

# U.S. FISH AND WILDLIFE SERVICE SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

## Scientific Name:

Necturus alabamensis

## Common Name:

Black Warrior Waterdog

## Lead region:

Region 4 (Southeast Region)

## Information current as of:

04/09/2012

## Status/Action

Funding provided for a proposed rule. Assessment not updated.

Species Assessment - determined species did not meet the definition of the endangered or threatened under the Act and, therefore, was not elevated to the Candidate status.

New Candidate

Continuing Candidate

Candidate Removal

Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status

Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species

Range is no longer a U.S. territory

Insufficient information exists on biological vulnerability and threats to support listing

Taxon mistakenly included in past notice of review

Taxon does not meet the definition of "species"

Taxon believed to be extinct

Conservation efforts have removed or reduced threats

\_\_\_ More abundant than believed, diminished threats, or threats eliminated.

## **Petition Information**

\_\_\_ Non-Petitioned

X Petitioned - Date petition received: 04/20/2010

90-Day Positive:05/11/2005

12 Month Positive:05/11/2005

Did the Petition request a reclassification? **No**

### **For Petitioned Candidate species:**

Is the listing warranted(if yes, see summary threats below) **Yes**

To Date, has publication of the proposal to list been precluded by other higher priority listing?  
**Yes**

Explanation of why precluded:

Precluded by higher priority species within Region 4 and by court-ordered listing actions.

## **Historical States/Territories/Countries of Occurrence:**

- **States/US Territories:** Alabama
- **US Counties:** Blount, AL, Marshall, AL, Tuscaloosa, AL, Walker, AL, Winston, AL
- **Countries:** United States

## **Current States/Counties/Territories/Countries of Occurrence:**

- **States/US Territories:** Alabama
- **US Counties:** Winston, AL
- **Countries:** United States

## **Land Ownership:**

Federal ownership 10 percent (William Bankhead National Forest); private ownership 90 percent.

## **Lead Region Contact:**

ARD-ECOL SVCS, Lorna Patrick, 850-769-0552, lorna\_patrick@fws.gov

## **Lead Field Office Contact:**

MISSISSIPPI ESFO, Linda Laclaire, (601) 321-1126, linda\_laclaire@fws.gov

## **Biological Information**

## Species Description:

The Black Warrior waterdog is a large, aquatic, nocturnal salamander that permanently retains a larval form and external gills throughout its life (Conant and Collins 1991, pp. 241-245; Petranka 1998, pp. 418-419). The maximum recorded length for this salamander is 248 millimeters (mm) (9.8 inches (in)) (Bart et al. 1997, p. 195). Its head and body are depressed, its tail is compressed laterally, and it has four toes on each of its four feet. Larval Black Warrior waterdogs (28 to 48 mm (1.1 to 1.9 in) total length) are dark brown or black on their dorsum (upper surfaces) and have two light stripes running along their sides (Bailey 2000, p. 1). Subadults (40 to 100 mm (1.6 to 3.9 in) total length) do not have the stripes present on larvae and are not conspicuously marked although they do have a dark stripe extending from the nostril through the eye to the gills. Adults are usually brown, may be spotted or unspotted, and retain the dark eye stripe (Bailey 2000, p. 1). The ventral surface of all age classes is plain white. The striped pattern of larvae closely resembles the mudpuppy, *N. maculosus* (Brode 1969, pp. 30, 121; Hecht 1958, p. 18).

## Taxonomy:

Viosca (1937, pp. 120-138) described the Black Warrior waterdog as *Necturus alabamensis*. In subsequent years, the name *N. alabamensis* was mistakenly applied many different ways within the peer-reviewed literature. However, a re-examination and analysis of museum specimens was conducted. The taxonomy of the Black Warrior waterdog has been clarified by Bart et al. (1997, pp. 192-201) and the original description by Viosca (1937, pp. 120-138) remains valid. The available taxonomic information on *N. alabamensis* has been carefully reviewed and we conclude that this species is a valid taxon.

## Habitat/Life History:

### Habitat

The Black Warrior waterdog inhabits streams above the Fall Line within the Black Warrior River Basin (Basin) in Alabama including parts of the North River, Locust Fork, Mulberry Fork, and Sipsey Fork drainages and their tributaries. Rocks, submerged ledges, and other cover probably play an important role in determining habitat suitability (Ashton and Peavy 1986, p. 64). Semi-permanent leaf beds (where they exist) are likely visited frequently (Ashton and Peavy 1986, p. 64). Larvae and adult waterdogs are reliably found only in these submerged leaf beds and they may use them for both shelter and foraging habitat (Bailey 2000, p. 3). Guyer (1997, pp. 1-21) analyzed habitats to distinguish sites with waterdogs from those lacking the species. He found that Black Warrior waterdogs were associated with clay substrates lacking silt; wide and/or shallow stream morphology; increased snail and *Desmognathus* (dusky salamanders) abundance; and decreased *Corbicula* (Asiatic clam) occurrence. Durflinger-Moreno et al. (2006, pp. 70-80) completed an additional assessment of 112 localities surveyed for waterdogs. At a regional scale, Black Warrior waterdogs were associated with stream depths of 1 to 4 meters (m) (3.3 to 13.1 feet (ft)), reduced sedimentation, and large leaf packs supporting mayfly and caddis fly larvae.

