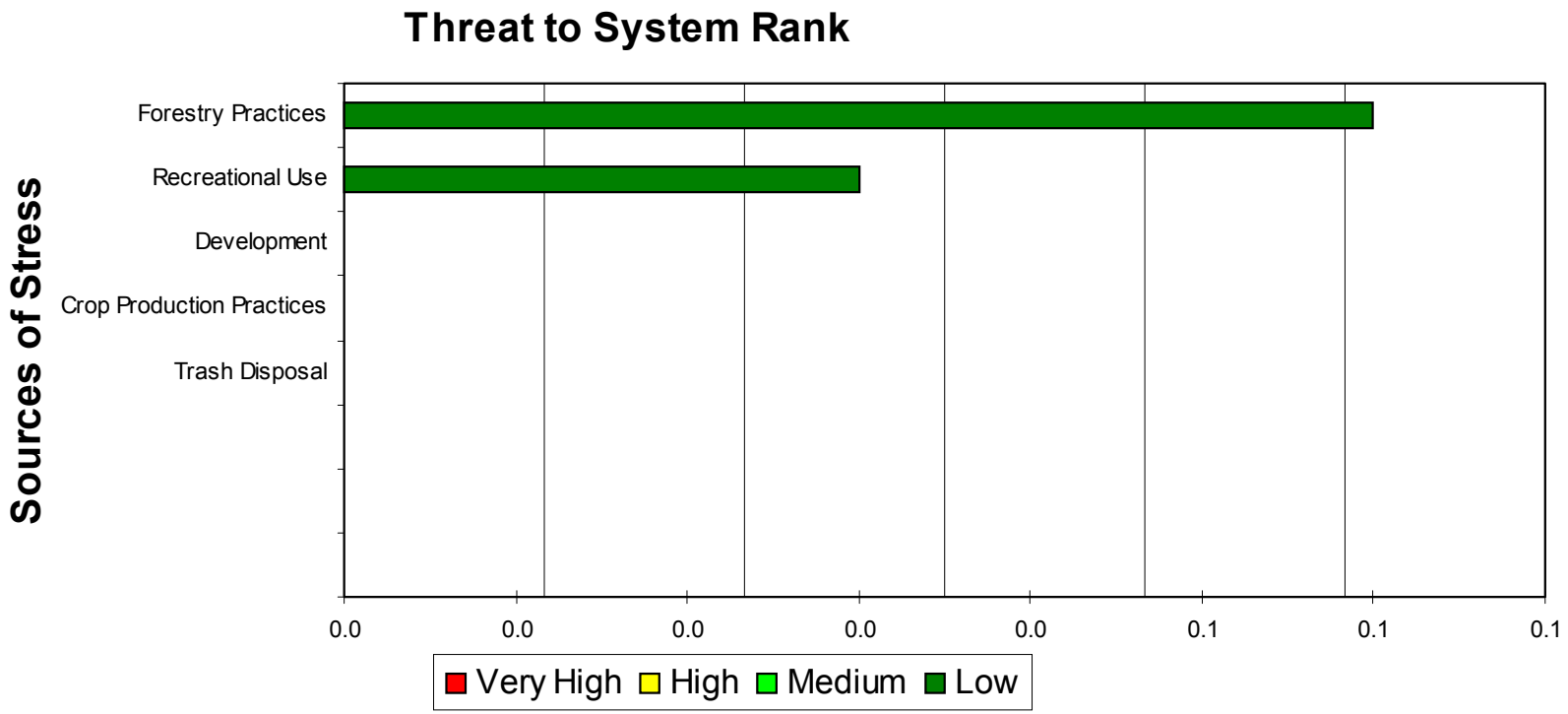


Fig E-7. Threat to system rank for sources of stress to the endangered bats conservation target identified in the upper Paint Rock River watershed.

