

# ALABAMA POWER COMPANY

*BIRMINGHAM, AL*

## BIOLOGICAL ASSESSMENT FOR THREATENED AND ENDANGERED SPECIES FOR THE WARRIOR HYDROELECTRIC PROJECT (FERC NO. 2165)



Flattened Musk Turtle, Source: USFWS



Bald Eagle, Source: USFWS



Black Warrior Water Dog, Source: ADCNR (Mark Bailey)



Alabama Streak Sorus Fern, Source: Alabama Forestry Commission

*NOVEMBER 2006*

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WARRIOR HYDROELECTRIC PROJECT  
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**ALABAMA POWER COMPANY  
BIRMINGHAM, ALABAMA**

**COOSA – WARRIOR RELICENSING PROJECT**

**BIOLOGICAL ASSESSMENT FOR THREATENED AND ENDANGERED SPECIES  
FOR THE  
WARRIOR HYDROELECTRIC PROJECT  
(FERC NO. 2165)**

**1.0 INTRODUCTION**

This Biological Assessment (BA) was developed by Alabama Power Company (APC), in cooperation with the United States Fish and Wildlife Service (USFWS), as part of APC’s efforts to acquire a new operating license from the Federal Energy Regulatory Commission (FERC) for the Warrior Hydroelectric Project. Specifically, the BA evaluates and describes the potential effects of APC’s proposed relicensing actions, as submitted in the Applicant-Prepared Environmental Assessment (APEA), on threatened and endangered species that are known to or potentially occur in the vicinity of the projects. Since APC considered the needs of listed species in the project area while developing the proposed actions, many of the proposed actions inherently serve to protect and/or enhance the species and their habitats.

The Warrior Project includes the Lewis Smith Development, located in Walker, Winston, and Cullman counties in north-central Alabama (Figure 1), and the Bankhead Development, located in Tuscaloosa County in west-central Alabama (Figure 2).

1.1 Need For Biological Assessment

USFWS regulations implementing Section 7 of the Endangered Species Act (ESA) require that a BA be prepared for federal actions that are “major construction activities” (50 C.F.R. § 402.12(b)). A “major construction activity” is a construction project (or other undertaking having similar physical impacts) which qualifies under the National Environmental Policy Act (NEPA) as a major federal action significantly affecting the quality of the human environment (50 C.F.R. § 402.02). According to USFWS guidance, major construction activities include dams, buildings, pipelines, roads,

water resource developments, channel improvements, and other such projects that modify the physical environment and that constitute major federal actions. APC's Warrior Basin hydroelectric developments are already constructed, and APC does not propose significant changes to their operations during the new license term that would rise to the level of a "major construction activity" that would require a BA. However, even in situations such as this where a BA is not required, USFWS guidance requires documentation of the basis for evaluating the likely effects of the action on listed species. A BA can provide such documentation. Similarly, FERC guidance recommends the preparation of a BA, even where one is not required, in order to identify and resolve issues early in the licensing process. In keeping with this guidance, APC has prepared this BA in order to provide FERC and USFWS with an account of the likely effects on listed and proposed species and critical habitat from the continued operation of the Warrior River developments.

A BA evaluates the potential impacts of the action on listed or proposed species or designated or proposed critical habitats present in the action area and concludes whether such species or habitat are likely to be affected by the action. The contents of the assessment are discretionary, but generally include results of on-site inspections determining the presence of listed or proposed species, analyses of the likely effects of the action on the species or habitat based on biological studies, review of the literature, and/or the views of species experts. The assessment also describes any known, unrelated, future, non-federal activities ("cumulative effects") reasonably certain to occur within the action area that are likely to affect the species. Information from previous draft environmental analysis documents and the draft license application have been modified and/or used in part or in their entirety to produce this assessment. One of the purposes of the BA is to help make the determination of whether the proposed action is "likely to adversely affect" listed species and critical habitat. To make such a determination, all listed, candidate, and proposed species and designated and proposed critical habitats found in the action area have been addressed. Such an assessment may help determine the need for conference on proposed species as well as formal consultation on listed species.

Sometimes, BAs are confused with environmental assessments. The content of BAs prepared pursuant to the ESA are largely at the discretion of the action agency, although the regulations provide recommended contents (50 CFR §402.12(f)). BAs are not required to analyze alternatives to proposed actions. This BA analyzes the effects of the APC Proposed Alternative as described in the APEA. Environmental assessments are prepared pursuant to the NEPA and analyze a range of alternatives in addition to the preferred alternatives.

## 1.2 Determination Of Effect

The analyses included in this BA summarize all potential effects, both direct and indirect, of APC's proposed actions on federally listed species and designated critical habitats. Each analysis includes a determination of effect, which is consistent with the requirements under Section 7 of the ESA. Acceptable ESA determinations of effect include the following:

- *No Effect* – the appropriate conclusion when the action agency determines its proposed action will not affect listed species or critical habitat.
- *Not Likely to Adversely Affect* – the appropriate conclusion when effects on listed species are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse impacts to the species. Insignificant effects are related to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects or (2) expect discountable effects to occur.
- *Likely to Adversely Affect* – the appropriate conclusion if any adverse effects to listed species may occur as a direct or indirect result of the proposed action or interrelated or interdependent actions, and the effect is not discountable, insignificant, or beneficial. In the event the overall effect of the proposed action is beneficial to the listed species, but is also likely to cause some adverse effects, then the proposed action is considered “likely to adversely

affect” the listed species or critical habitat. A determination of “likely to adversely affect” requires formal consultation with the USFWS under Section 7 of the ESA.

### 1.3 Consultation History

By letter dated August 14, 2003, FERC designated APC as its non-federal representative for the purpose of conducting informal consultation with the USFWS under Section 7 of the Endangered Species Act (ESA). APC subsequently initiated informal consultation with the USFWS by letter dated January 14, 2004. That letter from APC included a list of federally-listed and candidate species and designated and proposed critical habitats that may be present in the action area. This initial list was compiled by APC from USFWS Region 4’s county listings for the counties in which the Warrior developments are located.

USFWS reviewed this initial list from APC and, by letter dated April 14, 2004, sent to APC a revised list of species and critical habitats that may be located in the action area based on USFWS’s review of its records. APC and USFWS then proceeded to analyze the impact of relicensing the projects on these species and habitats (as reflected in Table 1). As part of the informal consultation process, a number of meetings have been held between APC and USFWS to facilitate development of this BA. Table 2 lists the Section 7 meetings to date. Based on these meetings and other exchanges of information between APC and USFWS, APC prepared a draft BA and submitted it to USFWS on December 9, 2005, for its review and comment. Following its review, by letter dated January 13, 2006, USFWS responded to APC with a request that certain additional information be considered for inclusion in the BA. On February 16, 2006, APC forwarded to USFWS additional information in response to its request and proposed to revise the BA accordingly. In May 2006, APC submitted a revised BA to USFWS that incorporated the additional information requested by USFWS. After further discussions, APC provided USFWS with a further revised BA on March 6, 2007, to which USFWS provided its concurrence on March 12, 2007.

Table 1 lists the species and their critical habitats that are analyzed in this BA. Table 1 summarizes relevant information discussed at length in other sections of the BA, including known or suspected occurrences of the species within or near the Warrior developments and the final determination of effect. All of the species in Table 1 are the primary responsibility of USFWS, and none are the primary responsibility of the National Marine Fisheries Service (NMFS). Accordingly, USFWS has taken the lead on consultation and has agreed to coordinate directly with NMFS to confirm that it concurs with the determinations in this BA.

#### 1.4 Action Area

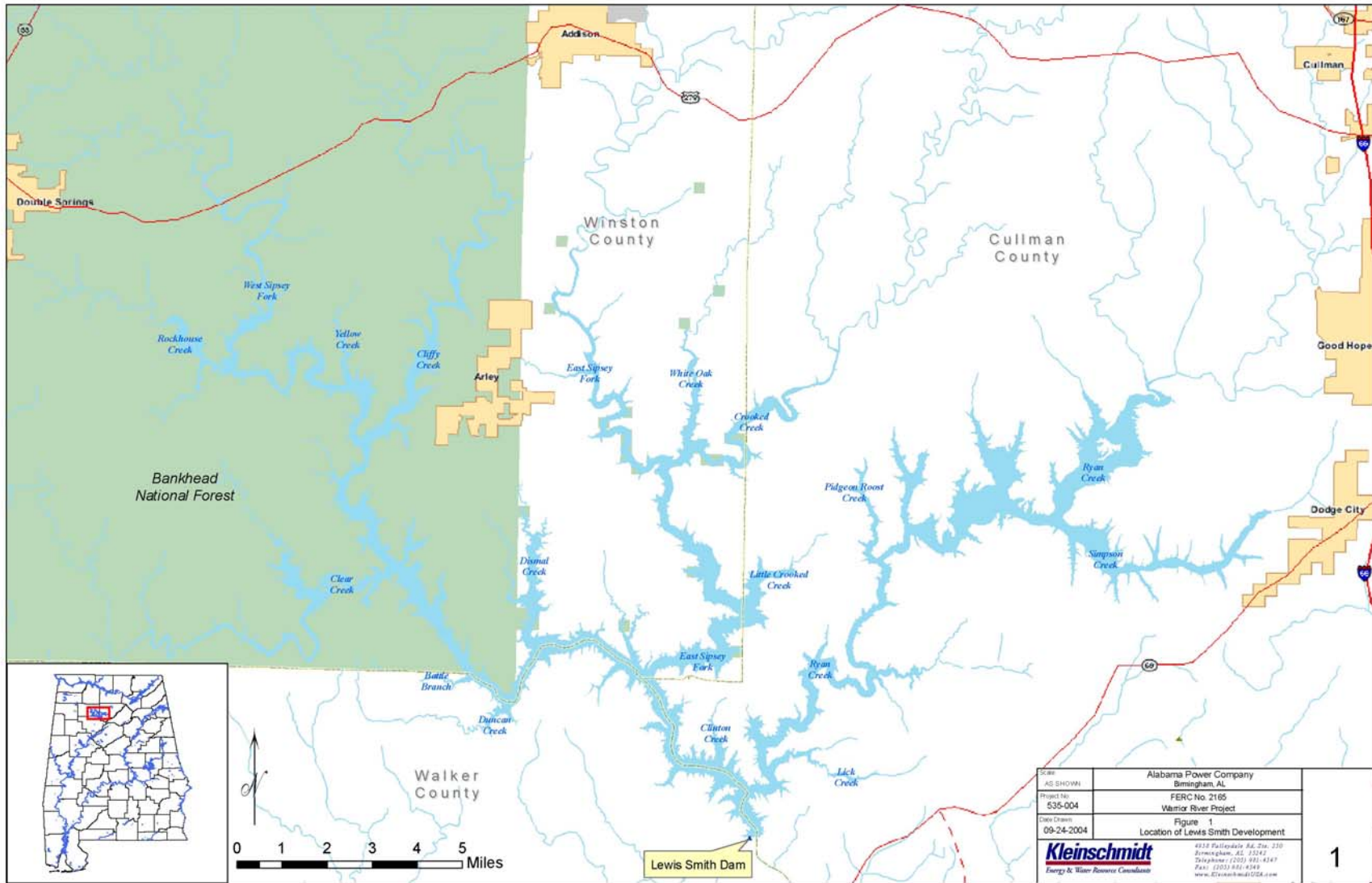
USFWS regulations define “action area” to mean “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” 50 C.F.R. § 402.02. Accordingly, this BA addresses all areas potentially affected (including outside the formal project boundary) and contain a detailed discussion of the likely effects (including direct, indirect, and cumulative effects) of the action on listed and candidate species and critical habitat based on the best scientific and commercial data available. Specifically, the action area used in the BA includes all of the area within the formal FERC project boundaries for the Lewis Smith and Bankhead developments. In addition, the BA considers areas outside the formal project boundaries, including the Sipsy Fork River for 14 miles downstream of Lewis Smith Dam to its confluence with the Mulberry Fork, many tributaries to Smith Lake within the Bankhead National Forest, and Bankhead Lake which is owned and operated by the U.S. Army Corps of Engineers (USACE). The action area for this BA is consistent with the geographic scope of the APEA submitted to FERC with the license application for purposes of compliance with the NEPA.