### Life History

Very little is known about the life history of the Black Warrior waterdog and data are generally limited for other species of southeastern *Necturus* as well.

Reproduction in the Black Warrior waterdog is aquatic. Egg deposition sites and clutch sizes are unknown. In the closely related Gulf Coast waterdog (*Necturus beyeri*), females attach their eggs singly to the undersides of underwater substrates (summarized in Guyer 2005, p. 868). Sexually active Black Warrior waterdog adults have been found in rock crevices (Bailey 2005, p. 867) and thus egg deposition may occur at these sites. Clutch sizes ranging from 4 to 40 eggs were reported in a summary of research conducted on the Gulf Coast

waterdog (Guyer 2005, p. 868). Ashton and Peavy (1986, p. 64) collected post-hatchling Black Warrior waterdog larvae in December; this suggests that nesting may occur in late spring or summer. Reproductive maturity is probably attained in the third winter or at 2.5 years of age (Bailey 2005, p. 867).

Aestivation (spending the summer in a state of torpor) in Black Warrior waterdogs is suspected since no specimens have been collected during the summer (Bailey 2005, p. 867). A similar seasonal pattern of activity primarily in winter and spring is also seen in other species of *Necturus* (Dundee 2005, p. 872; Guyer 2005, p. 868).

Larval and adult Black Warrior waterdogs are assumed to be opportunistic carnivores but prey taken in the wild have not been described. Adults are attracted to traps baited with fish-flavored cat food (Bailey 2005, p. 867). Captive Black Warrior waterdogs have eaten small fish and earthworms (Bailey 2005, p. 867). Crayfish, isopods, amphipods, freshwater clams, and insects including mayflies, caddisflies, dragonfly naiads, dytiscid beetles, and midges have been reported as prey items in Gulf Coast waterdogs (Guyer 2005, p. 868).

Home ranges of Black Warrior waterdogs are likely small as in other species of southeastern *Necturus*. In a Gulf Coast waterdog mark-recapture study, all recaptures were within 64 m (210 ft) of the original capture and release site (summarized in Guyer 2005, p. 868).

### **Historical Range/Distribution:**

Information on the Black Warrior waterdog is limited. There are a total of 11 historical records from sites in Blount, Tuscaloosa, Walker, and Winston Counties, Alabama. Potential waterdog habitat is expected to be similar to that of the threatened flattened musk turtle (*Sternotherus depressus*) which is also restricted to permanent streams above the Fall Line in the Black Warrior Basin (Mount 1975, p. 303). The waterdog received little attention between the time it was described in 1937 and the mid-1980s when it was found during surveys in the Tenn-Tom Waterway (Ashton and Peavy 1985, pp. 1-15). During this time, reference to the species, beyond field guides and summary descriptions, could be found in only three scientific publications and one unpublished Ph.D. dissertation (Hecht 1958, pp. 4, 17; Neil 1963, pp. 166-174; Gunter and Brode 1964, pp. 114-126; Brode 1969, pp. 21-22, 62-64, 132).

Bailey (2000, pp. 1-24) conducted a habitat assessment of the 11 sites verified as Black Warrior waterdog localities prior to 1993. Only 2 records were documented prior to the mid-1980s. These localities have since been inundated by impoundments. The historical waterdog records are sites from 10 streams or major segments: Sipsey Fork of the Black Warrior River and Brushy Creek (a tributary to Sipsey Fork) in Winston County; Locust Fork and Blackburn Fork of the Little Warrior River in Blount County; Mulberry Fork, Lost Creek, and Blackwater Creek in Walker County; and Yellow Creek, North River, and the Black Warrior River in Tuscaloosa County (Viosca 1937, pp. 120-122, 137-138; Ashton and Peavey 1985, pp. 1-15; Bailey 1992, pp. 7-9, 16-27; Bailey 1995, pp. 16-27; Bart et al. 1997, pp. 194-195, 198-200; Guyer 1997, p. 9; Bailey 2000, pp. 3-5). Bailey (2000, pp. 1-24) assessed the sites using subjective impressions of habitat suitability using parameters such as stream width and depth, water quality, substrate, structure (crevices, logs, etc.), and invertebrate fauna. Sites were stratified into four categories: good to excellent, moderate, poor to unsuitable, and impounded. Bailey concluded that 1 (9%) of the sites was good to excellent, 4 (36%) were moderate in quality, 2 (18%) were poor to unsuitable, and 4 (36%) were in impoundments. The two recent records of the species from impoundments were based on the capture of one animal at each site. The waterdogs were caught on baited hooks used by fishermen fishing off banks near impoundment feeder streams.