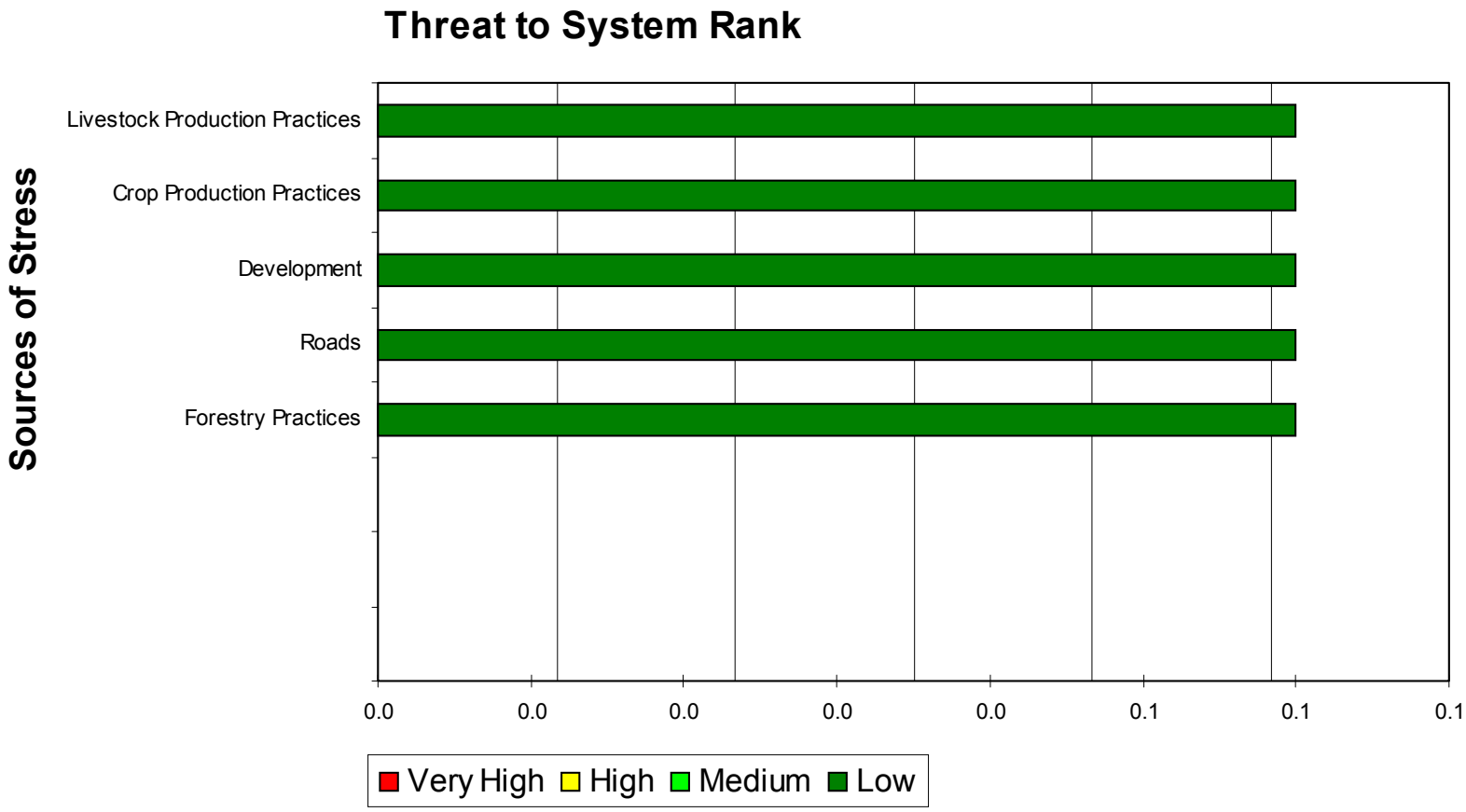


Fig E-8. Threat to system rank for sources of stress to the riparian vegetation conservation target identified in the upper Paint Rock River watershed.

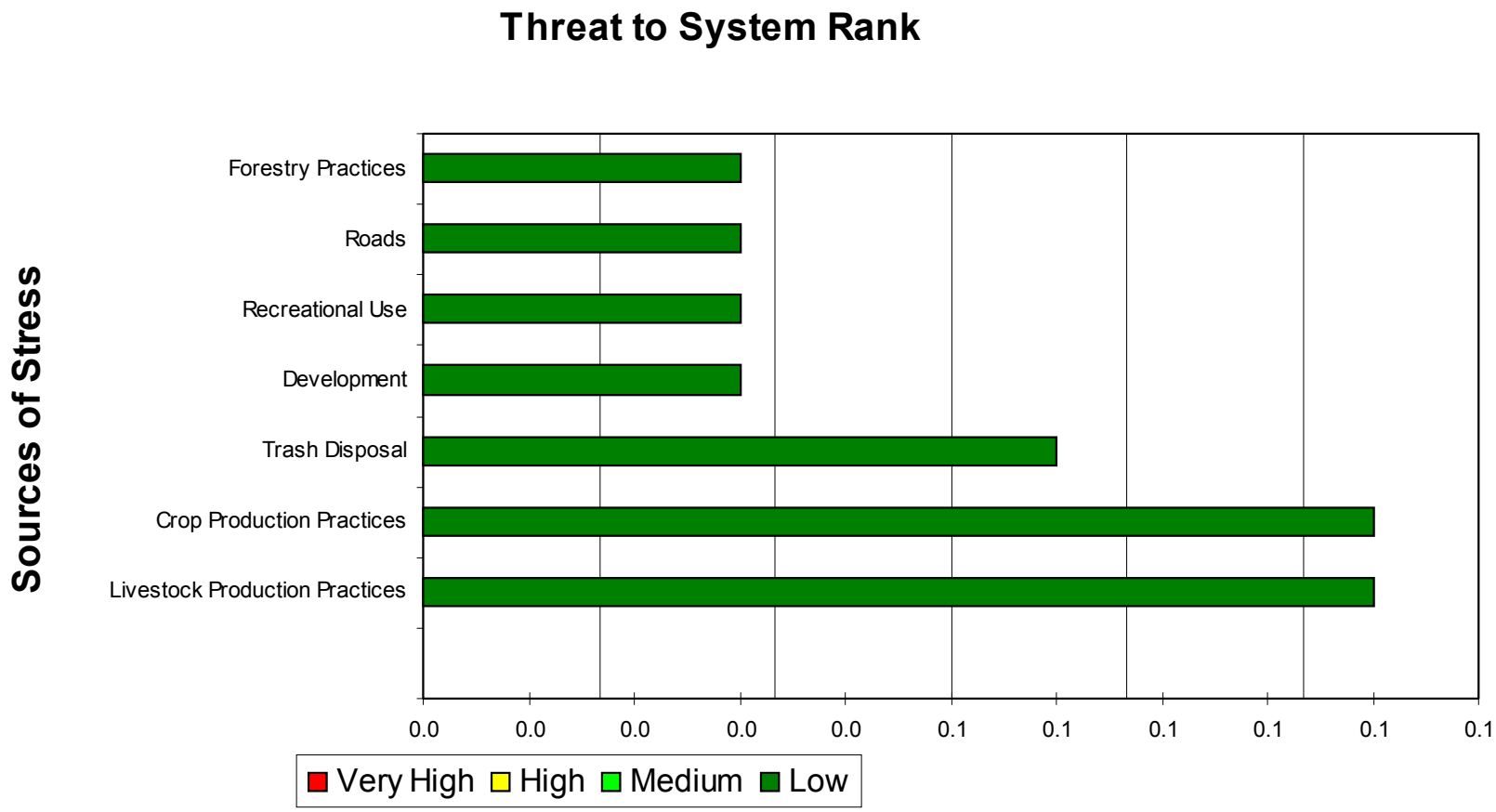


Fig E-9. Threat to system rank for sources of stress to the karst communities conservation target identified in the upper Paint Rock River watershed.

