CANDIDATE ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: Necturus alabamensis

COMMON NAME: Black Warrior waterdog

LEAD REGION: 4

INFORMATION CURRENT AS OF: February 2003

STATUS/ACTION (Check all that apply):
___ New candidate
_X_ Continuing candidate
_X_ Non-petitioned
___ Petitioned - Date petition received: ___
___ 90-day positive - FR date: ___
___ 12-month warranted but precluded - FR date: ___
_ Is the petition requesting a reclassification of a listed species?
___ Listing priority change
Former LP: ___
New LP: ___
Latest date species first became a Candidate: _____
___ Candidate removal: Former LP: ___ (Check only one reason)
___ A - Taxon more abundant or widespread than previously believed or not subject to a degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
___ F - Range is no longer a U.S. territory.
___ M - Taxon mistakenly included in past notice of review.
___ N - Taxon may not meet the Act=s definition of Aspecies.@
___ X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Amphibian - Proteidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Alabama

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Alabama

LEAD REGION CONTACT: Rick Gooch, 404/679-7124

LEAD FIELD OFFICE CONTACT: Jackson, Mississippi Field Office, Linda LaClaire, 601/321-1126

BIOLOGICAL INFORMATION (Describe habitat, historic vs. current range, historic vs. current population estimates (# populations, #individuals/population), etc.):

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). The maximum recorded length for this salamander is 248 millimeters (mm) (9.8 inches (in)) (Bailey 1995). 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). 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). The ventral surface of all age classes is plain white. The striped pattern of larvae closely resembles the mudpuppy, N. maculosus (Brode 1969, Hecht 1958).

Taxonomy

Viosca (1937) described the Black Warrior waterdog as Necturus alabamensis. In subsequent years, the name N. alabamensis was mistakenly applied to a more common species of waterdog that occurs in the lower coastal plain. This usage continued until recently when Bart et al. (1997) clarified the taxonomy of the Black Warrior waterdog. As a result, the more common species has no valid name.

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). Semi-permanent leaf beds (where they exist) are likely visited frequently (Ashton and Peavy 1986). Larvae and adults are reliably found only in these submerged leaf beds and the waterdogs may use them for both shelter and foraging habitat (Bailey 2000). Guyer (1997) analyzed habitat 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. (2003) completed an additional assessment of 113 localities surveyed for waterdogs. At a regional scale, Black Warrior waterdogs were associated with stream depths of 1 to 4 meters (3.3 to 13.1 feet), reduced sedimentation, and large leaf packs supporting mayfly and caddis fly larvae.

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. Potential waterdog habitat is expected to be similar to 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). The waterdog received little attention between the time it was described in 1937 and the mid-1980's when it was found during surveys in the Tenn-Tom Waterway (Ashton and Peavy 1985). 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, Neil 1963, Gunter and Brode 1964, Brode 1969).

Bailey (2000) conducted a habitat assessment of the 11 sites verified as Black Warrior waterdog localities prior to 1993. Only 2 records are known previous to the mid-80's. Unfortunately, these early localities have now 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, Ashton and Peavey 1985, Bailey 1992, Bailey 1995, Bart et al. 1997, Guyer 1997, Bailey 2000). Bailey 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 2 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 113 sites have been sampled for Black Warrior waterdogs since 1990 (Guyer 1997, Durflinger-Moreno et al. 2003). The species has been reported since 1990 from only 14 sites (12% success rate) in Blount, Marshall, Tuscaloosa, Walker, and Winston Counties, Alabama, despite surveys in 1990, 1991, 1992, 1994, 1996, 1997, and 1998 (Bailey 1995, Guyer 1997, 1998, Durflinger-Moreno et al. 2003). Survey sites included all stream localities within the range of the species that approached or intersected roads and had appropriate habitat. Guyer (1997) 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 data indicated that 200 additional surveys would be needed to discover a single new locality 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 1 or 2 animals were captured at survey sites with the exception of one site on the Sipsey Fork chosen for in-depth study because waterdogs were most common there (Durflinger-Moreno et al. 2003). Fifty-two waterdogs were captured at the Sipsey Fork site over a three-year period encompassing 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. The low number of subadults and larvae indicate that recruitment and survival rates are low. This implies that high mortality at the egg, larval, and/or juvenile stage, migration of these age classes out of the population, and/or longevity of adult waterdogs are affecting the age class distribution of the population (Durflinger-Moreno et al. 2003). The viability of any Black Warrior waterdog population, including the Sipsey Fork population, is unknown.