#### 1.5 APC’s Proposed Actions

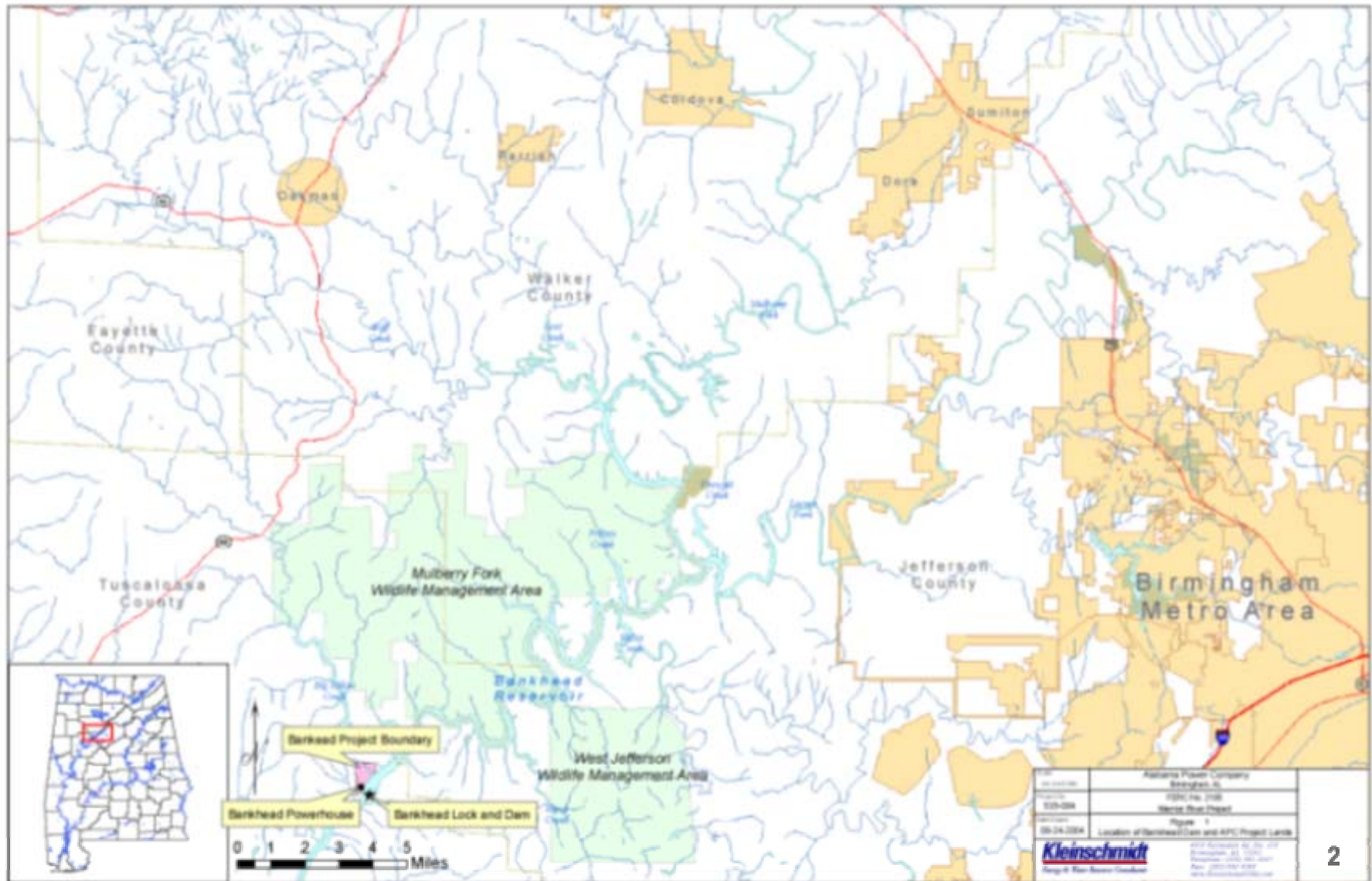
As part of relicensing, APC proposes to implement a number of basin-wide environmental enhancements that have the potential to affect federally listed species, including: 1) developing and implementing a Wildlife Management Plan for project lands; and 2) provide funding to the ADCNR to assist with development and operation of an aquatic research/culture facility. In addition, APC proposes the following project

specific actions that have potential to affect federally listed species: 1) design, install, operate and monitor an aeration system at the Smith reservoir to ensure that the state water quality standard of 4.0 milligrams per liter (mg/L) of dissolved oxygen is met in turbine discharges; 2) implement a minimum flow in the Smith Tailrace, 3) implement a Shoreline Management Plan on Smith Lake, and 4) assist the United States Forest Service with several environmental enhancements in and around Smith Lake. The basin-wide and project specific proposals are described in greater detail in Sections 3.0 and 4.0 of this BA, respectively.

**Figure 1: Smith Development Location Map**



**Figure 2: Bankhead Development Location Map**



**Table 1: List of Endangered, Threatened, and Candidate Species Evaluated in this Biological Assessment**

<b>Species Name</b>	<b>Federal Status</b>	<b>Counties</b>	<b>Critical Habitat in Warrior Basin<sup>1</sup>  (Units Present in Project Vicinity)</b>	<b>Known or Suspected Occurrences within or near Warrior Developments</b>	<b>Population Determination of Effect</b>	<b>Critical Habitat Determination of Effect</b>
<b>Birds</b>						
Bald eagle <i>Haliaeetus leucocephalus</i>	Threatened	Cullman, Jefferson, Lawrence, Tuscaloosa, Walker, Winston	No	Winston County adjacent to the Smith Lake  Tuscaloosa County adjacent to Bankhead Reservoir	Not likely to adversely affect	n/a
Red-cockaded woodpecker <i>Picoides borealis</i>	Endangered	Cullman, Jefferson, Lawrence, Tuscaloosa, Walker, Winston	No	None	Not likely to adversely affect	n/a

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<sup>1</sup> Refer to Table 3 for critical habitat within or near Warrior developments.

<b>Fish</b>						
Cahaba shiner <i>Notropis cahabae</i>	Endangered	Jefferson	No	Locust Fork (tributary to USACE Bankhead Lake) approximately 18 miles upstream of Bankhead dam	Not likely to adversely affect	n/a
<b>Freshwater Mussels</b>						
Orange-nacre mucket <i>Lampsilis perovalis</i>	Threatened	Lawrence, Winston	Yes (Unit 10)	Sipsey Fork and tributaries upstream of Smith Lake	Not likely to adversely affect	Not likely to adversely affect Sipsey Fork Critical Habitat Unit (Unit 10)
Fine-lined pocketbook <i>Lampsilis altilis</i> (reclassified as <i>Hamiota altilis</i> <sup>2</sup> )	Threatened	Lawrence, Walker, Winston	No	None	Not likely to adversely affect	n/a
Alabama moccasinshell <i>Medionidus acutissimus</i>	Threatened	Lawrence, Winston	Yes (Unit 10)	Sipsey Fork and tributaries upstream of Smith Lake	Not likely to adversely affect	Not likely to adversely affect Sipsey Fork Critical Habitat Unit (Unit 10)

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<sup>2</sup> See Roe, K.J. and Hartfield, P.D., *Hamiota*, a new genus of freshwater mussel (Bivalvia: Unionidae) from the Gulf of Mexico drainages of the southeastern United States, THE NAUTILUS 119(1):1-10 (2005).