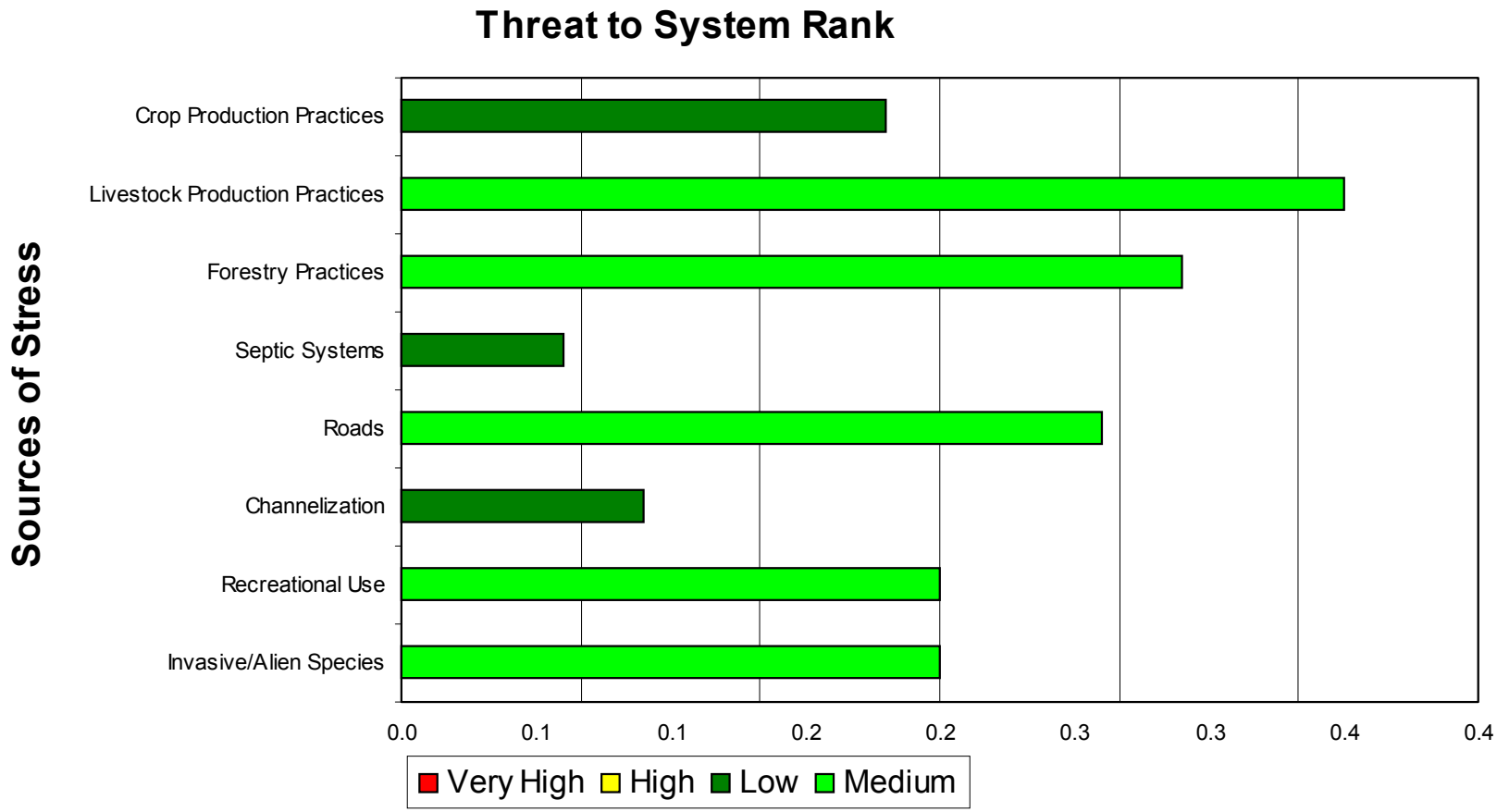


Fig E-10. Threat to system rank for sources of stress to the critically imperiled mussels and fish conservation target identified in the upper Paint Rock River watershed.

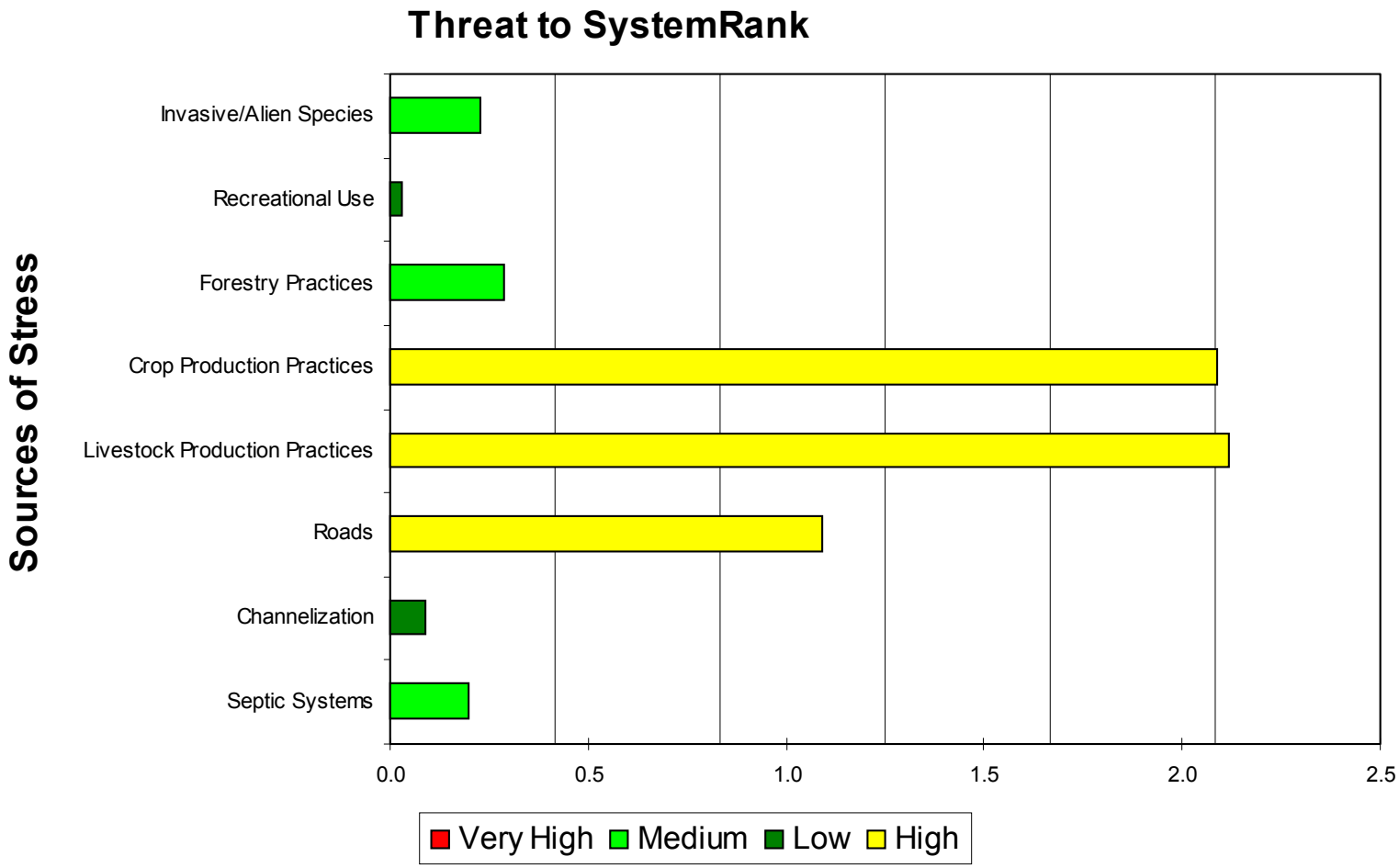


Fig E-11. Threat to system rank for sources of stress to the riverine system conservation target identified in the lower Paint Rock River watershed.