### **Current Range Distribution:**

At least 112 sites have been sampled for Black Warrior waterdogs since 1990 (Guyer 1997, pp. 19-21; Durflinger-Moreno et al. 2006, pp. 73-74). Survey sites included all stream localities within the range of the

species that approached or intersected roads and had appropriate habitat. The species has been reported since 1990 from only 14 sites (12% success rate) despite surveys in 1990, 1991, 1992, 1994, 1996, 1997, 1998, 2008, 2009, 2011, and 2012 (Bailey 1995, pp. 16-27; Guyer 1997, pp. 19-21 and 1998, pp. 6-7; Durflinger-Moreno et al. 2006, pp. 73-74; Stoops et al. 2010, p. 6; Alabama Natural Heritage Program 2011, p. 4). These sites are in Blount (Blackburn Fork of Little Warrior River), Marshall (Slab Creek, tributary to Locust Fork), Tuscaloosa (Yellow Creek, North River, Carroll Creek, Lye Branch, Mulberry Fork), Walker (Lost Creek, Little Blackwater Creek), and Winston (Sipsey Fork, Blackwater Creek, Browns Creek, Brush Creek, Capsey Creek) Counties, Alabama. Guyer (1997, pp. 3-4) did a statistical analysis of all waterdog field survey data. He concluded that waterdogs were unlikely to have been missed if they were present, especially at sites visited more than once. The relationship between cumulative number of site visits and the cumulative number of sites containing waterdogs indicated that 200 additional surveys would be needed to discover a single new locality for the species (Guyer 1997, p. 4).

Field surveys were conducted between 2008 and 2012 at historical localities. Only one population, on the Sipsey Fork in Winston County and occurring partially on the Bankhead National Forest, was found during these surveys (Stoops et al. 2010, pp. 1-6; Godwin 2012, p. 1). This site appears to be the stronghold for the species.

### **Population Estimates/Status:**

Each of the 14 sites verified as a Black Warrior waterdog locality represents an individual population. Very little is known about the status of these populations. Only one or two animals were captured at survey sites with the exception of one site on the Sipsey Fork chosen for an in-depth study because waterdogs were most common there (Durflinger-Moreno et al. 2006, pp. 70-71). Fifty-two waterdogs were captured at the Sipsey Fork site over a 3-year period representing 173,160 trap hours (1 waterdog/3,330 trap hours). Thirty-five (67%) animals were adults, 5 (10%) were subadults and 12 (23%) were larvae. The number of adult males and females captured was not significantly different from an expected 1:1 sex ratio (Durflinger-Moreno et al. 2006, p. 79). The low number of subadults and larvae indicate that recruitment and survival rates of these age classes are low. This implies that high mortality at the egg, larval, or juvenile stage, migration of these age classes out of the population, or longevity of adult waterdogs are affecting the age class distribution of the population. The viability of any Black Warrior waterdog population, including the Sipsey Fork population, is unknown.

## **Threats**

### **A. The present or threatened destruction, modification, or curtailment of its habitat or range:**

Water quality degradation is the biggest threat to the continued existence of the Black Warrior waterdog. Bailey (2000, p. 19-20) considered water quality degradation to be the primary reason for the extirpation of this species over much of its historical range in the upper Black Warrior River system. Most streams surveyed for the Black Warrior waterdog showed evidence of water quality degradation and many appeared biologically depauperate (Bailey 1992, p. 2 and 1995, p. 11; Durflinger-Moreno et al. 2006, p. 78).

Sources of point (point source discharge) and nonpoint (land surface runoff) pollution in the Black Warrior River Basin (Basin) have been numerous and widespread. Point pollution is generated from inadequately treated effluent from industrial plants, sanitary landfills, sewage treatment plants, and drain fields from individual private homes (U.S. Fish and Wildlife Service 2000, pp. 12-13). Nonpoint pollution originated from agricultural activities, poultry and cattle feedlots, abandoned mine runoff, construction, silviculture, failing septic tanks and contaminated runoff from urban areas (Deutsch et al. 1990, pp. 1-62, Upper Black Warrior Technical Task Force 1991, p. 1; O'Neil and Shepard 2001, p. 2). These sources contribute pollution

to the Basin via sediments, fertilizers, herbicides, pesticides, animal wastes, septic tank and gray water leakage, and oils and greases. Water quality, and the resident aquatic fauna, has declined as a result of this pollution which causes nitrification, decreased dissolved oxygen concentration, increased acidity and conductivity. These alterations have a direct effect on the survival of Black Warrior waterdogs which due to their highly permeable skin (Duellman and Trueb 1986, p. 197) and external gills are very sensitive to declines in water quality and oxygen concentration.