Coosa moccasinshell <i>Medionidus parvulus</i>	Endangered	Winston	No.	None	Not likely to adversely affect	n/a
Dark pigtoe <i>Pleurobema furvum</i>	Endangered	Lawrence, Winston	Yes (Unit 10)	Sipsey Fork and tributaries upstream of Smith Lake	Not likely to adversely affect	Not likely to adversely affect Sipsey Fork Critical Habitat Unit (Unit 10)
Ovate clubshell <i>Pleurobema perovatum</i>	Endangered	Lawrence, Walker, Winston	Yes (Unit 10)	None.	Not likely to adversely affect	Not likely to adversely affect Sipsey Fork Critical Habitat Unit (Unit 10)
Triangular kidneyshell <i>Ptychobranthus greeni</i>	Endangered	Lawrence, Walker, Winston	Yes (Unit 10)	Sipsey Fork and tributaries upstream of Smith Lake	Not likely to adversely affect	Not likely to adversely affect Sipsey Fork Critical Habitat Unit (Unit 10)
<b>Plants</b>						
Alabama streak-sorus fern <i>Thelypteris pilosa var alabamensis</i>	Threatened	Winston	No	West Sipsey Fork (tributary of Smith Lake)	Not likely to adversely affect	n/a

Kral's waterplantain <i>Sagittaria secundifolia</i>	Threatened	Winston	No	West Sipsey Fork (tributary of Smith Lake)	Not likely to adversely affect	n/a
<b>Amphibians</b>						
Black Warrior waterdog <i>Necturus alabamensis</i>	Candidate	Cullman, Jefferson, Lawrence, Tuscaloosa, Walker, Winston	No	Tributaries upstream of Smith Lake; tributaries to USACE Bankhead Lake	Not likely to adversely affect	n/a
<b>Reptiles</b>						
Flattened musk turtle <i>Sternotherus depressus</i>	Threatened	Cullman, Jefferson, Lawrence, Tuscaloosa, Walker, Winston	No	Brushy Creek, Sipsey Fork, Ryan Creek, and Rocky Creek (tributaries of Smith Lake); USACE Bankhead Lake	Not likely to adversely affect	n/a

**Table 2: Summary of Coosa/Warrior Section 7 Consultation Meetings**

<b>MEETING DATE</b>	<b>LOCATION</b>	<b>TOPICS DISCUSSED</b>
February 18, 2004	USFWS Office, Daphne, AL	Initiation of the Section 7 process
July 22, 2004	APC Headquarters, Birmingham, AL	Structure of Biological Assessment; Tracking of species list provided by USFWS
August 5, 2004	via conference call	Development of Biological Assessment
September 2, 2004	via conference call	Development of Biological Assessment; Species tracking
September 30, 2004	via conference call	Development of Biological Assessment; Species tracking; Shoreline Management
October 14, 2004	via conference call	Development of Biological Assessment; Species tracking
December 16, 2004	via conference call	Review of Draft Biological Assessments
January 24, 2005	Auburn University Hotel and Conference Center, Auburn, AL	Review of Draft Biological Assessments
April 6, 2006	via conference call	Discussion of incorporating additional information requested by the USFWS in the Biological Assessment
November 16, 2006	USFWS Office, Daphne, AL	Discussion of final edits to the BA

## 2.0 SPECIES DESCRIPTIONS

In consultation with the USFWS, it was determined that fourteen (14) species that are federally listed as threatened or endangered or are candidates for federal listing under the ESA are known to occur or have the potential to occur within the project boundary or in the vicinity of APC's Warrior River developments (Table 1). Detailed descriptions of these species, including their federal status and life histories, are provided below. Additional information can be found in the listing notices and recovery plans for each species.

### 2.1 Bald Eagle

The bald eagle was listed as federally-endangered on March 11, 1967, partially due to the significant population declines attributed to the use of DDT. Following the banning of DDT, populations began to increase, and the eagle's status was lowered from endangered to threatened on July 12, 1995 (USFWS 1995a). No critical habitat has been designated for this species.

Bald eagles may be found throughout North America, typically around water where they feed primarily on fish and scavenge carrion. The species thrives around bodies of water where adequate food exists and human disturbance is limited. Eagles nest in large trees near water and typically use the same nest for several years, making repairs to it annually (Degraaf and Rudis 1986).

In the Warrior River Basin in Alabama, bald eagles are known to occur in Winston County adjacent to the Smith Reservoir (Kleinschmidt and APC 2000) and Tuscaloosa County adjacent to Bankhead Reservoir (USFWS 1997); however, due to their ability to move extended distances, the USFWS has noted that this species has the potential to occur in any county in Alabama where suitable habitat exists (Table 1). Surveys conducted by the Alabama Department of Conservation and Natural Resources (ADCNR) during January of each year suggest that bald eagle populations have increased dramatically since the inception of a state-sponsored restoration program in 1984, with the number of sightings in Alabama increasing from 21 individuals in 1979 to approximately 100 in recent years (ADCNR 2004).

## 2.2 Red-Cockaded Woodpecker

The red-cockaded woodpecker (RCW), which has been listed as endangered under the ESA since 1970 (USFWS 1970), is endemic to open, mature, and old growth pine ecosystems in the southeastern United States (USFWS 2003). Over 97% of the pre-colonial era RCW population has been eradicated, leaving only 14,000 RCWs living in 5,600 colonies scattered across eleven states, including Alabama. RCW decline is generally attributed to a loss of suitable nesting and foraging habitats, including longleaf pine systems, due to logging, agriculture, fire suppression, and other factors (USFWS 2003). Suitable nesting habitat generally consists of open pine forests and savannahs with large, older pines and minimal hardwood midstory or overstory. Living trees, especially older trees that are susceptible to red-heart disease making them more easily excavated, provide the RCWs preferred nesting cavities. Suitable foraging habitat consists of open-canopy mature pine forests with low densities of small pines, little midstory vegetation, limited hardwood overstory, and abundant bunchgrass and forb groundcover (USFWS 2003).

RCWs are cooperative breeders, typically living in a family group consisting of a breeding pair with one or two male helpers (USFWS 2003). Family groups, or colonies, are non-migratory and defend an annual territory as well as a group of cavity trees known as a cluster (Jackson 1994, USFWS 2003). Clusters typically consist of one to twenty trees and range in size from three to sixty acres, with an average cluster size of ten acres. RCWs require large continuous tracts of suitable habitat, with a typical family group occupying a home range of 100 to 400 acres, depending on the quality of foraging habitat (USFWS 2003, Jackson 1994). In 2003, the USFWS issued the Red-Cockaded Woodpecker Recovery Plan.

The USFWS considers RCW as potentially occurring throughout the Warrior River Basin where suitable habitat occurs. However, there are no known or suspected occurrences within or near the Warrior developments.

### 2.3 Cahaba Shiner

The Cahaba shiner was listed as endangered under the ESA on November 26, 1990 (USFWS 1990a). The Cahaba shiner is a fish species endemic to the mainstem of the Cahaba River. This species currently inhabits approximately 60 miles of the Cahaba River. The Cahaba shiner has also been found in a 64 mile reach of the Locust Fork below the Alabama Highway 160 crossing. Water quality degradation is the primary cause of the decline and current status of this species (USFWS 2000).

The Cahaba shiner is a small fish that reaches 77 mm (3 in.) in length. This species is typically found in shallow shoal areas and downstream of riffles having clean sand or sand-gravel mix. Individuals have also been observed inhabiting shallow waters that flow through beds of aquatic vegetation (*Justicia*). Food sources for this species include small crustaceans, aquatic insect larvae, and possibly some vegetation. The Cahaba shiner spawns from mid-May to early July, with peak spawning activity occurring in June (Metee et al. 1996; Kuhajda and Shepard 2004).

In April 1992, the USFWS approved and published the Cahaba Shiner Recovery Plan. The goal of the recovery plan is to reclassify the Cahaba Shiner to threatened status (USFWS 2000). No critical habitat has been designated for this species.

### 2.4 Alabama Streak-Sorus Fern

The Alabama streak-sorus fern was federally-listed as threatened under the ESA on July 8, 1992 (USFWS 1996). It is a small evergreen fern that grows only on exposed rock surfaces and in crevices of Pottsville sandstone along a 4.25 mile reach of the Sipsey Fork in the Warrior River Basin. The type locale (location where the species was first described) was located approximately 5 miles downstream of the closest extant population, but was destroyed during construction of a bridge in 1960. The fern's historical range is thought to have extended from the current extant range of the species to at least the type locale and possibly farther downstream. Although historical population data is not available, the USFWS has suggested that some populations of Alabama streak-sorus fern may have been extirpated when Smith Lake was impounded (USFWS 1996).

Plants typically occur on moist, shady sites such as ceilings of rockhouses, ledges beneath sandstone overhangs, and on exposed cliff faces (USFWS 1996). Locations vary in slope aspect and shade coverage, from completely shaded to partially sunny on exposed bluff faces. Sites are usually directly above or a short distance from the river, are shaded to partially sunny, and have substrates that are kept moist by water vapor from the river and up-slope runoff over the sandstone (USFWS 1996). No critical habitat has been designated for this species.

Populations of Alabama streak-sorus fern are currently limited to the West Sipsey Fork, downstream of the confluence of Sipsey Fork and Caney Creek, and occur primarily in the U.S. Forest Service's Bankhead National Forest (USFWS 1996).

## 2.5 Kral's Waterplantain

Kral's waterplantain was listed as threatened under the ESA on April 30, 1990 (USFWS 1990b). Having been first described in 1982 (Kral 1982), the species was historically known from only 3 tributaries in northern Alabama and Georgia (NatureServe 2004): the Little River Canyon in the Coosa River Basin, the West Sipsey Fork in the Warrior Basin, and Town Creek in the Tennessee Basin. Extant populations are currently thought to occur only at the Little River and West Sipsey Fork locations. Extirpation of the Town Creek population was attributed to siltation and erosion related to silvicultural, residential-recreational, and agricultural development (USFWS 1991; NatureServe 2004). No critical habitat has been designated for this species.

Kral's waterplantain is an aquatic perennial herb that inhabits rocky substrates of unimpounded stream reaches. Streams typically have a narrow bottom and are flanked by steep slopes. Plants are typically found in almost pure stands on exposed shoals or rooted among loose boulders in sand, silt, or gravel in pools up to 1 m (40 in.) in depth (NatureServe 2004). It demonstrates mostly submerged leaves and emergent flowering stems and is often found in association other floating-leaved and emergent species such as pondweed, watermilfoil, water willow, and waternymph. Typical shoreline associates include azaleas, mountain laurel, and holly (USFWS 1991).

In the Warrior Basin, one population of Kral's waterplantain is known from the West Sipsy Fork upstream of Smith Lake (Table 1).

## 2.6 Black Warrior Waterdog

The Black Warrior waterdog is a large, gilled aquatic salamander (up to 9.8 in. in length; Bart et al. 1997) that is endemic to the Black Warrior River Basin and is a candidate for listing as threatened or endangered under the ESA (USFWS 2001). This species inhabits streams of the basin above the fall line and is patchily-distributed in the drainages of the North River, Locust Fork, Mulberry Fork, and Sipsy Fork and their tributaries (Bailey and Guyer 2004). Current population of Black Warrior waterdog have proven difficult to document; of 120 sites samples since 1990, waterdogs have been reported from only ten sites in Blount, Tuscaloosa, Winston, and Walker Counties (Bailey 1995; Guyer 1997, 1998). Since it is not federally listed, no critical habitat has been designated for this species.

Studies suggest that preferred habitats for the Black Warrior waterdog include clay substrates lacking silt, wide and/or shallow stream morphology, increased abundance of dusky salamanders and snails, and decreased Asiatic clam occurrence (USFWS 2001). Occurrence of semi-permanent leaf packs and availability submerged ledges, rocks, and other covers are also important factors in determining habitat suitability for this species (Bailey and Guyer 2004).