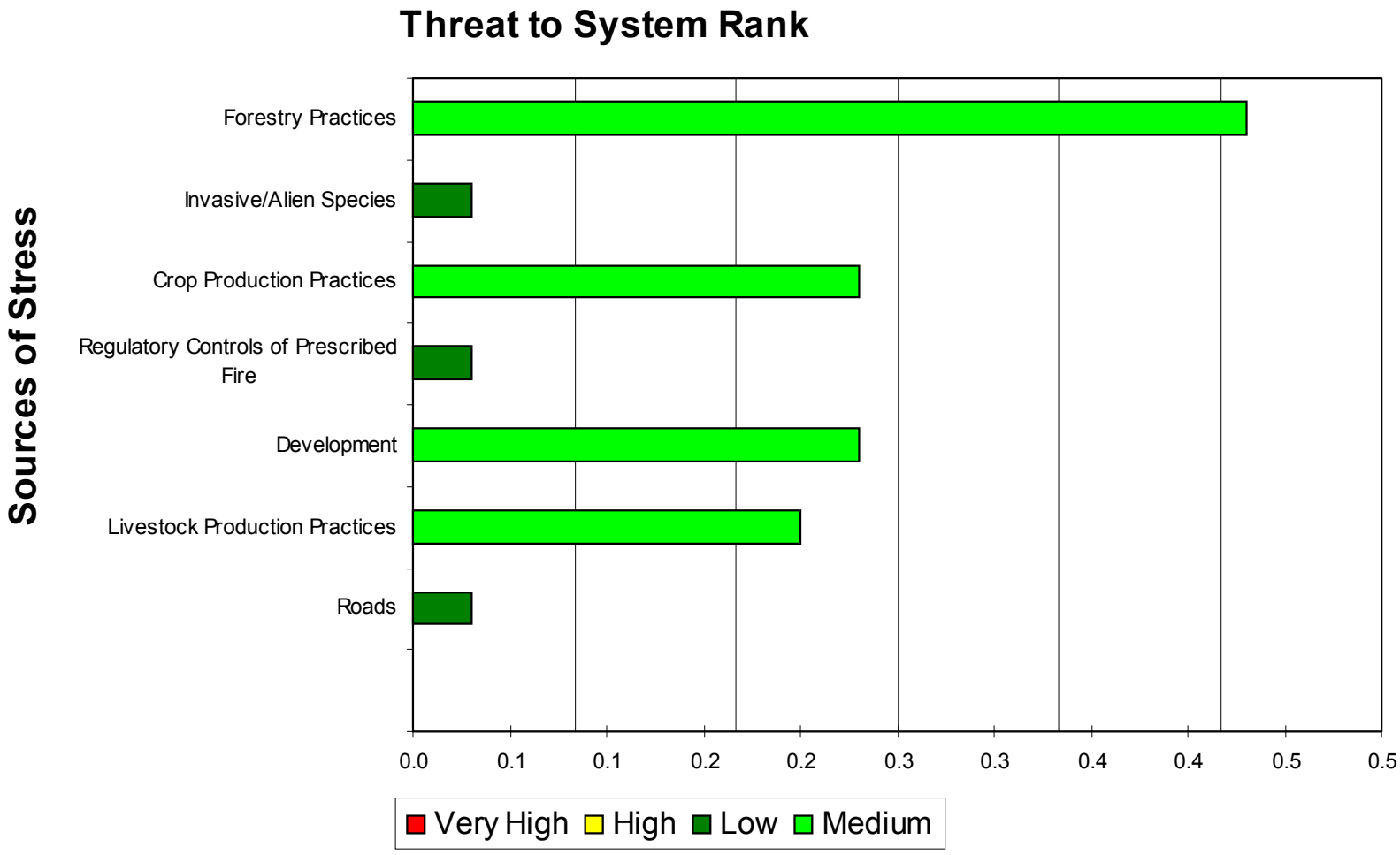


Fig E-12. Threat to system rank for sources of stress to the matrix forest community conservation target identified in the lower Paint Rock River watershed.