THREATS (Describe threats in terms of the five factors in section 4 of the ESA providing specific, substantive information. If this is a removal of a species from candidate status or a change in listing priority, explain reasons for change):

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 (1995) considered water quality degradation to be the primary reason for the extirpation of this species over much of its historic 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, 1995, Guyer 1997).

Sources of point and nonpoint pollution in the Black Warrior River Basin (Basin) have been numerous and widespread. Water quality, and the resident aquatic fauna, have declined as a result. 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). Poultry and cattle feedlots are other major contributors of pollution to the drainage (Deutsch et al. 1990).

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, Hartfield 1990), and populations of the flattened musk turtle (U.S. Fish and Wildlife Service 1990), have been extirpated from large areas of the watershed due primarily to water quality degradation.

Mettee et al. (1989) noted the absence of at least nine fish species from streams draining the Birmingham metropolitan area where they were previously common. These species were otherwise abundant and easily collected in the lower Sipsey, Mulberry, and Locust Forks. Hartfield (1990) documented the extirpation of most species of mussels from tributaries of the Black Warrior River. He conducted extensive surveys of sites where mussels had been collected previously. Although historically the Basin supported at least 45 species, only 5 species of live or fresh dead mussels were found on the Locust Fork, 6 species on the Mulberry Fork and its tributaries, and 6 species on the Sipsey Fork. Locust Fork tributaries had little evidence of an extant unionid fauna (mussels in the family Unionidae). This was reflected in the lack of mussel shell in muskrat middens (refuse heaps), which were composed entirely of Corbicula.
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). 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). 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). Old, abandoned mines will continue to contribute pollutants to streams for the foreseeable future. At present levels of manpower and funding, it will take 166 years to reclaim known mines in the Basin (W. Cartwright, Alabama Department of Industrial Relations, pers. comm. 1999).

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, U.S. Fish and Wildlife Service 2000). 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.

Dodd et al. (1986) concluded that sedimentation in the upper Black Warrior River system 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. Habitat degradation is the primary factor that has reduced the distribution of viable flattened musk turtle populations to an estimated 15 percent of their historical distribution in the upper Black Warrior system (U.S. Fish and Wildlife Service 1990). Black Warrior waterdogs have probably experienced similar declines. They are vulnerable to sedimentation since they spend virtually all of their lives at the stream bottom. Therefore, they are in almost constant contact with any toxic sediments that may be present (Bailey 1995).

Creation of large impoundments within the Basin has flooded thousands of square hectares (acres) of habitat previously considered appropriate for the Black Warrior waterdog. 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 and flyers have been circulated (offering a reward for the species) to 187 bait shops, marinas, conservation officers, and other individuals throughout the target area (Bailey 1995, Guyer 1997). As a result of these efforts, only three Black Warrior waterdogs have been reported from impoundments (Bailey 2000). 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.
Hartfield (1990) 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. At least 32 km (20 mi) of the lower reach of the Locust Fork, 64 km (40 mi) of the lower Mulberry Fork, 48 km (30 mi) of the North River, and 48 km (30 mi) of the Sipsey Fork (and at least as many kilometers of its tributaries) have been impounded or are affected by impoundments.

The Sipsey Fork is the best remaining locality for the Black Warrior waterdog (Guyer 1998). Bailey and Guyer (1998) recently 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.

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 State of Alabama provides no protection for the Black Warrior waterdog (J. Godwin, Alabama Natural Heritage Program, pers. comm. 1999). The Federal Surface Mining Control and Reclamation Act of 1977 and the Clean Water Act of 1972 have been ineffective in preventing the continued decline of species in the Black Warrior Basin (Dodd et al. 1986, Mettee et al. 1989, Hartfield 1990, Bailey and Guyer 1998, U.S. Fish and Wildlife Service 2000).