In consultation with the USFWS, it was determined that Black Warrior waterdogs occur or have the potential to occur in Cullman, Walker, Winston, Lawrence, Tuscaloosa counties in Alabama (Table 1).

## 2.7 Flattened Musk Turtle

The flattened musk turtle was federally-listed as a threatened species on June 11, 1987. An endemic of the Warrior River System, the flattened musk turtle historically occurred throughout the basin above the fall line (USFWS 1990c). Although current data are limited, the USFWS Recovery Plan (1990c) suggests that only approximately 10 to

20 % of the basin presently supports viable populations of flattened musk turtle. No critical habitat has been designated for this species.

The flattened musk turtle is an aquatic species. Typically, optimal habitats are large, free-flowing streams above the fall line with rocky substrates. These streams usually have vegetated shallows approximately 2 ft. deep and alternate with deeper pools of 3.6 to 5 ft. in depth and an abundance of crevices, submerged boulders, and rock shelves for refugia. Headwaters and rocky shorelines of impoundments are also suitable habitat for this species. Flattened musk turtles feed primarily on invertebrates, such as snails and mussels (USFWS 1990c).

Populations of flattened musk turtle appear to have been seriously impacted by siltation of their preferred habitats (Dodd et al. 1988). Potential negative impacts of siltation include: extirpation or reduced populations of mollusks and other invertebrate prey, physical alteration of rocky stream habitats, and accumulation of substrates where chemicals toxic to turtles or their prey may persist (Dodd et al. 1988; USFWS 1990c). Habitat fragmentation associated with mining, flood control, and navigation projects has also been cited as a factor that has potentially contributed to the decline of the species. Other potential impacts include overharvesting for the pet trade, disease and parasites, and altered patterns of genetic exchange (UFWS 1990c).

Flattened musk turtles are known to occur or have the potential to occur throughout their historical range in the Warrior River Basin in Cullman, Walker, Winston, Lawrence, Tuscaloosa counties where suitable habitats occur (Table 1). Surveys completed during 2002 and 2003 indicated populations of flattened musk turtles in both the Sipsey Fork, Brushy Creek, Ryan Creek, and Rocky Creek arms of Smith Lake (Bailey and Bailey 2003, Rogers and Marion 2004a,b).

## 2.8 Freshwater Mussels and Associated Critical Habitats

Historically, 175 species of mussels have been reported from Alabama. However, Alabama's mussels have experienced drastic declines in abundance and diversity, extirpation from large portions of their historic ranges, and even extinction. Currently, only 71% of these 175 species are still found in Alabama (Garner 2004). In the past, one of the largest impacts to mussels was the construction of large dams which converted large amounts of riverine habitat into impoundments. Subsequently, mussel populations that remained in unimpounded streams were impacted by habitat degradation caused by dredging, mining, point and non-point source pollution, and siltation. Presently, remaining mussel populations are fragmented and only occupy small reaches of their historic range where habitats have remained relatively unimpacted.

In July of 2004, the USFWS designated critical habitat for 11 federally listed mussel species in the Mobile River Basin (USFWS 2004), including the seven species identified by the USFWS as occurring or potentially occurring with the project boundaries of APC's Warrior Basin developments (Table 1). A critical habitat designation identifies geographic areas that contain features essential for the conservation of a threatened or endangered species and may require special management considerations. Of the 26 critical habitat units designated by the USFWS in the Mobile Basin (USFWS 2004), only the Sipsey Fork Unit (Unit 10) is located partially within the project boundaries of APC's Warrior Basin developments (Figures 3, 4, & 5). The Sipsey Fork Unit is designated critical habitat for five mussel species, as indicated in Table 1.

In addition to the designation of critical habitat, the USFWS also approved and published the multi-species Mobile River Basin Aquatic Ecosystem Recovery Plan in November 2000, which includes all of the freshwater mussel species addressed in this BA. The immediate goal of the recovery plan is to prevent the further decline of these species by locating, protecting, and restoring streams with remaining populations (USFWS 2000).

Detailed descriptions of the Sipsey Fork Critical Habitat Unit and of the seven federally listed freshwater mussel species identified by the USFWS as occurring or having historically occurred in the vicinity of the Warrior Basin developments are provided below.

#### 2.8.1 Sipsey Fork Critical Habitat (Unit 10)

A portion of the Sipsey Fork and its tributaries upstream of Lewis Smith Lake have been designated as critical habitat for five listed mussel species (Unit 10; Figures 3, 4, & 5). These species are dark pigtoe, orange-nacre mucket, Alabama moccasinshell, triangular kidneyshell, and ovate clubshell (USFWS 2004). Except for the ovate clubshell, which has possibly been extirpated from the Black Warrior drainage (Haag 2004b), each of these species currently occupies some portion of the designated critical habitat. A total of 91 miles of the Sipsey Fork and its tributaries are included in the critical habitat unit, of which, 82 miles are federally owned and 9 miles are privately owned. The federally owned portion of this critical habitat unit is within the U. S. Forest Service's Bankhead National Forest. The complete description from the Final Rule designating this critical habitat unit is provided below (USFWS 2004).

##### *Unit 10. Sipsey Fork drainage, Winston, Lawrence Counties, Alabama*

Unit 10 encompasses 147 km (91 mi) of stream channel in Alabama, including: Sipsey Fork, 31 km (19 mi), from section 11/12 line, T10S R8W, Winston County, upstream to the confluence of Hubbard Creek, Lawrence County, Alabama; Thompson Creek, 8 km (5 mi), from confluence with Hubbard Creek, upstream to section 2 line, T8S R9W, Lawrence County, Alabama; Brushy Creek, 35 km (22 mi), from the confluence of Glover Creek, Winston County, Alabama, upstream to section 9, T8S R7W, Lawrence County, Alabama; Capsey Creek, 15 km (9 mi), from confluence with Brushy Creek, Winston County, upstream to the confluence of Turkey Creek, Lawrence County, Alabama; Rush Creek, 10 km (6 mi), from confluence with Brushy Creek, upstream to

Winston/Lawrence County Line, Winston County, Alabama; Brown Creek, 5 km (3 mi), from confluence with Rush Creek, Winston County, upstream to section 24 line, T8S R7W Lawrence County, Alabama; Beech Creek, 3 km (2 mi), from confluence with Brushy Creek, to confluence of East and West Forks, Winston County, Alabama; Caney Creek and North Fork Caney Creek, 13 km (8 mi), from confluence with Sipsey Fork, upstream to section 14 line, Winston County, Alabama; Borden Creek, 18 km (11 mi), from confluence with Sipsey Fork, Winston County, Alabama, upstream to the confluence of Montgomery Creek, Lawrence County, Alabama; Flannagin Creek, 10 km (6 mi), from confluence with Borden Creek, upstream to confluence of Dry Creek, Lawrence County, Alabama.

As part of the Final Rule designating critical habitat for the 11 Mobile Basin species (USFWS 2004), the USFWS identified the following six “primary constituent elements” as being essential for their conservation: (1) Geomorphically stable stream and river channels and banks; (2) A flow regime (i.e., the magnitude, frequency, duration, and seasonality of discharge over time) necessary for normal behavior, growth, and survival of all life stages of mussels and their fish hosts in the river environment; (3) Water quality, including temperature, pH, hardness, turbidity, oxygen content, and other chemical characteristics necessary for normal behavior, growth, and viability of all life stages; (4) Sand, gravel, and/or cobble substrates with low to moderate amounts of fine sediment, low amounts of attached filamentous algae, and other physical and chemical characteristics necessary for normal behavior, growth, and viability of all life stages; (5) Fish hosts with adequate living, foraging, and spawning areas for them; and, (6) Few or no competitive or predaceous nonnative species present. Since these elements are common to all of the freshwater mussel species listed by the USFWS for the Sipsey Fork Unit, potential impacts of the proposed action on these species and their habitats within the reach are analyzed collectively in Section 4.1.3.

### 2.8.2 Fine-lined Pocketbook

The fine-lined pocketbook was listed as threatened under the ESA on April 16, 1993. The fine-lined pocketbook is endemic to the Mobile River Basin. The historic range of this species included the Alabama, Tombigbee, Black Warrior, Cahaba, Tallapoosa, and Coosa Rivers and their tributaries. The current distribution of the fine-lined pocketbook includes numerous small, isolated populations within its historic range. Reasons for the decline and current status of this species include habitat modification, sedimentation, eutrophication, and water quality degradation (USFWS 2000).

The fine-lined pocketbook is a medium-sized, sub-oval shaped mussel that rarely exceeds 100 mm (4 in.) in length. This mussel has been collected from large rivers to small creek habitats above the fall line having stable sand/gravel/cobble substrates and moderate to swift currents. During reproduction, it releases glochidia (larvae) as a superconglutinate (gelatinous mass) from March through June. Confirmed host fish species include blackspotted topminnow, redeye bass, spotted bass, largemouth bass, and green sunfish (Haag 2004a).

There are 12 designated critical habitat units for the fine-lined pocketbook totaling approximately 544 miles of streams and rivers within its current and historic range (USFWS 2004). None of the designated critical habitat areas are located within the Black Warrior River Basin.

### 2.8.3 Coosa Moccasinshell

The Coosa moccasinshell was listed as endangered under the ESA on April 16, 1993 (USFWS 1993). The Coosa moccasinshell is endemic to the Mobile River Basin. The historic distribution of this species included the Cahaba River, the Coosa River, and its tributaries. Currently, the only known extant populations occur in the Conasauga River and its tributary, Holly Creek, in Georgia and Tennessee, and in Little River, a tributary to Weiss Lake on the

Coosa River. Reasons for the decline and current status of this species include habitat modification, sedimentation, eutrophication, and water quality degradation (USFWS 2000).

The Coosa moccasinshell is a small, thin, elongate mussel that is elliptical to square-shaped and reaches up to 40 mm (1.6 in.) in length. This species is typically found in streams and small rivers with sand/gravel/cobble shoals in moderate to swift currents. Little is known about the reproductive strategy of this species. However, it is believed to be similar to its close relative, the Alabama moccasinshell, and probably has the same host fish species, though no research has confirmed this (Haag 2004b).

There are 9 designated critical habitat units for the Coosa moccasinshell totaling approximately 321 miles of streams and rivers within its current and historic range (USFWS 2004). None of the critical habitat units designated for this species are within the Black Warrior River Basin.