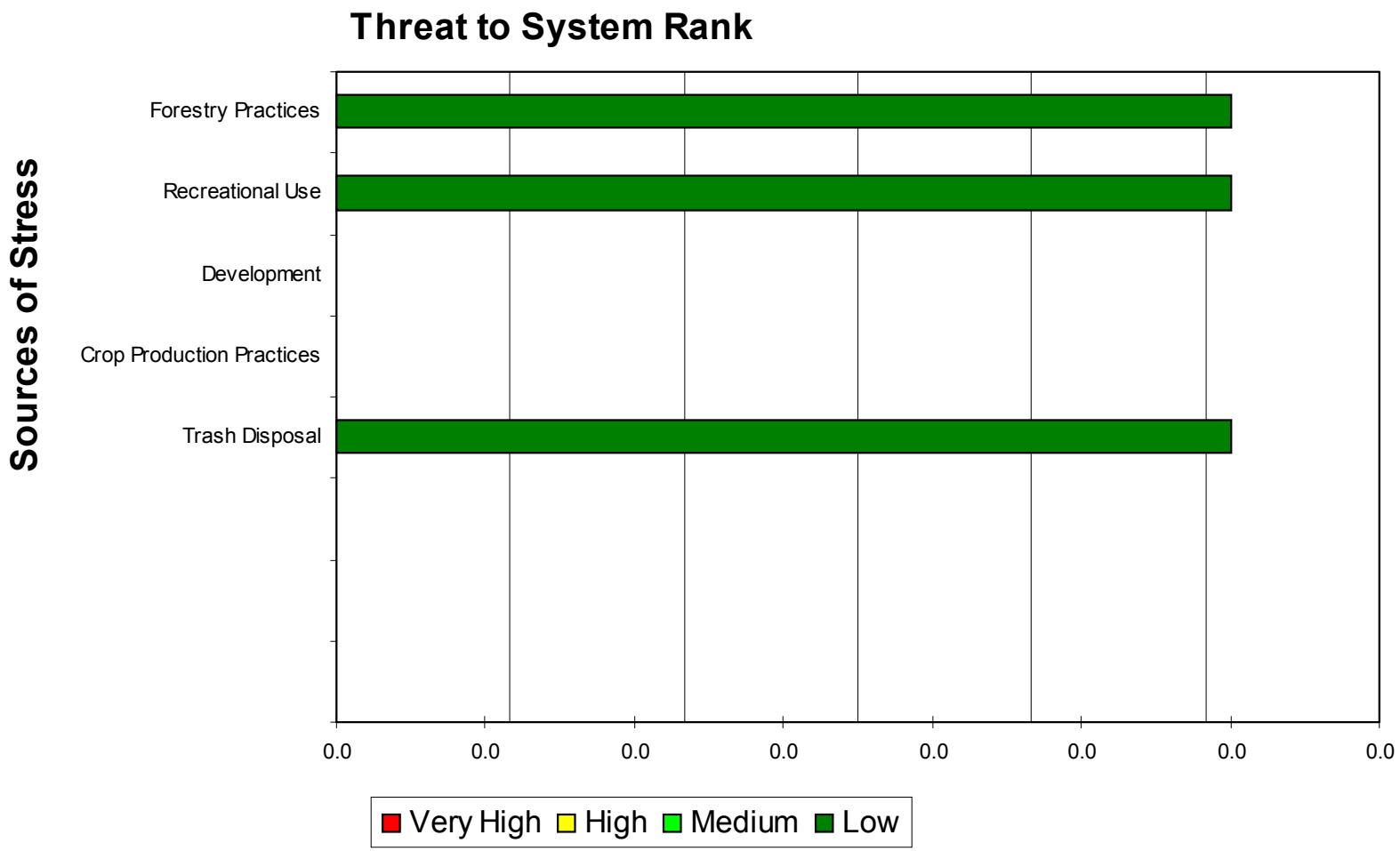


Fig E-13. Threat to system rank for sources of stress to the endangered bats conservation target identified in the lower Paint Rock River watershed.

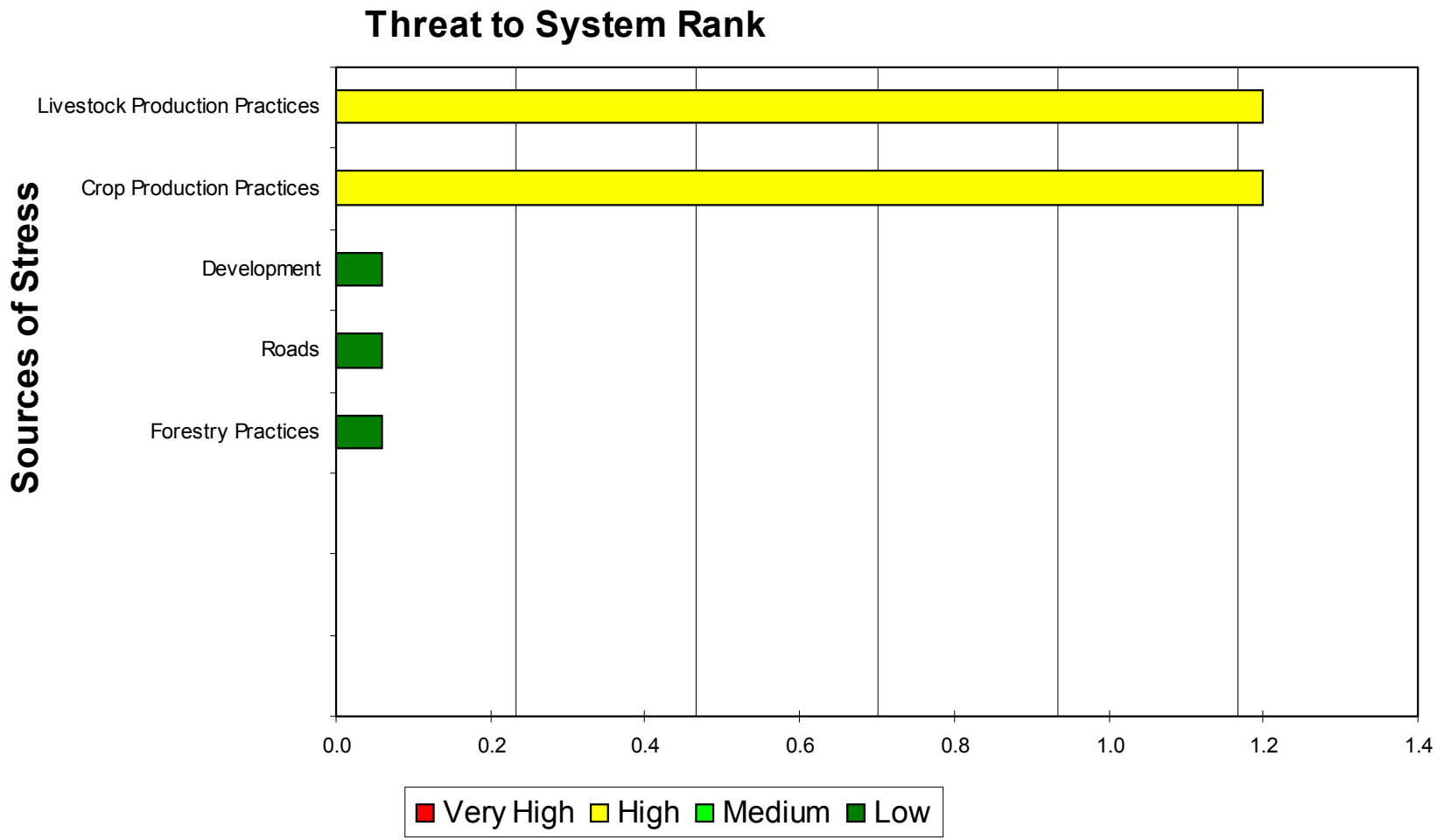


Fig E-14. Threat to system rank for sources of stress to the riparian vegetation conservation target identified in the lower Paint Rock River watershed.