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. The fragmentation of habitat renders populations vulnerable to catastrophic events such as flood, drought, or chemical spills. In addition, if stream quality improves within areas of the Basin, impoundments and polluted reaches will act as barriers to reestablishment of Black Warrior waterdog populations.

FOR RECYCLED PETITIONS:

a. Is listing still warranted? ___
b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? ___
c. Is a proposal to list the species as threatened or endangered in preparation? ___
d. If the answer to c. above is no, provide an explanation of why the action is still precluded.

LAND OWNERSHIP (Estimate proportion Federal/state/local government/private, identify non-private owners):

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

PRELISTING (Describe status of conservation agreements or other conservation activities):

None.

REFERENCES (Identify primary sources of information (e.g., status reports, petitions, journal publications, unpublished data from species experts) using formal citation format):

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.

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 Herpetolgy 31:192-201.

Bishop, S.C. 1943. Handbook of salamanders. Comstock Publishing Company, Inc., Ithaca, NY.

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

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.

Dodd, C.K., Jr. 1990. Effects of habitat fragmentation on a stream-dwelling species, the flattened musk turtle, Sternotherus depressus. Biological Conservation 54:33-45.

Dodd, C.K., K.M. Enge, and J.N. Stuart. 1986. The effects of mining siltation on the distribution and abundance of the flattened musk turtle, Sternotherus depressus, in northern Alabama. Denver Wildlife Research Center, Gainevsille, FL 82 pp.

Durflinger-Moreno, M.C., M. Bailey, and C. Guyer. 2003. Distribution, habitat use, and population ecology of the Black Warrior waterdog, Necturus alabamensis. Unpublished manuscript. 39 pp.

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

Guttman, S.I., L.A. Weight, P.E. Moler, R.E. Ashton, B.W. Mansell, and J. Peavy. 1990. An electrophoretic analysis of Necturus from the southeastern United States. Journal of Herpetology 24:163-175.

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.

Guyer, C. and M. Durflinger. 1999. A demographic study of the Black Warrior waterdog (Necturus alabamensis):Final report. Unpublished report submitted to the Alabama Department of Conservation, Montgomery, AL. 9 pp.

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.

Maxson, L.R., P.E. Moler, and B.W. Mansell. 1988. Albumin evolution in salamanders of the genus Necturus (Amphibia: Proteidae). Journal of Herpetology 22:231-235.

Mettee, M.F., P.E. O=Neill, 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.

Mount, R.H. 1981. The status of the flattened musk turtle, Sternotherus minor depressus Tinkle and Webb. Unpublished report to the U.S. Fish and Wildlife Service, Jackson, MS. 119 pp.

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

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

Shepard, T.E., P.E. O=Neil, and S.W. McGregor. 1997. Biological assessment of the Locust Fork system, 1997. Unpublished report submitted to Alabama Department of Conservation and Natural Resources by Geological Survey of Alabama, Tuscaloosa, AL. 37 pp.

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.

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.

LISTING PRIORITY (place * after number)

THREAT

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

Rationale for listing priority number:

Magnitude: Many streams of the Black Warrior basin are biologically depauperate due to water quality degradation from point and nonpoint-source pollution. This situation is pervasive and problematic.

Imminence: Water quality degradation in the Black Warrior basin is insidious but is not expected to be catastrophic.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all additions of species to the candidate list, removal of candidates, and listing priority changes.

Approve: Linda Kelsey — March 14, 2003
Acting Regional Director, Fish and Wildlife Service — Date

Concur: _____ _____
Director, Fish and Wildlife Service — Date

Do not concur: _____ _____
Director, Fish and Wildlife Service — Date

Director's Remarks: _____

_____

_____

Date of annual review: February 2003
Conducted by: Linda LaClaire - Jackson, Mississippi FO

Comments:

_____

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