#### 2.8.4 Ovate Clubshell

The ovate clubshell was listed as endangered under the ESA on April 16, 1993 (USFWS 1993). This species is endemic to the Mobile River Basin and historically occurred in the Black Warrior River and tributaries; Alabama River; Cahaba River and a tributary; Uhapee Creek and tributaries to the lower Tallapoosa River; and the Coosa River and major tributaries (Conasauga and Etowah Rivers, and Holly Creek). Current data suggest that the ovate clubshell may have been extirpated from much of its former range, including the Warrior drainage, with extant populations known only from one tributary to Uhapee Creek and the Coosa River below Weiss Dam (Haag 2004c). Reasons for the decline and current status of this species include habitat modification, sedimentation, eutrophication, and water quality degradation (USFWS 2000).

The ovate clubshell is a small to medium-sized, elliptical to oval-shaped mussel that rarely exceeds 50 mm (2.0 in.) in length. This species is typically found in sand/gravel shoals and runs of small rivers and large streams. Females of this species are gravid from May to July. Although other species within this genus utilize cyprinids as host fishes, the specific host fish species for the ovate clubshell are not known (Haag 2004c).

There are 20 designated critical habitat units for the ovate clubshell totaling approximately 857 miles of streams and rivers within its current and historic range (USFWS 2004). In the Warrior Basin, these include 91 miles of the Sipsey Fork (Unit 10) and 63 miles of the Locust Fork (Unit 12), including tributaries. Only Unit 10 is within the action area of this BA.

#### 2.8.5 Orange-nacre Mucket

The orange-nacre mucket was listed as threatened under the ESA on April 16, 1993. The historic range of the orange-nacre mucket included the Alabama, Tombigbee, Black Warrior, and Cahaba Rivers and their tributaries in Alabama and Mississippi. Numerous populations remain within this historic range; however most are small and localized. The orange-nacre mucket is locally common in the Sipsey Fork upstream of Lewis Smith Lake. Reasons for the decline and current status of this species include habitat modification, sedimentation, eutrophication, and water quality degradation (USFWS 2000; Haag 2004d).

The orange-nacre mucket is a medium-sized, 50 – 90 mm (2.0 to 3.5 in.) in length. The shell is oval in shape and moderately thick. This species is usually found in stream and small river habitat with stable sand/gravel/cobble substrate and moderate to swift currents. As part of reproduction, the orange-nacre mucket expels mature glochidia as a superconglutinate between March and June, with releases concentrated in early April. Confirmed host fish species include redeye bass, spotted bass, and largemouth bass (Haag 2004d).

There are 15 designated critical habitat units for the orange-nacre mucket totaling approximately 616 miles of streams and rivers within its current and historic range (USFWS 2004). In the Warrior Basin, these include 95 miles of the streams and rivers that are tributaries to Lewis Smith Lake (Unit 10) and 63 miles of the Locust Fork (Unit 12). As previously noted, only Unit 10 is within the action area for this BA.

#### 2.8.6 Alabama Moccasinshell

The Alabama moccasinshell was listed as threatened under the ESA on April 16, 1993 (USFWS 1993). The Alabama moccasinshell is endemic to the Mobile River Basin. The historic range of this species included the Alabama, Tombigbee, Black Warrior, Cahaba, and Coosa Rivers and their tributaries. Scattered populations of this species occur in several tributaries and rivers within its historic range. Densities of these remaining mussel populations are highest in the Sipsey Fork in Bankhead National Forest upstream of Lewis Smith Lake. Reasons for the decline and current status of this species include habitat modification, sedimentation, eutrophication, and water quality degradation (USFWS 2000).

The Alabama moccasinshell is a small, narrowly elliptical mussel that reaches approximately 30 mm (1.2 in.) in length. This species is typically found in streams and small rivers with sand/gravel/cobble shoals in moderate to swift currents. Females are typically gravid from February through May. Confirmed hosts for Alabama moccasinshell glochidia include the blackspotted topminnow, rock darter, naked sand darter, southern sand darter, Tuskaloosa darter, Johnny darter, speckled darter, Gulf darter, saddleback darter, and blackbanded darter (Haag 2004e).

There are 16 designated critical habitat units for the Alabama moccasinshell totaling approximately 716 miles of streams and rivers within its current and historic range (USFWS 2004). In the Warrior Basin, critical habitat has been designated along 91 miles of the Sipsey Fork (Unit 10) and its

tributaries, and 63 miles of the Locust Fork (Unit 12). Only Unit 10 is within the action area for this BA.

#### 2.8.7 Dark Pigtoe

The dark pigtoe was listed as endangered under the ESA on April 16, 1993 (USFWS 1993). The historic range of this species included the Black Warrior River and its tributaries, above the fall line. Currently, extant populations occupy the Sipsey Fork and its tributaries, and the North River and its tributary, Clear Creek. Dead and badly weathered specimens have been collected from the Locust Fork. Reasons for the decline and current status of this species include habitat modification, sedimentation, eutrophication, and water quality degradation (USFWS 2000).

The dark pigtoe is a small to medium-sized mussel that is oval in shape, reaching 60 mm (2.4 in.) in length. This species is typically found in streams and small rivers with sand/gravel/cobble shoals and rapids. Gravid females of this species release glochidia in June. Several fish species have been confirmed as host for glochidia, including largescale stoneroller, Alabama shiner, blacktail shiner, creek chub, and blackspotted topminnow (USFWS 2000; Haag 2004f).

There are 3 designated critical habitat units for the dark pigtoe totaling approximately 183 miles of streams and rivers within its current and historic range (USFWS 2004). In the Warrior Basin, these units include 91 miles of the Sipsey Fork (Unit 10), 29 miles of the North River (Unit 11), and 63 miles of the Locust Fork (Unit 12), including tributaries. Only Unit 10 is within the action area for this BA.

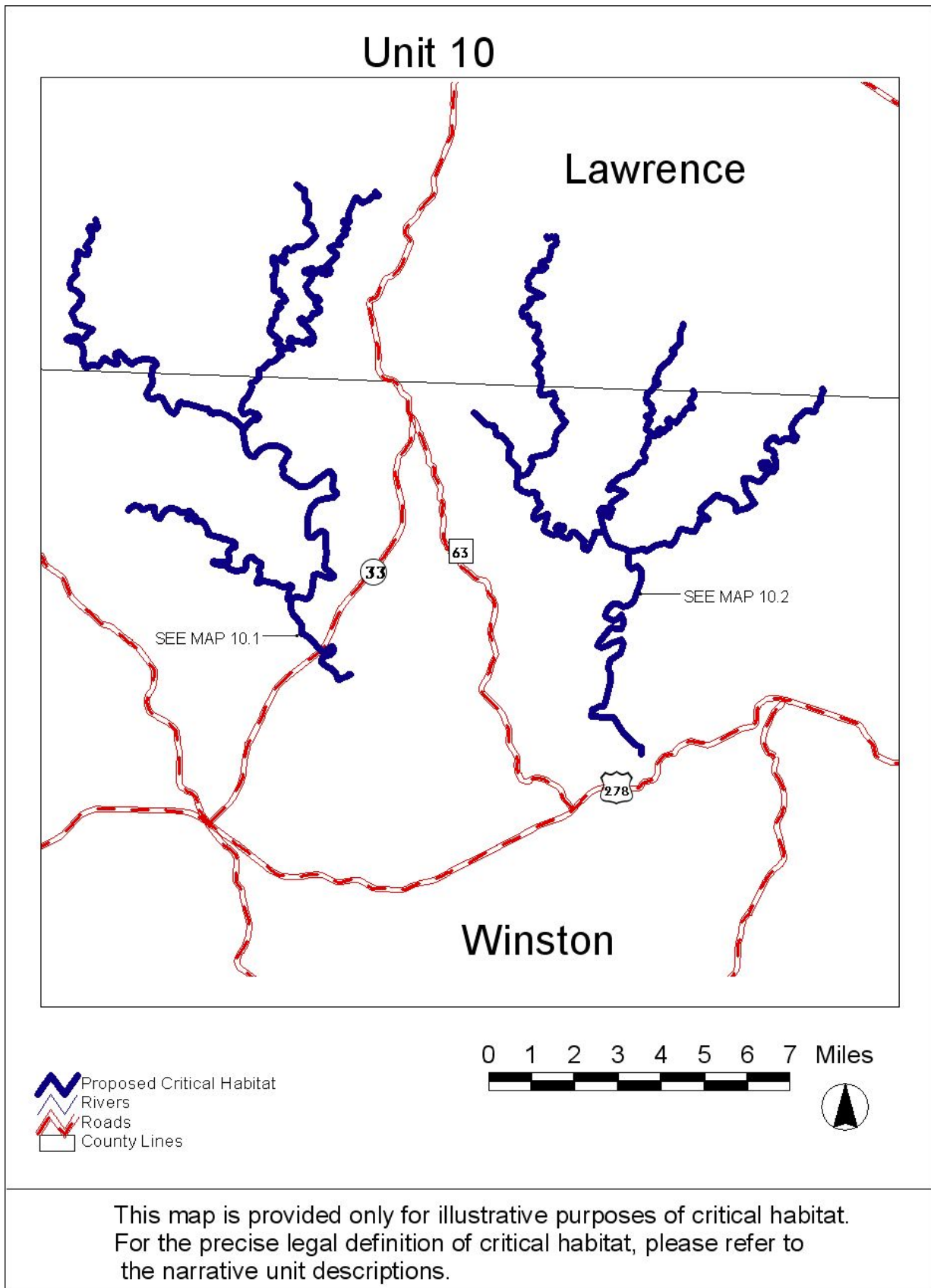
### 2.8.8 Triangular Kidneyshell

The triangular kidneyshell was listed as endangered under the ESA on April 16, 1993. A Mobile River Basin endemic, the historic range of this species included the Cahaba River, and the Black Warrior and Coosa Rivers and their tributaries. Currently, small populations of triangular kidneyshell remain within the historic range, including the Sipsey Fork and its tributaries, and the Locust Fork. Reasons for the decline and current status of this species include habitat modification, sedimentation, eutrophication, and water quality degradation (USFWS 2000).