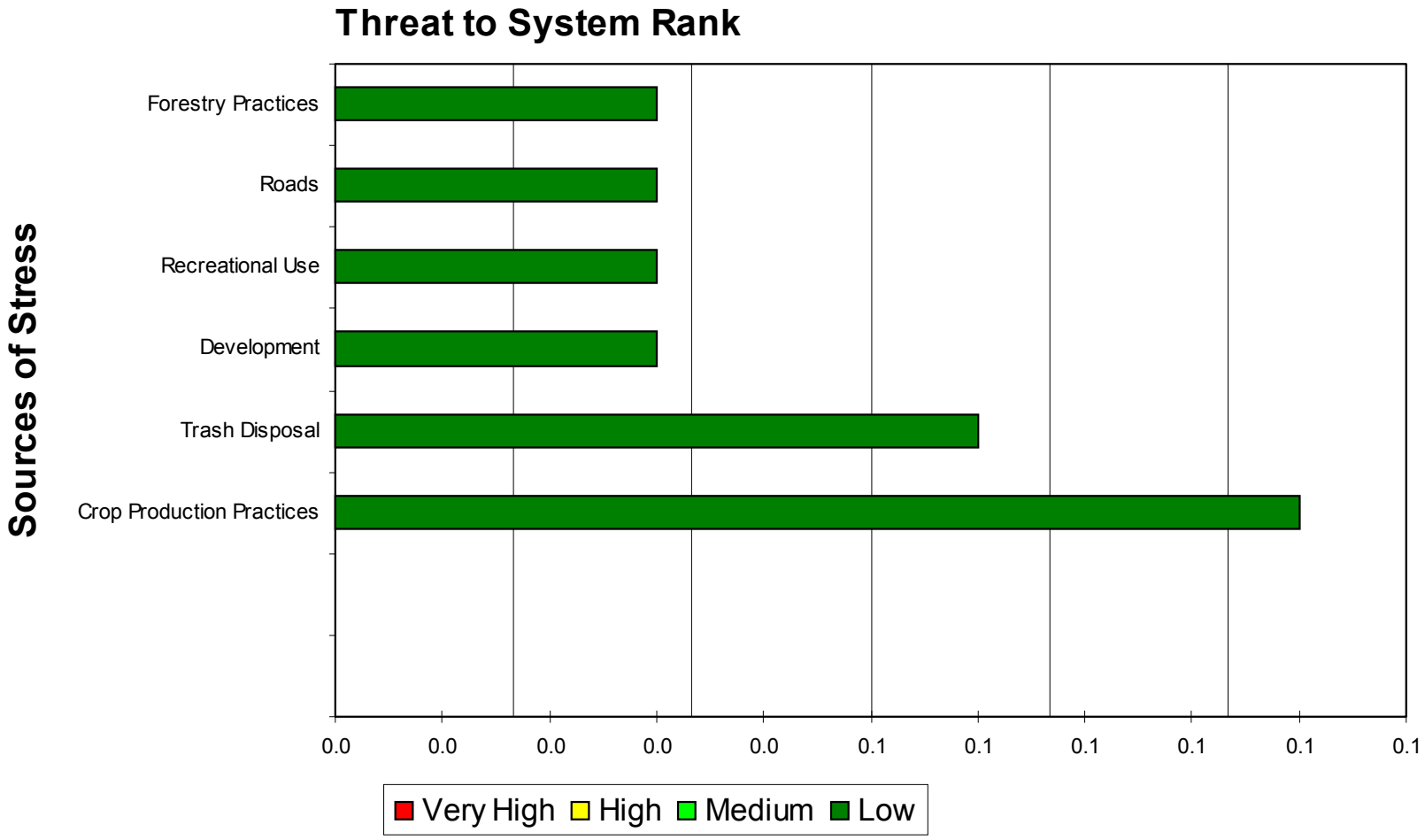


Fig E-15. Threat to system rank for sources of stress to the karst communities conservation target identified in the lower Paint Rock River watershed.