The large population centers of Birmingham, Tuscaloosa, and Jasper contribute substantial runoff to the Basin. The watershed occupied by these three cities contains more industrial and residential land area than any other river basin in Alabama. Streams draining these areas have a history of serious water quality problems. Species of fishes, mussels, and snails (Mettee et al. 1989, pp. 1, 14-16; Hartfield 1990, pp. 1-8), and populations of the flattened musk turtle (U.S. Fish and Wildlife Service 1990, p. 3), have been extirpated from large areas of the watershed due primarily to water quality degradation. For example, Mettee et al. (1989, pp. 14-16) noted the absence of at least nine fish species from streams draining the Birmingham metropolitan area where they had previously been common and Hartfield (1990, pp. 1-8) documented the extirpation of 39 to 40 species of mussels from individual tributaries of the Black Warrior River.

Forestry operations and highway construction are also sources of nonpoint pollution when Best Management Practices (BMPs) are not followed to protect streamside management zones (Hartfield 1990, pp. 4-6; U.S. Fish and Wildlife Service 2000, p. 13). Logging can cause erosion, siltation, and streambed structural changes from the introduction of tree slash. Highway construction and bridge replacements can also result in increased sedimentation and runoff may introduce toxic chemicals into streams. In addition, highway construction may reroute streams or change their shape.

Surface mining represents another threat to the biological integrity of streams in the Black Warrior River system and has undoubtedly affected the distribution of the Black Warrior waterdog (Bailey 1995, p. 10). Strip mining for coal results in hydrologic problems (i.e., erosion, sedimentation, decline in groundwater levels, and general degradation of water quality) that affect many aquatic organisms (U.S. Fish and Wildlife Service 2000, p. 12). Runoff from coal surface mining generates pollution through acidification, increased mineralization, and sediment loading. Impacts are generally associated with past activities and abandoned mines, since presently operating mines are required to employ environmental safeguards established by the Federal Surface Mining Control and Reclamation Act of 1977 and the Clean Water Act of 1972 (U.S. Fish and Wildlife Service 2000, p. 12). Old, abandoned mines will continue to contribute pollutants to streams for the foreseeable future.

Black Warrior waterdogs have probably experienced similar declines as the flattened musk turtle which also occurs in the upper Black Warrior River system. Sedimentation in this system has negatively affected the flattened musk turtle by: (1) reduction of mollusks and other invertebrates used as food; (2) physical alteration of rocky habitats where the animals forage and take cover, and (3) accumulation of substrate in which chemicals toxic to animals and their prey persist (Dodd et al. 1988, pp. 1-61). The Sipsey Fork of the Black Warrior River is the best remaining locality for the Black Warrior waterdog (Guyer 1998, p. 2). Bailey and Guyer (1998, pp. 77-83) completed a study of the flattened musk turtle at this site. They found that the turtle population was declining and suggested that habitat quality is deteriorating at this site. Deteriorating habitat quality may also affect the Black Warrior waterdog.

Black Warrior waterdogs are vulnerable to sedimentation, and the associated pollution concentrated in sediments, since they spend virtually all of their lives at the stream bottom and would be in almost constant contact with any toxic substances that may be present (Bailey 1995, p. 10). The skin of amphibians is highly permeable and water is exchanged readily with the environment. As a result, the respiration (breathing) and osmoregulation (balance of body fluids) of Black Warrior waterdogs would be negatively affected by toxic sediments. Excessive sediments also impact the hard stream and river bottoms by making the habitat unsuitable for feeding or reproduction of Black Warrior waterdogs. For example, sediments have been shown to affect respiration, growth, reproductive success, and survival of aquatic insects and fish (Waters 1995, pp.

173-175) that serve as food sources for the salamander (Bailey 2005, p. 867). Potential sources of pollution and associated sedimentation within a watershed include virtually all activities that disturb the land surface, and all localities currently occupied by the Black Warrior waterdog are affected to varying degrees by sedimentation (O'Neil and Shepard 2001, Appendix B, p. 5). Sedimentation, or siltation, is one of the most severe threats to the Black Warrior River (Black Warrior Riverkeeper 2012, p. 1). The Black Warrior River watershed receives significant pollutant loadings from activities related to the human population and land-use activities including sedimentation from construction, forestry, mining, agriculture, and channelization of stream segments (Black Warrior River Watershed Management Plan 2012, p. 4.3).

Creation of large impoundments, behind Bankhead, Lewis, and Holt dams, within the Basin has flooded thousands of square hectares (acres) of habitat previously considered appropriate for the Black Warrior waterdog. Hartfield (1990, p. 7) summarized the number of miles of streams affected by impoundments in the Basin. He found that the entire main channel of the Black Warrior River, over 272 kilometers (km) (170 miles (mi)), has been affected. Impoundments do not have the shallow, flowing water preferred by the species. As a result, they are likely marginal or unsuitable habitat for the salamander. The abundance of predatory fish in impoundments further renders these lakes unsuitable for the Black Warrior waterdog. Impoundments have been trapped for waterdogs. Informational flyers, offering a reward for the species, have been circulated to 187 bait shops, marinas, conservation officers, and other individuals throughout the target area (Bailey 1995, pp. 8, 14). As a result of these efforts, only three Black Warrior waterdogs have been reported from impoundments (Bailey 2000, pp. 9-10, 19). All three specimens were captured by fishermen fishing off a bank or near streams that empty into the reservoirs. The question remains whether impoundments represent suitable habitat or are habitat sinks. Given the habitat requirements of the species, it seems unlikely that a viable population of Black Warrior waterdogs could be sustained in an impoundment.