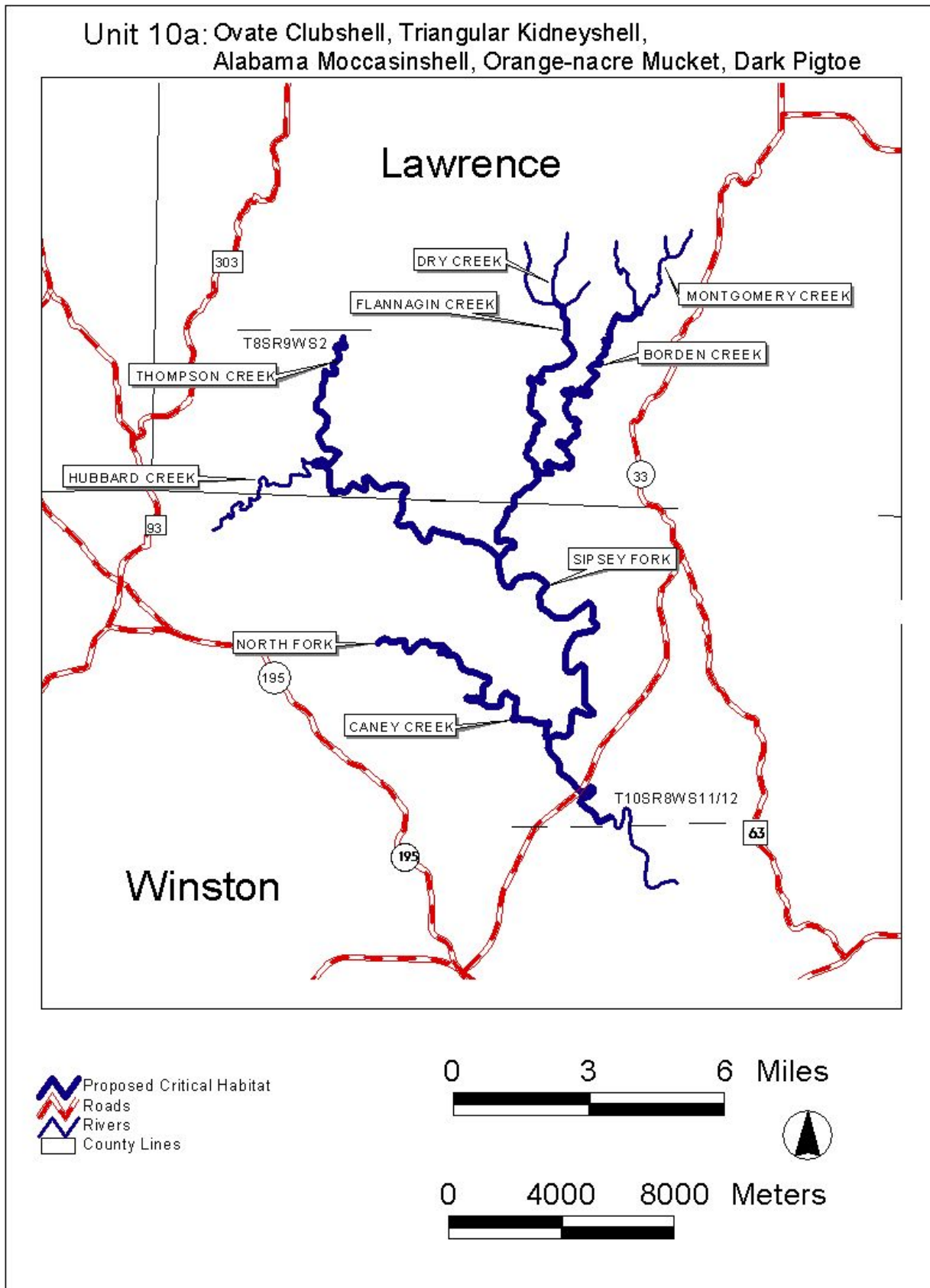
The triangular kidneyshell is a medium to large, triangular-shaped mussel that can reach 70 mm (2.75 in.) in length. This species typically inhabits sand/gravel/cobble substrate in shoals and runs of small rivers and large streams. Gravid individuals of this species release glochidia in April. This species appears to package its glochidia into conglomerates that resemble dipteran larvae (e.g., fly and mosquito larvae). Several host fish species have been identified, including Warrior darter, Tuskaloosa darter, blackbanded darter, and Mobile logperch (Haag 2004g).

There are 13 designated critical habitat units for the triangular kidneyshell totaling approximately 581 miles of streams and rivers within its current and historic range. These include 91 miles of the Sipsey Fork (Unit 10) and 63 miles of the Locust Fork (Unit 12) in the Warrior Basin. Only Unit 10 is within the action area for this BA.

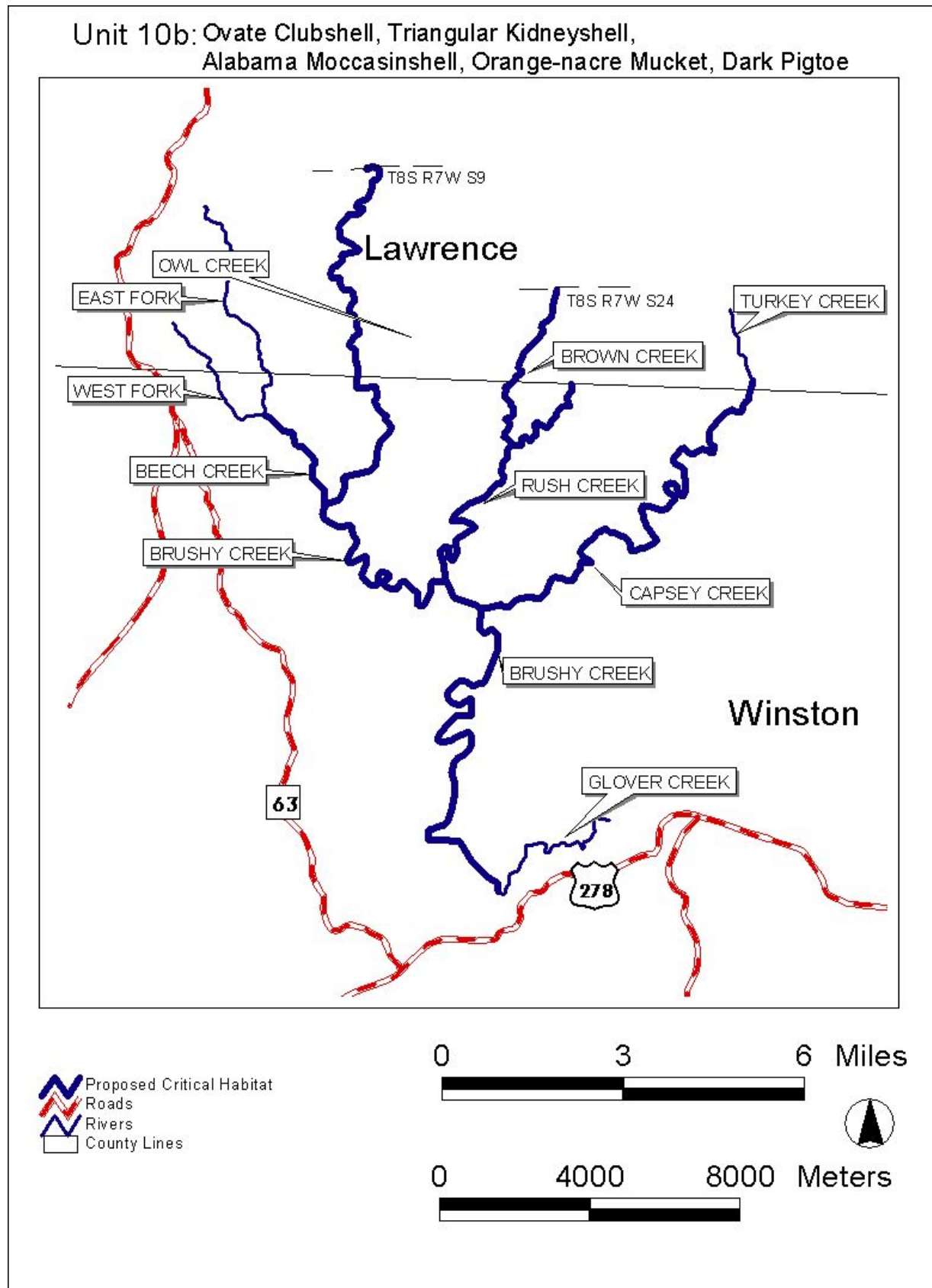
**Figure 3: Sipsey Fork Critical Habitat Unit Location Map**



**Figure 4: Sipsy Fork Critical Habitat Unit – Western Portion**



**Figure 5: Sipsy Fork Critical Habitat Unit – Eastern Portion**



### 3.0 ANALYSIS OF BASIN-LEVEL ACTIONS

APC's proposed action for the Warrior developments includes two actions to be applied basin-wide. These two actions and their likely impacts are discussed below.

#### 3.1 Wildlife Management Plan

As part of relicensing, APC has developed a Wildlife Management Plan for the Warrior Project, which will be implemented upon license approval. Upon approval, the proposed plan would provide for a number of wildlife enhancements on project lands, including measures aimed at benefiting the federally listed bald eagle. Wildlife enhancements proposed as part of the Wildlife Management Plan include the following:

- Along with the proposed Shoreline Management Plan for the Smith reservoir, establishment of a minimum 15-foot-wide buffer of undisturbed vegetation along shoreline areas of Smith Lake to promote native vegetative communities, enhance wildlife habitat, and protect water quality;
- In the event that nesting eagles are discovered on the Warrior Project, prohibition on all disruptive activities (including timbering, construction, road building, etc.) within 1500 feet of any known bald eagle nest during the nesting season, and 750 feet during the non-nesting period;
- Implementation of timber management methods that result in enhanced value of project lands as wildlife habitat (all or uneven-aged management scheme, with a sawtimber cycle of 20 years, overall forest rotation of 60 years, and select cut harvests); and
- Creation and maintenance of an additional public hunting area for the physically disabled on project lands of the Smith Development.

##### 3.1.1 Assessment of Effects

Since the Wildlife Management Plan was specifically developed to benefit wildlife, including at least one federally listed species (bald eagle), its implementation is likely to result in only positive impacts on listed species. As such, we determine that the proposed action is not likely to adversely affect any of the federally listed species addressed in this BA.

### 3.2 APC's Commitments to Resource Enhancement & Restoration Programs

APC is committed to establish, maintain and make periodic contributions to a fund to support the Alabama Aquatic Biodiversity Center (AABC) established and operated by the Alabama Department of Conservation and Natural Resources (ADCNR). By serving as a partner with ADCNR and sponsoring activities at the AABC, APC will be contributing toward the enhancement and restoration of freshwater and mussel snail populations in the Mobile River Basin.. Due to the small size of the remnant populations of many imperiled Warrior Basin species, in particular freshwater mussel and snail species, captive propagation and reintroduction into remaining suitable habitats has recently emerged as an important recovery goal. In addition, the proposed facility would provide a venue for research on the life history and reproductive habits of federally listed species, which has been cited as being essential to their protection and recovery in the Mobile River Basin (USFWS 2000).