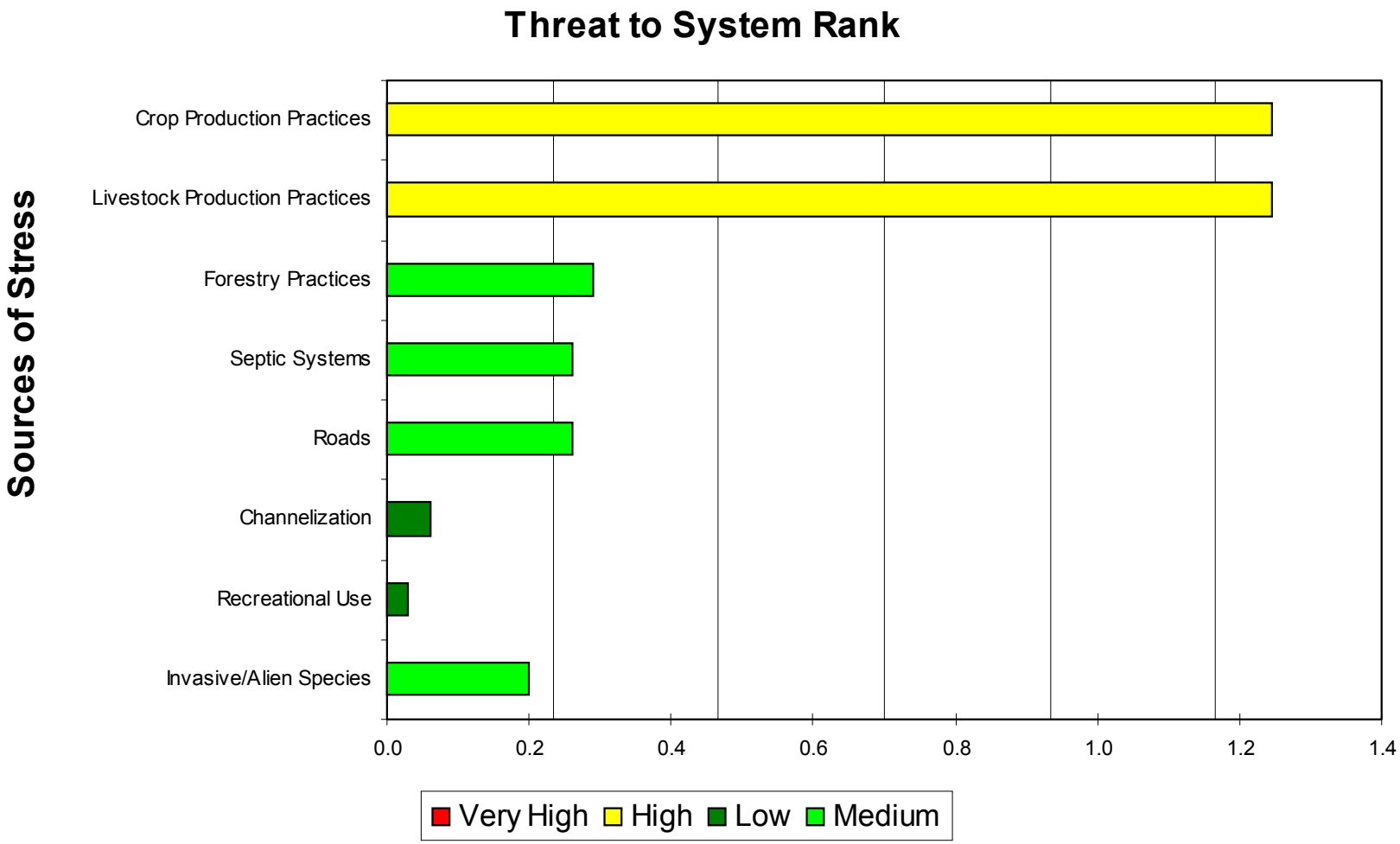
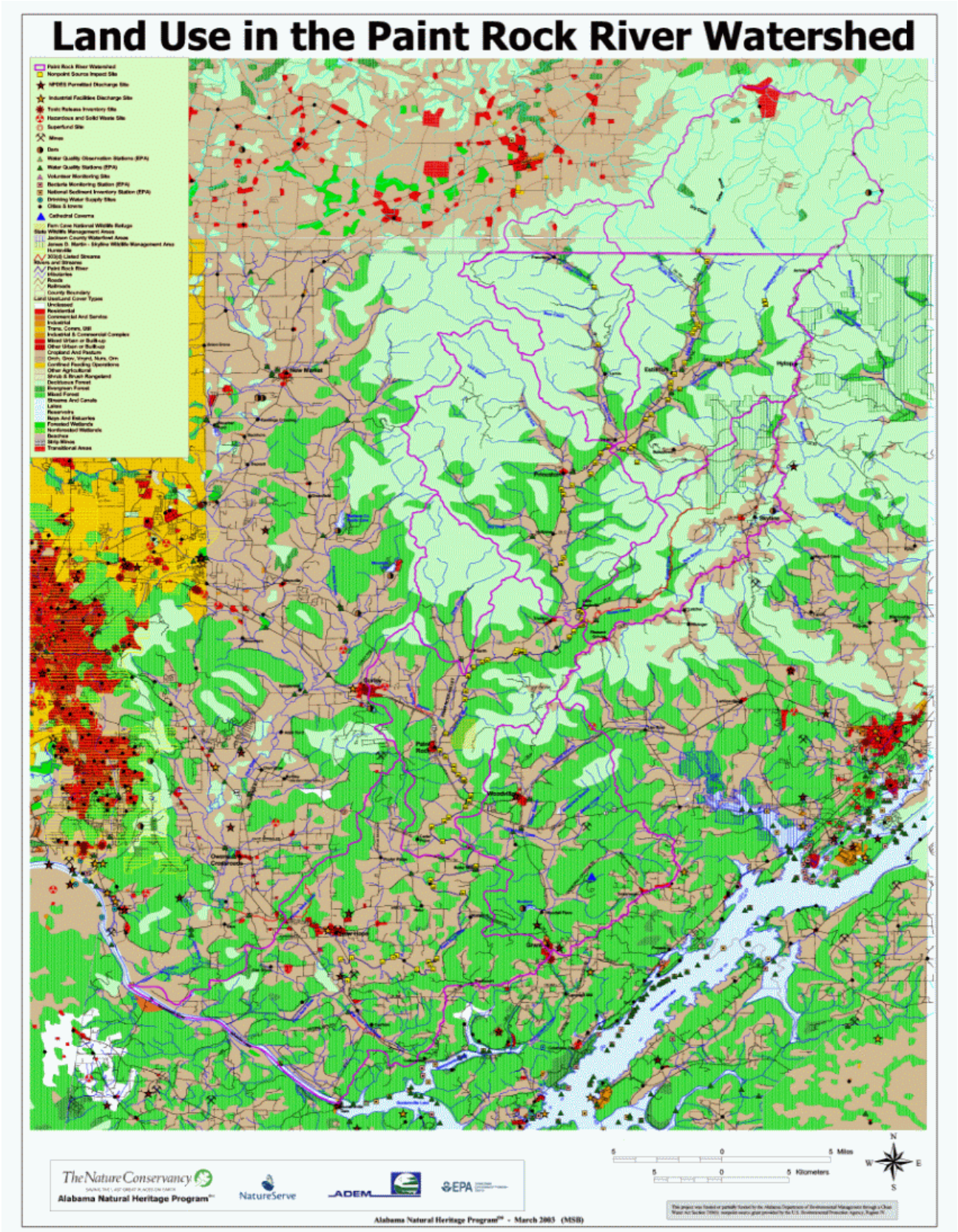
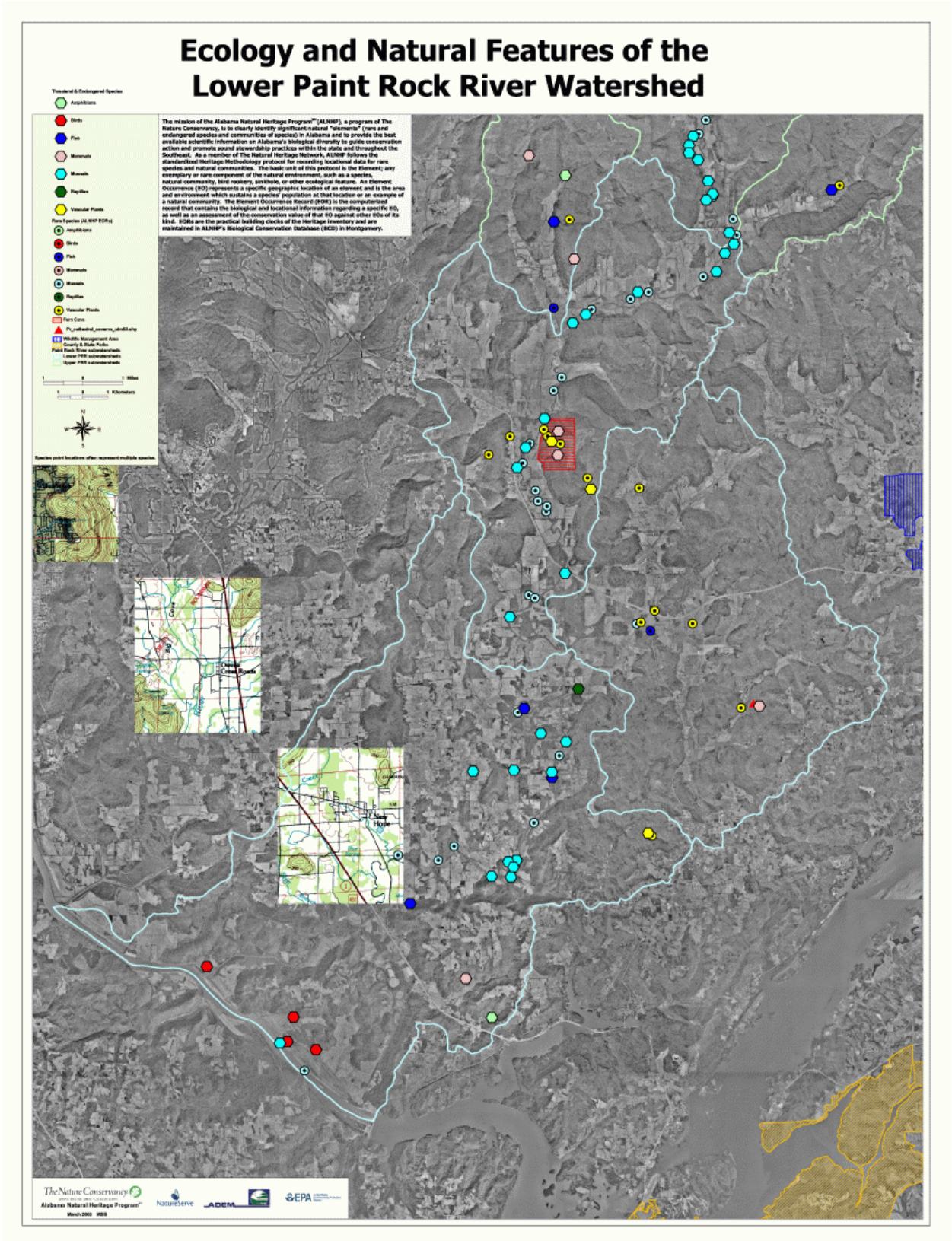
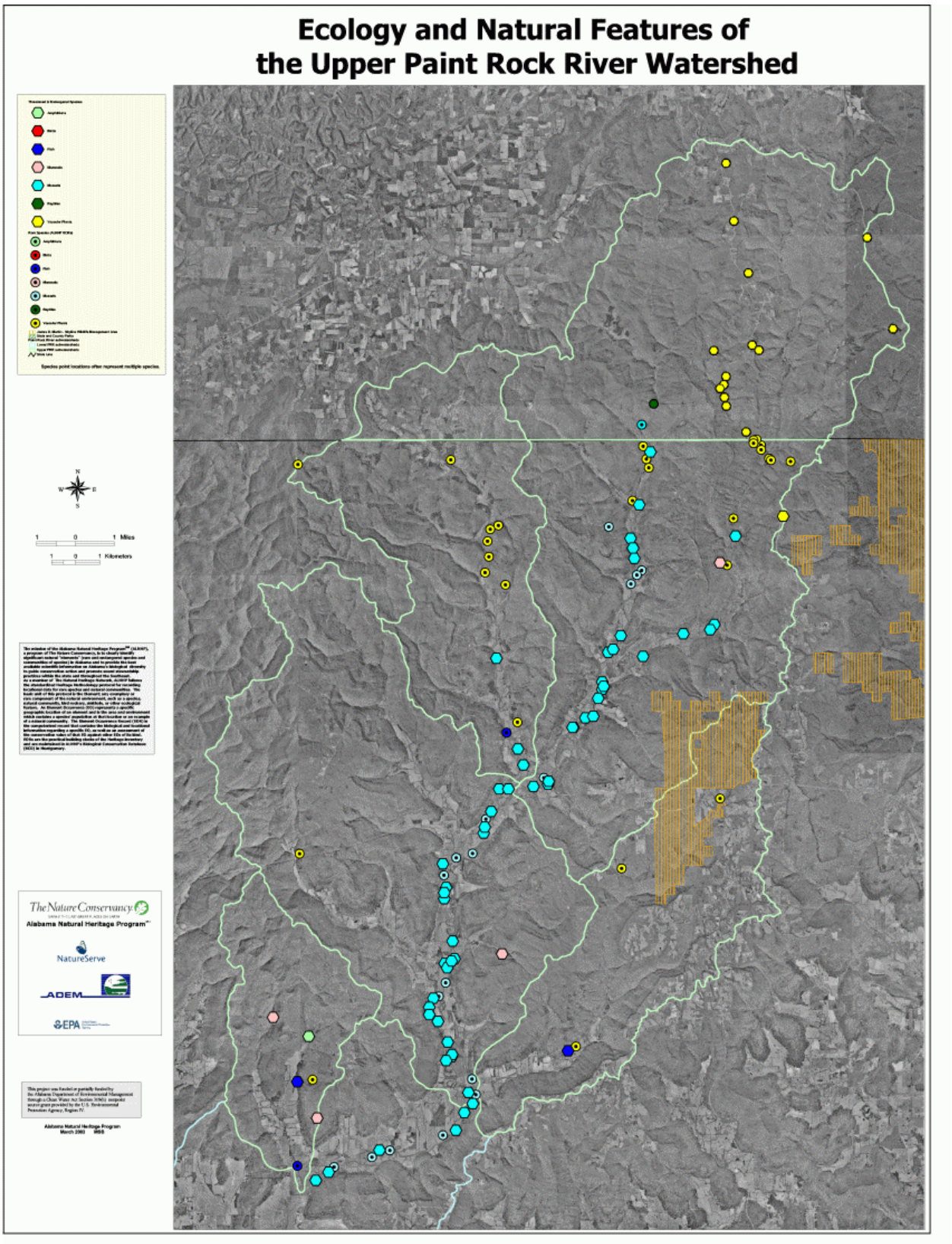