In summary, the historical loss of habitat is currently, and projected to continue to be, a significant threat to the Black Warrior waterdog. Habitat loss also amplifies threats from point and nonpoint source water and habitat quality degradation, accidental spills, or violation of permitted discharges. Due to the limited extent of habitat currently occupied by the species, and the severity and magnitude of this threat, we consider that the present or threatened destruction, modification, or curtailment of habitat and range represents a threat to the Black Warrior waterdog.

## **B. Overutilization for commercial, recreational, scientific, or educational purposes:**

Direct take of Black Warrior waterdogs for commercial, recreational, scientific, or educational purposes is not currently considered to be a threat.

## **C. Disease or predation:**

Disease and predation are not known to be factors in the decline of the Black Warrior waterdog.

## **D. The inadequacy of existing regulatory mechanisms:**

The Alabama Department of Conservation and Natural Resources (ADCNR) has identified the Black Warrior waterdog as a "Priority 2" species of high conservation concern due to its rarity and restricted distribution (ADCNR 2005, p. 298). Recent changes in the Alabama Nongame Species Regulation have included adding the Black Warrior waterdog to the Alabama list of non-game state-protected species (ADCNR 2012, pp. 1-4). These changes will make it slightly more difficult to obtain a collecting permit for the species, but do not offer any protection for habitat loss and degradation. Lacking Federal protection, and with only limited State protection, the Black Warrior waterdog is not currently given any special consideration under other environmental laws when project impacts are reviewed.

Stream segments within the Black Warrior River drainage currently occupied by the Black Warrior waterdog have been assigned water-use classifications of “fish and wildlife” (F&W) by the Alabama Department of Environmental Management (ADEM) under authority of the Clean Water Act of 1972. The F&W designation establishes minimum water quality standards that are believed to protect existing species and their uses within the designated area; many of the stream segments draining into Black Warrior waterdog habitat currently support their F&W classification standards. However, a combined total of 171 miles of the Locust Fork, Mulberry Fork, and other tributaries of the Black Warrior River have been identified on the Alabama 303(d) List (a list of water bodies failing to meet their designated water-use classifications) as impaired by siltation and nutrients (ADEM 2010, pp.1-3). The sources of these impairments have been identified as runoff from agricultural fields, abandoned surface mines, and industrial or municipal sites. The Sipsey Fork is currently meeting its F&W classification, and is also designated as an Outstanding National Resource Water. Recently, new coal mines, which have the potential of discharging additional pollutants into waters within the range of the Black Warrior waterdog, have been proposed in the Sipsey Fork and the Mulberry Fork (Dillard 2011, pers. comm.; Drennen 2011, pers. comm.; Alabama Surface Mining Commission 2012, pp. 1-4).

The Federal Surface Mining Control and Reclamation Act of 1977 has been ineffective in preventing the continued decline of many species, including the threatened flattened musk turtle, fish, and a number of mussels, in the Black Warrior Basin (Dodd et al. 1988, pp. 55-61; Mettee et al. 1989, pp. 18-20; Hartfield 1990, pp. 1-8; Bailey and Guyer 1998, pp. 77-83; U.S. Fish and Wildlife Service 2000, pp. 12-13). Federal water projects contributed to the decline of the species due to the construction of Bankhead, Lewis, and Holt dams. Surviving populations are negatively affected by discharges, highway construction, mining (current and un-reclaimed sites), and other activities with a Federal nexus (see Factor A, above).

In summary, although regulatory mechanisms are in place to protect aquatic species, multiple stream reaches within the occupied habitat of the Black Warrior waterdog (Locust Fork, Mulberry Fork, Yellow Creek, and North River) fail to meet current regulatory standards. In addition, the lack of specific information on the sensitivity of the Black Warrior waterdog to common industrial and municipal pollutants limits their application; without these data, it is not possible to document harm to the species as a result of the pollutants. Therefore, we consider existing regulatory mechanisms, as currently applied, not fully protective of the Black Warrior waterdog.

### **E. Other natural or manmade factors affecting its continued existence:**

The remaining Black Warrior waterdog populations are isolated from each other by unsuitable habitat created by impoundments, pollution, or other factors. Even in the best localities, waterdog population densities are apparently low. Low population densities combined with fragmentation of habitat renders populations extremely vulnerable to inbreeding depression (negative genetic effects of small populations) (Wright et al. 2008, p. 833) and catastrophic events such as flood, drought, or chemical spills (Black Warrior River Watershed Management Plan 2012, p. 4.4). In addition, if stream quality improves within areas of the Basin, impoundments and polluted reaches will act as barriers to re-establishment of Black Warrior waterdog populations. Therefore, we consider the Black Warrior waterdog vulnerable to other natural or manmade factors, such as droughts, floods, spills, and/or inbreeding.