Because ADCNR anticipates that the Coosa River basin will be the focus of its efforts, this basin-wide action is discussed and analyzed at length in the biological assessment prepared as part of the license applications for the Coosa River Projects. Because that analysis concludes that there is some possibility of take of individual species as part of the AABC's activities, formal consultation will be conducted as part of the applications for the Coosa River Projects and an incidental take statement provided with the resulting biological opinion. Consequently, formal consultation is not necessary as part of the Warrior Project application and a conclusion of not likely to adversely affect is appropriate here.

## 4.0 PROJECT EFFECTS

This section analyzes the direct impacts of APC's proposed actions related to relicensing the Warrior Project.

### 4.1 Smith Development

The USFWS considers 13 federally listed and one candidate species as occurring, potentially occurring, or having historically occurred within the Smith Development (Table 1): bald eagle, red-cockaded woodpecker, orange-nacre mucket, fine-lined pocketbook, Alabama moccasinshell, Coosa moccasinshell, dark pigtoe, ovate clubshell, triangular kidneyshell, Alabama streak-sorus fern, Kral's waterplantain, Black Warrior waterdog (candidate), and flattened musk turtle. In addition, a portion of the Sipsey Fork and its tributaries upstream of Lewis Smith Lake (Unit 10; Figures 3 & 4) have been designated as critical habitat for five of the freshwater mussel species listed above: dark pigtoe, orange-nacre mucket, Alabama moccasinshell, triangular kidneyshell, and ovate clubshell. Potential impacts of APC's proposed actions at Smith on these species and critical habitats are analyzed below.

#### 4.1.1 Current Operations

The Smith Development is primarily operated in a peaking mode, with seasonal variation in storage and generation. Alabama Power typically operates the Smith Development such that lake levels remain at 510 ft mean sea level (msl) from early April through the end of June (normal pool). Beginning in July, the lake is drawn down to 496 ft msl (winter pool) by November, and maintained at this level until the end of January. Beginning in February, the lake is refilled to normal pool again by April. APC is currently also allowed to periodically store water above the 510 ft msl up to the 522 ft msl during high flow events.

#### 4.1.2 Proposed Actions

APC proposes to continue to operate the Smith Development in peaking mode and regulate lake levels according to the current rule curve (normal summer and winter pool elevations of 510 and 496 ft, respectively). In addition, APC proposes a number of enhancements that are not part of current operations, but that have potential to affect federally listed species. These enhancements include:

- Design, install, operate, and monitor an aeration system within 18 months of license issuance to ensure that the state water quality standard of 4.0 milligrams per liter (mg/L) of dissolved oxygen (DO) is met in turbine discharges during periods of generation, consistent with the certification issued by the Alabama Department of Environmental Management;
- Supplement tailrace flow during periods of non-generation with approximately 50 cubic feet per second (cfs). This flow would be provided through valves that would be installed on the two penstocks in the powerhouse; and
- Implement modifications (e.g., placement of shoreline rip-rap, shoreline buffer zones, and implementation of shoreline best management practices (BMPs)) to the Lake Shore Use Permitting Program as described in the Warrior River Project Shoreline Management Plan (SMP) (APC, 2004).

In addition to the preceding proposals, APC proposes to address issues related to lands owned by the U.S. Forest Service (USFS) within the project boundary in the following manner:

- Continue collection of water quality data in the mainstem of the reservoir to chart changes in the lake water quality;
- Assist the USFS with retrofitting selected road crossing culvert systems on USFS property that have fragmented tributaries of Smith Lake;

- Provide additional analysis of terrestrial habitat data collected by APC at the request of USFS during relicensing;
- Provide specific funding to clean up the current encroachment areas on USFS lands, educate Smith Lake contractors on encroachment issues on USFS lands, and provide information when encroachments are detected on USFS lands;
- Provide additional funding to continue studies of flattened musk turtles and work with the USFWS in addressing this species; and
- Provide funding and “in-kind” services to perform periodic surveys of existing populations of listed species in the Smith Lake watershed.

#### 4.1.3 Assessment of Effects

##### 4.1.3.1 Project Operations

###### Bald Eagle

Nesting of bald eagles has not been documented within the Smith Development Project Boundary; however, foraging bald eagles have been observed at Smith Lake, particularly during winter (J. Lochamy, APC, Personal Communication). Since APC is proposing no changes in operation at Smith, the quality of foraging habitat on the lake is expected to remain unchanged. As such, we conclude that implementation of APC’s proposal to continue current operations is not likely to adversely affect bald eagles. In addition, APC’s proposal to provide a minimum flow of approximately 50 cfs and to ensure that DO levels meet or exceed 4.0 mg/L below Smith Dam during periods of non-generation would likely have positive impacts to eagle foraging due to enhancement of the tailwater fishery.

### Red-cockaded Woodpecker

Red-cockaded woodpeckers historically occurred within the Bankhead National Forest, adjacent to Smith Lake. This population is presumed extirpated since 1992, however, due to loss of the two-layered (open pine canopy and herbaceous groundcover) forest structure and the overall loss in pine-dominated forests (USFS 2003a). Since red-cockaded woodpeckers do not presently occur in the Smith Development vicinity, continued operation is not likely to adversely affect this species.

### Cahaba Shiner

The current populations of Cahaba shiners potentially affected by the Project are located on the Locust Fork, which empties into Bankhead Lake. These populations are not located within the direct influence of the proposed project operations. Therefore, continued operation of the Smith Development in its current or proposed mode is not likely to adversely affect existing populations of Cahaba shiners.

### Flattened Musk Turtle

APC and the USFS funded research aimed at determining the status of the flattened musk turtle in selected reaches of Smith Lake (Sipsey Fork and Brushy Creek) and upstream on the Bankhead National Forest (Rogers and Marion 2004a,b). While the study results suggested that recruitment may be lower in the Smith Lake population than in free-flowing upstream reaches of the Sipsey Fork, flattened musk turtles were found to be readily utilizing numerous locations in the Brushy Creek and Sipsey Fork branches of Smith Lake with suitable habitat (i.e., submerged rocky shelves and crevices; Rogers and Marion 2004b). Further, all of the turtles captured in the study were found to be in good to excellent condition (Rogers and Marion 2004b). Bailey and Bailey (2003) also

documented occurrence of the species in the Ryan Creek and Rocky Creek branches of the lake. In a recently published account of the species' status, Marion and Bailey (2004) noted that "recent and ongoing studies in Lewis Smith Reservoir conducted by the authors indicate that some reservoir sites with low sediment accumulation, good water quality, and adequate refugia have apparent healthy, reproducing populations of at least low to moderate densities." Since these populations appear to be healthy and reproducing under current condition, continued operation of the Smith Development in its current mode is not likely to adversely affect resident populations of flattened musk turtle. It should be noted that, because existing populations are located in close proximity to lands of the Bankhead National Forest, the species should also receive protection under the Land and Resource Management Plan of the USFS (2003b).

#### *Black Warrior Waterdog*

Black Warrior waterdogs are known to occur in tributaries upstream of Smith Lake (Bailey 2000); however, impounded reaches of the Basin are thought to be unsuitable as habitat for this species due to restricted flows, limited shallow water, and abundant predatory game fish (Bailey and Guyer 2004). Only three waterdogs have been captured from impoundments, all three by fishermen fishing in the mouths of tributaries (Bailey 2000). These data suggest that occurrence of Black Warrior waterdogs within the Smith Development project area is likely limited to areas where the project boundary extends upstream into flowing tributary reaches. Since APC is proposing no changes in lake elevation, continued operations at Smith are not likely to adversely affect Black Warrior waterdogs potentially inhabiting these areas.

#### *Kral's WaterPlantain*

The West Sipsey Fork population of Kral's waterplantain is located within the Smith Development Project Boundary. Continued operation of the

Smith Development is not likely to adversely affect the species, because the existing population appears to be located well upstream of the influence of the Smith Lake pool. According to the USFWS Recovery Plan for Kral's waterplantain (1991), extant populations of the species remain vulnerable to siltation and erosion resulting from incompatible shoreline land-use such as agriculture, timbering, and recreational and residential development. The West Sipsey Fork population is not likely to be affected by such impacts as it is located within the USFS's Bankhead National Forest and should be protected under its Land and Resource Management Plan (USFS 2003b).

*Alabama Streak-sorus Fern*

Although the Alabama streak-sorus fern has the potential to occur within the Smith Development Project Boundary, the fern is currently located on both sides of a highway bridge over the Sipsey Fork (upstream of the reservoir's influence). Thus, continued project operations at Smith are not likely to adversely affect the species because all extant populations are located upstream of the influence of the Smith Lake pool (USFWS 1996). It should be noted that many of these known populations are located within the Bankhead National Forest and should be protected under its Land and Resource Management Plan (USFS 2003b).

*Fine-lined Pocketbook*

The fine-lined pocketbook has apparently been extirpated from the Black Warrior River Basin (USFWS 2000; Haag 2004a). Additionally, within the Basin, no critical habitat units have been designated. As such, implementation of APC's proposed actions in the basin are Not Likely to Adversely Affect the species.

### Ovate Clubshell

No extant populations of ovate clubshell are known to occur in the Warrior River Basin (Haag 2004c). As such, implementation of APC's proposal to continue current operations at Smith is not likely to adversely affect the species. However, as previously noted, critical habitat has been designated for ovate clubshell in the Sipsey Fork of the Warrior Basin (USFWS 2004). Potential impacts of the proposed actions on the Sipsey Fork Critical Habitat Unit are analyzed below.

### Coosa moccasinshell

The Coosa moccasinshell has not been documented in the Warrior River Basin since 1985, when a single individual was reportedly collected by a USFWS biologist (J. Pulliam) from the headwaters of the Sipsey Fork (USFWS 1993); this suggests that the species may be extirpated from the Basin. Because there appear to be no extant populations of Coosa moccasinshell in the Warrior Basin, implementation of APC's proposed actions in the basin is not likely to adversely affect the species.

### Sipsey Fork Critical Habitat Unit and Extant Freshwater Mussels

Within the Sipsey Fork Critical Habitat Unit, dark pigtoe, orange-nacre mucket, Alabama moccasinshell, triangular kidneyshell, and ovate clubshell are currently present and locally common (USFWS 2004). Portions of this critical habitat unit lie within the project boundary for the Smith Development, near the upstream limits of the impoundment.