Fig E-16. Threat to system rank for sources of stress to the critically imperiled mussels and fish conservation target identified in the lower Paint Rock River watershed.

Appendix F. Large Format Maps Included With This Report.


Land Use in the Paint Rock River Watershed
The Nature Conservancy
Alabama Natural Heritage Program
NatureServe
ADEM
EPA
Alabama Natural Heritage Program - March 2003 (MSH)


Ecology and Natural Features of the
Lower Paint Rock River Watershed
The mission of the Alabama Natural Heritage Program℠ (ALNHP), a program of The Nature Conservancy, is to clearly identify significant natural "elements" (rare and endangered species and communities of species) in Alabama and to provide the best available scientific information on Alabama's biological diversity to guide conservation action and promote sound stewardship practices within the state and throughout the Southeast. As a member of The Natural Heritage Network, ALNHP follows the standardized Heritage Methodology protocol for recording locational data for rare species and natural communities. The basic unit of this protocol is the element; any exemplary or rare component of the natural environment, such as a species, natural community, bird rookery, sinkhole, or other ecological feature. An Element Occurrence (EO) represents a specific geographic location of an element and is the area and environment which sustains a species' population at that location or an example of a natural community. The Element Occurrence Record (EOR) is the computerized record that contains the biological and locational information regarding a specific EO, as well as an assessment of the conservation value of that EO against other EOs of its kind. EORs are the practical building blocks of the Heritage inventory and are maintained in ALNHP's Biological Conservation Database (BCD) in Montgomery.
Threatened & Endangered Species
Amphibians
Birds
Fish
Mammals
Mussels
Reptiles
Vascular Plants
Rare Species (ALNHP EORs)
Fern Cave
Wildlife Management Area
County & State Parks
Paint Rock River subwatersheds
Lower PRR subwatersheds
Upper PRR subwatersheds
Miles
Kilometers
The Nature Conservancy
Alabama Natural Heritage Program℠
NatureServe
ADEM
EPA


Ecology and Natural Features of
the Upper Paint Rock River Watershed
Species point locations often represent multiple species.
N
W
E
S
1 0 1 Miles
1 0 1 Kilometers
The Nature Conservancy
Alabama Natural Heritage Program℠
NatureServe
ADEM
EPA
Alabama Natural Heritage Program
March 2003