### **Conservation Measures Planned or Implemented :**

There are other listed aquatic species within the range of the Black Warrior waterdog. Activities to improve water quality conditions for these species will also improve conditions for the Black Warrior waterdog. Several nonprofit organizations, including the Black Warrior River Basin Clean Water Partnership and the Black Warrior Riverkeeper, coordinate stakeholders to encourage basin restoration and protection, monitor river quality by collecting water samples, provide educational materials to the public, and pursue legal action

to encourage enforcement of the Clean Water Act. No conservation actions have been implemented or planned specifically for the Black Warrior waterdog (Godwin 2010, pers. comm.).

### Summary of Threats :

Water quality degradation is the biggest threat to the continued existence of the Black Warrior waterdog. Populations are at risk due to impoundments, increased sedimentation, and pollution resulting from mining, forestry, agricultural activities, and industrial and residential sewage effluent. Low population densities and habitat fragmentation further threaten this species. We find that this species is warranted for listing throughout all its range, and, therefore, find that it is unnecessary to analyze whether it is threatened or endangered in a significant portion of its range.

### For species that are being removed from candidate status:

\_\_\_\_\_ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions(PECE)?

### Recommended Conservation Measures :

Analyze the watershed level water quality threats and develop a strategy to reduce pollution. Work with other governmental agencies and private landowners to develop partnerships to implement the strategy.

### Priority Table

Magnitude	Immediacy	Taxonomy	Priority
<b>High</b>	<b>Imminent</b>	Monotypic genus	1
		<b>Species</b>	<b>2</b>
		Subspecies/Population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/Population	6
Moderate to Low	Imminent	Monotype genus	7
		Species	8
		Subspecies/Population	9
	Non-Imminent	Monotype genus	10
		Species	11
		Subspecies/Population	12

### Rationale for Change in Listing Priority Number:

The magnitude of threat is high because it is pervasive throughout the range of the species. The immediacy of threat is imminent because it is currently ongoing. Therefore, it is appropriate to change the Listing Priority Number from 8 to 2.

### Magnitude:

Many streams of the Black Warrior basin are biologically depauperate due to water quality degradation from point and nonpoint-source pollution. Suitable habitat for the Black Warrior waterdog is limited and available data indicate extant populations are small and their viability is questionable. As a result, there is risk of inbreeding depression and vulnerability to stochastic events. Water quality issues are persistent and regulatory mechanisms are not ameliorating these threats. This situation is pervasive and the threats are ongoing. Our most recent information indicates all populations except one may have decreased below detectable limits. Therefore, the overall magnitude of the threats is high.

### **Imminence :**

Sources of point and nonpoint source threats posed by water and habitat quality degradation in the Black Warrior basin are currently affecting all populations to some degree. Water quality degradation in the Black Warrior basin is ongoing; therefore, the threats are imminent.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determination whether emergency listing is needed?

### **Emergency Listing Review**

No Is Emergency Listing Warranted?

Although the pervasive habitat degradation poses a high threat to the Black Warrior waterdog requiring action to conserve the species, one population is known to be persisting and the species is not immediately in danger of becoming extinct.

### **Description of Monitoring:**

Since the last update of this assessment form, species experts, and appropriate individuals with State and Federal agencies, have been contacted concerning the Black Warrior waterdog and asked to provide any new relevant literature and/or data. These individuals, their affiliation, and date of contact are as follows: Mark Bailey, Conservation Southeast, Inc., March 5, 2012; Craig Guyer, Auburn University, March 5, 2012; Monica Stoops and Erik Keyster, Cincinnati Zoo and Botanical Garden, March 5 2012; Mark Sasser, Alabama Department of Conservation and Natural Resources (ADCNR), March 5, 2012; Ashley Peters, ADCNR, Natural Heritage Program, March 5, 2012; Dan Everson, Sergio Pierluissi, and Jeff Powell, Alabama Field Office, U.S. Fish and Wildlife Service, March 5, 2012; Leslie Rissler, University of Alabama, March 5, 2012; Michael Barbour and Jim Godwin, Alabama Natural Heritage Program, March 5, 2012. In addition to making personal contacts, recent herpetological journals were searched for relevant literature and data. Monica Stoops and Erik Keyster, Cincinnati Zoo and Botanical Garden, and Jim Godwin of the Alabama Natural Heritage Program, have conducted field surveys between 2008 and 2012 at historical localities. During these surveys, only one population has been found.

**Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment:**

Alabama

**Indicate which State(s) did not provide any information or comment:**

none

**State Coordination:**

The Black Warrior waterdog is included in Alabama's Comprehensive Wildlife Conservation Strategy on a list entitled "Species of Greatest Conservation Need." It has been given a Priority Rank of "P2" which indicates taxa of high conservation concern for which timely research and/or conservation action is needed.