The existing populations of federally listed mussels in the Sipsey Fork Critical Habitat Unit could potentially be affected by lake level fluctuations due to project operations at Smith. Since the preferred habitat for these species is relatively shallow, flowing water over clean substrate

(USFWS 2000), they would be expected to primarily inhabit areas upstream of the impounded reach. Some mussels might occur in the “transition zone” where flow velocities begin to decrease and water depths increase. This transition zone is dynamic, becoming longer or shorter, and moving upstream and downstream as seasonal lake levels at Smith change. This zone can also be influenced by periodic high flow events when APC must temporarily store water to aid in flood control. Mussels present in this transition zone would potentially be subjected to decreased velocities and increased siltation rates, which could affect feeding and reproductive success. It is important to note, however, that the mussel populations in this critical habitat unit have persisted under the existing Smith operating scheme since the 1960’s. Therefore, major impacts to existing populations are not expected, because APC does not propose to change lake level operations from the existing scheme.

Shoreline management could potentially affect the Sipsey Fork Critical Habitat Unit and associated mussel populations. APC’s proposed SMP for the Warrior River Project designates the areas of critical habitat as “Sensitive Resources,” which would discourage development in the area and require that any proposed development receive an additional level of environmental review (See Section 4.1.3.2).

Based on the above information, we conclude that continued operation of the Smith Development in the current mode is not likely to adversely affect the Sipsey Fork Critical Habitat Unit or populations of dark pigtoe, orange-nacre mucket, Alabama moccasinshell, triangular kidneyshell, and ovate clubshell that currently occupy the reach.

#### 4.1.3.2 Proposed Enhancements

##### Shoreline Management Plan

APC has proposed to implement a SMP for the approximately 500 miles of shoreline within the project boundaries of the Smith Development. As part of the proposed SMP, a Geographic Information System (GIS)-based shoreline classification system was developed to guide future management actions to protect natural and other resources. This system classifies reservoir shorelines into one of five land use categories according to their current and future designated uses. Two of these categories, Sensitive Resource Lands and Natural / Undeveloped Lands, have potential for providing protection for federally listed species and their habitats.

Sensitive Resource Lands are project lands, generally privately-owned with APC maintaining a flood easement, that are managed for protection and enhancement of sensitive resources. Sensitive resources include archaeological sites, sites/structures listed on or eligible for listing on the National Register of Historic Places, wetlands, floodplains, Rare, Threatened and Endangered (RTE) habitat protection areas, significant scenic areas, and other sensitive ecological areas. Permitted activities, if applicable, in these areas will be highly restrictive to avoid potential impacts to sensitive resources and will trigger an environmental review by APC's environmental department prior to issuance of a Shoreline Use Permit.

Natural / Undeveloped Lands are project lands, typically owned in fee by APC, that are to remain in an undeveloped state for specific project purposes including: to protect environmentally sensitive areas; to maintain natural aesthetic qualities; to serve as buffer zones around public recreation areas; and to provide a means for preventing overcrowding of

partially developed shoreline areas. This classification allows for public hiking trails, nature studies, primitive camping, wildlife management (excluding hunting), and normal forestry management practices.

The SMP also proposes a number of BMPs that have potential to benefit federally listed species. For instance, the SMP provides for establishment of a minimum 15-foot-wide linear shoreline buffer zone of unmanaged vegetation. Establishment of a vegetated buffer would be required on all project lands owned in fee by APC and would be recommended (through public education efforts) on privately-owned project lands adjacent to the reservoirs. Implementation of this buffer zone by private shoreline landowners and by APC would promote native vegetative communities, protect shoreline wetlands, and enhance wildlife habitat within the Warrior Basin development boundaries. In addition, establishment of unmanaged buffer zones around the reservoir would help protect riparian zones and their ability to function as filters for water quality.

Since the SMP was specifically developed to provide enhanced protection for natural resources, including threatened and endangered species, its implementation is unlikely to result in any negative direct, indirect, or cumulative impacts on listed species. Further, its implementation will likely result in reduced erosion and siltation, and in turn, improved habitat conditions for species, such as Kral's waterplantain, flattened musk turtle, Black Warrior waterdog, as well as the Sipse Fork Critical Habitat Unit and associated freshwater mussels. As such, we determine that the proposed action is Not Likely to Adversely Affect any of the federally listed species addressed in this BA.

#### *U.S. Forest Service Enhancements*

APC has proposed several measures to help protect, restore, and enhance populations of federally listed species within Bankhead National

Forest. These include assisting the USFS in modifying selected road culverts in Bankhead National Forest. These modifications are intended to reduce the fragmentation of remaining suitable aquatic habitats by ensuring that the culverts are capable of allowing fish species to move freely up and downstream of culvert locations. As noted earlier, the federally listed mussel species all require certain species of fish as reproductive hosts (USFWS 2000). Ensuring that these host fish species have access to all available suitable habitats would increase the potential viability of both the mussels and their hosts. APC has also committed to provide funding and in-kind services to allow the USFS to survey specific populations of threatened and endangered species periodically. These surveys will help to track the protection and recovery of selected mollusk species. Since these enhancements were developed specifically to benefit federally listed species, their implementation is not likely to adversely affect any of the federally listed species addressed in this BA.

#### Minimum Flow

APC proposes to supplement flows in the Smith tailrace by releasing a continuous flow of approximately 50 cfs through penstock valves during periods of non-generation. While the supplemental flow will likely improve general aquatic habitat downstream of the powerhouse, no federally listed species are known to occur in the tailrace; therefore implementation of the flow is not likely to adversely affect any of the federally listed aquatic species addressed in this BA.

#### Dissolved Oxygen Enhancements

As previously noted, APC proposes to design, build, operate, and monitor an aeration system at the Smith Development within 18 months of license issuance to ensure that the state water quality standard of 4.0 mg/L of DO is met during periods of generation. While the proposed aeration systems would improve aquatic habitat conditions downstream of the

Smith Powerhouse, its implementation is Not Likely to Adversely Affect federally listed aquatic species, however, as none are known to occur in the tailrace area.

#### 4.2 Bankhead Development

The USFWS lists 5 federally listed species as occurring or potentially occurring in the counties surrounding Bankhead Lake (Table 1): bald eagle, red-cockaded woodpecker, Cahaba shiner, Black Warrior waterdog, and flattened musk turtle. Potential impacts of APC's proposed actions at Bankhead on these species are analyzed below.

##### 4.2.1 Current Operations

APC operates the Bankhead powerhouse principally in a peaking mode. Usable storage of 26,000 acre-ft is provided by an allowable daily drawdown of 3 ft, from elevation 255 to 252 ft msl. However, because of development of the lake by private owners, APC generally limits drawdown to about 254 ft msl. Because of navigation requirements, the pool must not be drawn below elevation 252 ft msl. Normally, the powerhouse will operate on a weekly cycle, and the power generated is available for use in daily peak load periods. The normal static tailwater elevation is 186.5 ft msl, providing 68.5 ft of gross head at normal full pool.

The U.S. Army Corps of Engineers (USACE) operates the Bankhead Dam as a run-of-river project. Basically, water entering the lake each day is released that same day. The unit in the powerhouse is operated daily to maintain the proper lake elevation while generating electricity during the peak use times. When high inflows to the lake exceed turbine discharge capacity, APC notifies the USACE Lock Operator that use of the spillway gates will be required. The Lock Operator raises the required spillway gates to manage the proper lake elevation. When the high inflows recede, the spillway gates are closed and the water level is managed by turbine releases.

#### 4.2.2 Proposed Actions

APC proposes to continue to operate the Bankhead development between elevations 252 ft msl and 255 ft msl in coordination with the USACE operations. APC also proposes to continue to voluntarily restrict the drawdown to 254 ft msl because of extensive development of the lake area by private owners.

#### 4.2.3 Assessment of Effects

##### Bald Eagle

While there are no bald eagle nests on the 126 acres surrounding the powerhouse, eagles potentially utilize Bankhead Lake and areas downstream of the powerhouse for foraging. Since APC is proposing no changes in operation at Bankhead, the quality of foraging habitat on the lake is expected to remain unchanged. As such, we conclude that implementation of APC's proposal to continue current operations is not likely to adversely affect bald eagles.

##### Red-cockaded Woodpecker

While the USFWS lists red-cockaded woodpecker as occurring in Tuscaloosa County (Table 1), the species is not known to occur within the Bankhead Project Boundary (J. Lochamy , APC, Pers. Comm.). As previously noted, the Bankhead Project Boundary is limited to approximately 126 acres surrounding the powerhouse, of which only 50 - 60% is wooded (B. Vinson, APC, Pers. Comm.). These areas are composed of mixed pine-hardwood forests and do not constitute suitable habitat for red-cockaded woodpecker. As such, continued operation under the current mode at Bankhead is not likely to adversely affect the species.

### *Cahaba Shiner*

Within the Black Warrior Basin, the Cahaba shiner occurs within a 73 mile reach of the Locust Fork, from the first shoal upstream of Bankhead Lake, upstream to the Highway 160 crossing near Cleveland (Kuhajda and Shepard 2004). This distribution does not lie within the project boundary for APC's Bankhead development. Since APC has proposed no changes in lake elevation at Bankhead, this population is expected to remain well upstream of the influence of the reservoir pool. Further, because of the location of the Locust Fork (approximately 18 miles upstream of the dam) and the Cahaba shiner's preference for shallow riffle habitats, there is very little potential that individuals from the Locust Fork would enter the lake, travel downstream, and be exposed to potential turbine entrainment and mortality. Based on this information, we conclude that APC's proposal to continue current operations at Bankhead is not likely to adversely affect the Locust Fork population of Cahaba shiner.

### *Flattened Musk Turtle*

While flattened musk turtles do not occur within the Bankhead Project Boundary, the species has been documented at several locations in Bankhead Lake with suitable submerged rocky shelf and crevice habitat (M. Bailey, Conservation Southeast, Pers. Comm.). APC's proposed actions at Bankhead are not likely to adversely affect this population, however, as their proposed action is limited to continuation of current operations. Under current operations, lake levels fluctuation at Bankhead is typically less than 1.5 ft, with a maximum fluctuation of 3 ft (See Section 4.2.1).

### *Black Warrior Waterdog*

Although current distribution data is limited, Black Warrior waterdogs have been documented in several tributaries upstream of Bankhead Lake, including the Mulberry and Locust Forks and Blackwater Creek as far

downstream as the impoundment headwaters (M. Bailey, Conservation Southeast, Pers. Comm.; Bart et al. 1997). APC's proposal to continue current operations at Bankhead is not likely to adversely affect waterdogs potentially occurring in this transition zone, however, due to the limited nature of impoundment fluctuation at Bankhead (typically less than 2 ft, with a maximum of 3 ft) and the fact that waterdogs have existed under these conditions since the early 1960's.

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