## **Literature Cited:**

Alabama Department of Conservation and Natural Resources (ADCNR). 2005. Alabama's comprehensive wildlife conservation strategy. Montgomery, Alabama. 322 pp.

Alabama Department of Conservation and Natural Resources. 2012. Nongame vertebrates protected by Alabama regulations. 220-2-.92 Nongame Species Regulation. Website: <http://www.outdooralabama.com/watchable-wildlife/regulations/nongame.cfm>; viewed on July 20, 2012.

Alabama Department of Environmental Management (ADEM). 2010. Alabama 303(d) Information and Map. Website: <http://adem.alabama.gov/programs/water/303d.cnt>; viewed on June 2, 2010.

Alabama Natural Heritage Program. 2011. 2011 Annual Report. Alabama Natural Heritage Program, Auburn University, AL. 11 pp.

Alabama Surface Mining Commission (ASMC). 2012. Permit applications on file with ASMC. Website: <http://surface-mining.alabama.gov/PermitApplications.html>; viewed on July 23, 2012.

Ashton, R.E., Jr. and B. Peavy. 1985. Tenn-Tom Waterway Necturus project. Unpublished report submitted to Alabama Department of Conservation and Natural Resources, Montgomery, AL. 15 pp.

Ashton, R.E., Jr., and J. Peavy. 1986. Black Warrior waterdog. Pgs. 63-64 In: R.H. Mount (ed.), Vertebrate animals of Alabama in need of special attention. Alabama Agricultural Experiment Station, Auburn University, Auburn, AL.

Bailey, K.A. and C. Guyer. 1998. Demography and population status of the flattened musk turtle, *Sternotherus depressus*, in the Black Warrior River Basin of Alabama. *Chelonian Conservation and Biology* 3:77-83.

Bailey, M.A. 1992. Black Warrior waterdog status survey: Unpublished report submitted to Alabama Department of conservation and Natural Resources, Montgomery, AL. 27 pp.

Bailey, M.A. 1995. Black Warrior waterdog survey 1994-95: Performance report. Unpublished report submitted to Alabama Department of Conservation and Natural Resources, Montgomery, AL. 27 pp.

Bailey, M.A. 2000. Habitat assessment of known occurrences of the Black Warrior waterdog (*Necturus alabamensis*). Unpublished report prepared for the U.S. Fish and Wildlife Service, Jackson, MS. 24 pp. + appendices.

Bailey, M.A. 2005. *Necturus alabamensis* Viosca, 1937. Black Warrior waterdog. Pgs. 866-867 In: M. Lannoo (ed.), Amphibian declines. The conservation status of United States species. University of California Press, Berkeley and Los Angeles, CA.

Bart, H.L., Jr., M.A. Bailey, R.E. Ashton, Jr., and P.E. Moler. 1997. Taxonomic and nomenclatural status of the Upper Black Warrior River waterdog. *Journal of Herpetology* 31:192-201.

Black Warrior River Watershed Management Plan. Undated. Website:  
<http://adem.state.al.us/programs/water/nps/files/blackwarriorbmp.pdf>; viewed on July 20, 2012.

Black Warrior Riverkeeper. 2012. Siltation and sedimentation. Website:  
<http://blackwarriorriver.org/siltation-sedimentation.html>; viewed on July 22, 2012.

Brode, W.E. 1969. A systematic study of salamanders in the genus, *Necturus* Rafinesque. Unpublished PhD. Dissertation, University of Southern Mississippi, Hattiesburg, MS. 137 pp.

Conant, R. and J.T. Collins. 1991. A field guide to reptiles and amphibians of eastern and central North America, third edition. Houghton Mifflin Company, Boston, MA. 450 pp.

Deutsch, W.G., W.C. Seesock, E.C. Webber, and D.R. Bayne. 1990. The impact of poultry rearing operations on water quality and biological communities of second order streams in Cullman and Winston counties, Alabama, 1988-89. Auburn University, Department of Fisheries and Allied Aquacultures, Auburn, AL. 62 pp.

Dillard, E. 2011. Email concerning review of mining permits issued by Alabama Department of Environmental Management for areas of Mulberry Fork within range of Black Warrior waterdog. Black Warrior Riverkeeper, Birmingham, Alabama. January 14, 2011, to Linda LaClaire, U.S. Fish and Wildlife Service, Jackson, Mississippi Field Office.

Dodd, C.K., K.M. Enge, and J.N. Stuart. 1988. Aspects of the biology of the flattened musk turtle, *Sternotherus depressus*, in northern Alabama. *Bulletin of the Florida State Museum, Biological Sciences* 34:1-64.

Drennen, D. 2011. Personal interview, U.S. Fish and Wildlife Service, Jackson, Mississippi. April 1, 2011, with Linda LaClaire, U.S. Fish and Wildlife Service, Jackson, Mississippi Field Office.

Duellman, W.E. and L. Trueb. 1986. *Biology of Amphibians*. McGraw-Hill Book Company, New York, New York. 670 pp.

Durflinger-Moreno, M.C., C. Guyer, and M.A. Bailey. 2006. Distribution and population biology of the Black Warrior waterdog, *Necturus alabamensis*. *Southeastern Naturalist* 5:69-84.

Dundee, H.A. 2005. *Necturus punctatus* (Gibbes, 1850). Dwarf waterdog. Pgs. 871-873 In: M. Lannoo (ed.), *Amphibian declines. The conservation status of United States species*. University of California Press, Berkeley and Los Angeles, CA.

Godwin, J. 2010. Email concerning annual review of candidate status for Black Warrior waterdog. Alabama Natural Heritage Program, Auburn, Alabama. March 15, 2010, with Linda LaClaire, U.S. Fish and Wildlife Service, Jackson, Mississippi Field Office.

Godwin, J. 2012. Telephone interview, Alabama Natural Heritage Program, Auburn, Alabama. February 13, 2012, with Linda LaClaire, U.S. Fish and Wildlife Service, Jackson, Mississippi Field Office.

Gunter, G. and W.E. Brode. 1964. Necturus in the state of Mississippi, with notes on adjacent areas. *Herpetologica* 20:114-126.

Guyer, C. 1997. A status survey of the Black Warrior waterdog (*Necturus* sp.). Unpublished report submitted to Alabama Department of Conservation and Natural Resources, Montgomery, AL. 16 pp. + figures and appendix.

Guyer, C. 1998. Historical affinities and population biology of the Black Warrior waterdog (*Necturus alabamensis*). Unpublished report submitted to Alabama Department of Conservation and Natural Resources, Montgomery, AL. 12 pp.

G

Guyer, C. 2005. *Necturus beyeri* Viosca, 1937. Gulf Coast waterdog. Pgs. 867-868 In: M. Lannoo (ed.), *Amphibian declines. The conservation status of United States species*. University of California Press, Berkeley and Los Angeles, CA.

Hartfield, P. 1990. Status survey for mussels in the tributaries of the Black Warrior River, Alabama. U.S. Fish and Wildlife Service, Jackson, MS. 8 pp.

Hecht, M.K. 1958. A synopsis of the mud puppies of eastern North America. *Proceedings of the Staten Island Institute of Arts and Sciences* 21:1-38.

Mettee, M.F., P.E. O'Neil, J.M. Pierson, and R.D. Suttkus. 1989. Fishes of the Black Warrior River system in Alabama. *Geological Survey of Alabama Bulletin* 133. 201 pp.

Mount, R.H. 1975. *The reptiles and amphibians of Alabama*. Agricultural Experimental Station, Auburn University, Auburn, AL. 347 pp.

Neil, W.T. 1963. Notes on the Alabama waterdog, *Necturus alabamensis* Viosca. *Herpetologica* 19:166-174.

O'Neil, P.E., and T.E. Shepard. 2001. Water-quality assessment of the Locust Fork watershed, Alabama. *Geological Survey of Alabama*. 33 pp.

Petranka, J.W. 1998. *Salamanders of the United States and Canada*. Smithsonian Institution Press, Washington, D.C. 587 pp.

Stoops, M., E. Keyster, and C. DeChant. 2010. Black Warrior waterdog summary report. Unpublished report by the Center for Conservation and Research of Endangered Wildlife, Cincinnati Zoo and Botanical Garden, Cincinnati, OH. 6 pp. + appendices

U.S. Fish and Wildlife Service (USFWS). 1990. Flattened musk turtle recovery plan. Jackson, MS. 15 pp.

U.S. Fish and Wildlife Service (USFWS). 2000. Recovery plan for Mobile River Basin Aquatic Ecosystem. Jackson, MS. 128 pp.

Upper Black Warrior Technical Task Force. 1991. Upper Black Warrior water quality improvement plan. USDA Soil Conservation Service. 34 pp.

Viosca, P., Jr. 1937. A tentative revision of the genus *Necturus*, with descriptions of three new species from the southern Gulf drainage area. *Copeia* 1937:120-138.

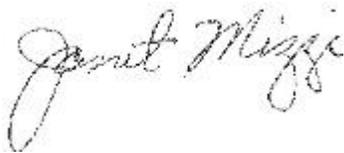
Waters, Thomas F. 1995. Sediment in streams: sources, biological effects and control. American Fisheries Society Monograph 7. 251 pp.

Wright, L.I., T. Tregenza, and D.J. Hosken. 2008. Inbreeding, inbreeding depression and extinction. *Conservation Genetics* 9:833-843.

### **Approval/Concurrence:**

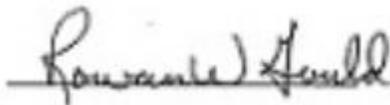
Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve:



06/12/2012  
Date

Concur:



11/06/2012  
Date

Did not concur: \_\_\_\_\_

\_\_\_\_\_  
Date

Director's Remarks: