Black Warrior Waterdog
(*Necturus alabamensis*)

5-Year Status Review:
Summary and Evaluation

An adult Black Warrior waterdog. Photo by: Joe Jenkins, Alabama Natural Heritage Program

U.S. Fish and Wildlife Service
Southeast Region
Alabama Ecological Services Field Office
Daphne, Alabama

June 2024

5-YEAR STATUS REVIEW
Black Warrior waterdog (*Necturus alabamensis*)

GENERAL INFORMATION

Current Classification: Endangered

Lead Field Office: Alabama Ecological Services Field Office, Evan Collins

Reviewers:
Lead Regional Office: Southeast Region, Carrie Straight

Date of original listing: February 2, 2018 (83 FR 257 284; January 2, 2018)

Critical Habitat: January 2, 2018 (83 FR 257).

Methodology used to complete the review:
In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a status review is to assess each threatened species or endangered species to determine whether its status has changed and if it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants (50 CFR 424.11). The U.S. Fish and Wildlife Service (Service) evaluated the best available information about the Black Warrior waterdog's biology, habitat, and threats of to inform this status review.

Information summarized in this review include information from the final listing rule, published and unpublished reports, field observations, and personal communications from recognized experts in the field along with information from a Species Status Assessment Report (Black Warrior Waterdog Species Status Assessment, Service 2018, entire) that was developed by the Service and species experts. The SSA is a peer-reviewed document that represents our evaluation of the best available scientific information regarding the biology, life history, and condition of the species. In addition to the Service, the core team responsible for the SSA included species experts from organizations such as the Alabama Natural Heritage Program, Conservation Southeast, Auburn University. We published an announcement in the Federal Register requesting information on this species on May 13, 2022 (87 FR 29364), and a 60-day comment period was opened. In response, we received no public comments. This review was completed by the U.S. Fish and Wildlife Service, Alabama Ecological Services Field Office, Daphne, Alabama. All literature and documents used for this review are on file at the Field Office. All comments received were evaluated and incorporated into this final document as appropriate. All recommendations resulting from this review are the result of thoroughly reviewing the best available information on the Black Warrior waterdog.

FR Notice citation announcing the species is under active review:
May 12, 2022 (83 FR 29364)

Species' Recovery Priority Number at start of 5-year review (48 FR 43098):
5. The Black Warrior waterdog is a species with a high degree of threat and a low recovery potential.

Review History:
This is the first 5-year status review for this species.

REVIEW ANALYSIS

Listed Entity

Taxonomy and nomenclature
We are not aware of any changes to the taxonomy of this entity, and it is still considered valid by the Service.

Distinct Population Segment (DPS) (61 FR 4722)
The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate wildlife. This species was not listed as a DPS, and we have no new information that would indicate the species should be listed as a DPS under the Service's 1996 DPS Policy.

Recovery Criteria

Recovery Plan or Outline
At the time of this review, recovery criteria for this species have not been finalized.

Biology and Habitat Summary

The Black Warrior waterdog is a large, aquatic salamander that retains larval characters throughout its life, including large, well-formed gills. It can reach a length of approximately 10 inches (248 millimeters). Larvae of the species exhibit bold dark and light stripes that run the length of the body, while adults are typically more uniformly dark with varying amounts of spotting on the back and sides. The range of the Black Warrior waterdog is limited to the Black Warrior River watershed upstream of the fall line in Blount, Marshall, Tuscaloosa, Walker, and Winston counties, AL (Figure 1).

The Black Warrior waterdog is a cryptic species that is difficult to detect. Brushy Creek and Sipsey Fork, within the Bankhead National Forest remain the two streams where the species is most likely to be detected using standard techniques (Table 1 and Table 2). The largest single collection of Black Warrior waterdog (135 individuals) occurred in 1938 and has attributed to the Black Warrior River near Cordova, AL (Bart et al. 1997, p. 138). As this location is at the mouth of Cane Creek and upstream of the mouth of the Locust Fork, it is more accurately considered to be the Mulberry Fork. If the location is accurate, this site likely no longer supports the species due to habitat modification.

The mainstem of the Black Warrior River was heavily modified in the 19th century to facilitate commerce by barge through the construction of a series of 14 locks and dams. In the 1930s, these structures were replaced with a series of four locks and dams. Construction on Smith Dam located on the Sipsey fork began in 1957 and was dedicated in 1961. These projects altered and removed much of the lotic habitat from the watershed that the species would have utilized. Populations of the Black Warrior waterdog that persisted through this period of alteration were found in the tributaries that remained largely unaffected by impoundments and channelization.

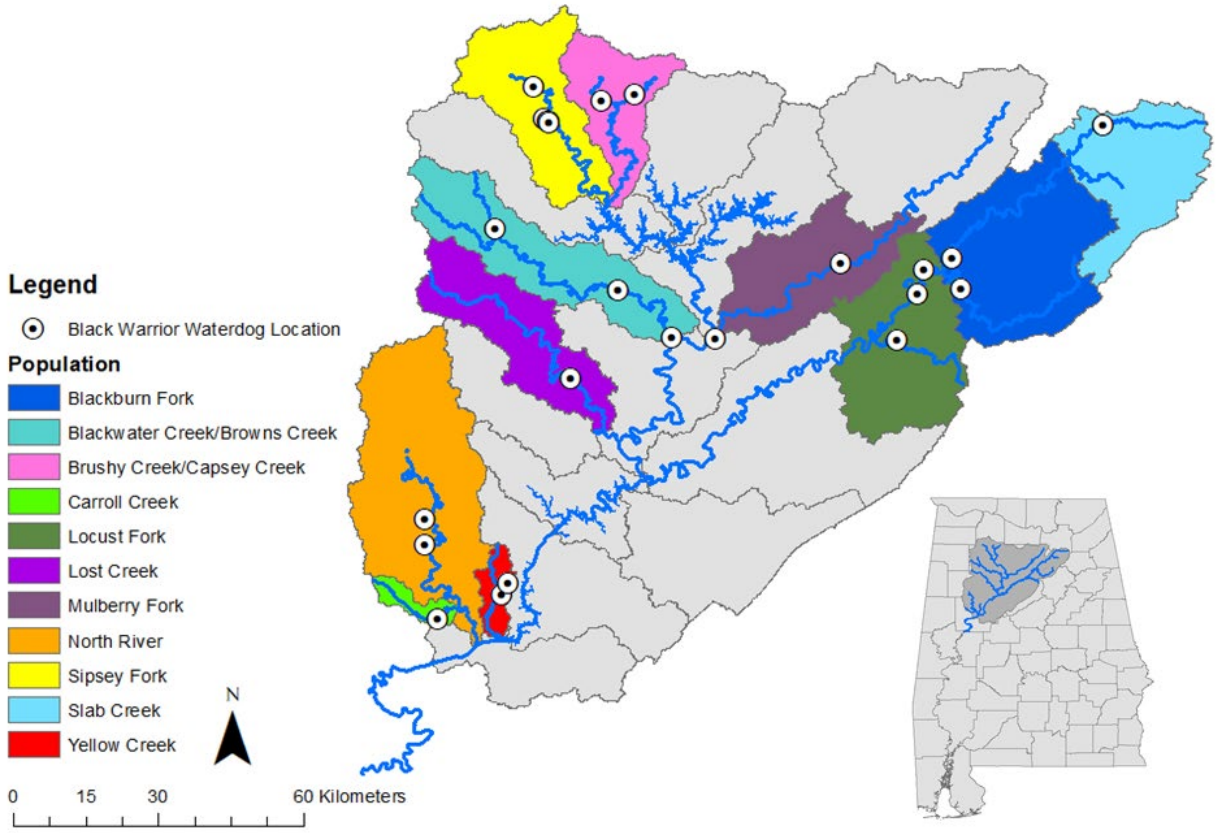

Figure 1. Range of the Black Warrior waterdog in the upper Black Warrior River watershed with 11 known populations depicted.

Table 1. Capture rates reported as captures per trap night in two streams. Total individuals caught in parentheses.

Population	**Status**	**2012-2016 Capture Rate†**	**2024 Capture Rate**
Sipsey Fork	Extant	*0.017 (7)*	*0.0829 (29)*
Brushy Creek	Extant	*0.021 (3*)*	*0.0075 (3)*
Source		*Godwin 2016*	*Jenkins and Godwin 2023*

†Capture rates from 2012-2016 are calculated using data only from the named stream.

**A fourth record from Brushy Creek was reported from the 2012-2016 time period but this animal was not captured during the targeted trapping efforts.*

Subbasins/Populations. Eleven populations have been delineated in tributaries and river reaches throughout upper Black Warrior River and based on geographic proximity and isolation. The locality of the type specimen of the species is identified as the Black Warrior River at

Tuscaloosa, indicating a twelfth population. The twelve known populations have been clustered into four subbasins or representation units (e.g., Sipsey Fork, Mulberry Fork, Locust Fork, and Upper Black Warrior River; Table 2; Service 2018, pp. 24-25 and 41).

Sipsey Fork. Populations in the Sipsey Fork subbasin produce the highest number and most consistent observations of the species (Table 1 and Table 2). The two populations, one in Sipsey Fork and the other in Brushy Creek, also provide the highest water quality and best habitat (Bailey 2000, pp. 11-13; Godwin 2013, pp. 8, 39-40, 44-51; Service 2018, pp. 31-33).

Mulberry Fork. Available information suggests that the species has declined substantially in the Mulberry Fork subbasin due to a lack of observations (Table 2) and declines in water and habitat quality (Mettee et al. 2002, pp. 59-62). Anecdotal reports for the species indicated a likely population persisted in the Mulberry Fork mainstem into the 1990s; however, environmental conditions have not been definitively classified into a suitability category (Bailey 2000, pp. 9-10; Godwin 2013, pp. 21-23; Service 2018, pp. 32-33). Presence of the Black Warrior waterdog has been confirmed in Blackwater Creek, providing evidence of an extant population, from detections of its DNA in water samples (environmental DNA (eDNA)) (Table 2). Like the Mulberry Fork, environmental conditions were difficult to categorize in Blackwater Creek but appeared poor (Bailey 2000, pp. 9; Godwin 2013, pp. 36, 41-43; Service 2018, pp. 31). Along with the mainstem Mulberry Fork population, the Lost Creek population is considered extirpated at this time.

Locust Fork. Continued presence of the Black Warrior waterdog in the Locust Fork subbasin is supported from detections of its eDNA in the Locust Fork population and Blackburn Fork population, although, the species hasn't been observed directly since the 1990s (Table 2). Habitat degradation has been observed throughout the subbasin, though the Locust Fork and Blackburn Fork are considered to provide moderately suitable conditions for populations of the species (Bailey 2020, pp. 16-18; Godwin 2013, pp. 10-19; Service 2018, pp. 30-32). The Slab Creek population in this subbasin is considered extirpated at this time.

Upper Black Warrior River. Detection of eDNA and the observation of a single individual from Yellow Creek confirms the presence of the Black Warrior waterdog in the Upper Black Warrior River subbasin. Yellow Creek is reported to have poor habitat and water quality conditions (Bailey 2000, pp. 15; Godwin 2013, pp. 33-35; Service 2018, pp. 33). The species is considered likely extirpated from the North River and Carroll Creek populations since the species has not been reported since the 1990s, even though habitat in those populations has been assessed as good and moderate (Bailey 1992, pp. 22; Bailey 2000, pp. 14; Godwin 2013, pp.28-29; Service 2018, pp. 31-33). One additional population, Black Warrior River, was not assessed in the species status assessment (Service 2018, entire). The type specimen of the Black Warrior waterdog was collected from the Black Warrior River in Tuscaloosa in 1914. Due to the substantial habitat modification that has taken place since that time, it is unlikely that the species still occurs here. This population is currently considered extirpated but is included include all known records. This record provides further evidence of the species' historical distribution that included the mainstem of the Black Warrior River above the Fall Line.

Genetic Information. In 2021, genetics from two subbasins (Sipsey Fork and Upper Black Warrior River) and three populations (Sipsey Fork, Brushy Creek, and Yellow Creek) were

analyzed (Apodaca and Krohn 2021, unpaginated). The results of this effort indicated that the species exhibits extremely low genetic diversity across its range with low levels of genetic structuring. The limited structuring that was observed provides support for the delimitations of identified populations and further clustering into subbasins (or representation units) (Apodaca and Krohn 2021, unpaginated). However, the results of this study show that unique and useful genetic diversity is unlikely to exist in each delimited subbasin. Additional information from Locust Fork would help support this conclusion. Further, while genetic diversity is low and is approximately one-half the level of diversity observed in a sister taxon (Murphy 2016, pp. 24), data do not support evidence of pervasive inbreeding (Apodaca and Kronhn 2021, unpaginated). However, such low levels of diversity still have ramification on resiliency and representation and reduces adaptive potential. This study also estimated an effective population size, as a species, at 236.2 (172.5-370.8; 95% parametric confidence interval) (Apodaca and Krohn 2021, unpaginated). An effective population size below 500 indicates genetic drift is likely a strong force on the population, furthering the loss of genetic diversity and creating a long-term risk of extinction (Franklin 1980, entire).

Of note, eDNA sampling is a newer technique to detect species occurrence where captures using more traditional techniques may be difficult or when the species is very rare on the landscape. To summarize information provided above, two populations in the Locust Fork subbasin (Locust Fork and Blackburn Fork populations) and one population in the Mulberry Fork subbasin have been confirmed by eDNA with no recent direct observations, indicating the presence, but likely rarity of the species in those populations. Presence of the species in Yellow Creek (Upper Black Warrior River subbasin) has been confirmed by a single individual and eDNA detection. The Sipsey Fork and Brushy Creek populations have been confirmed by both eDNA detection and direct observation of individuals.

Table 2. Records of Black Warrior waterdog by population over time. (Note gaps in timeline when no records are known, 1940-1980 and 2002-2010).

Representation Unit	Population	Status	1910-1940	1980-1989	1990-2001	2010-2018	2019-2024
Sipsey Fork	Sipsey Fork	Extant	***0***	***0***	***59***	***14 (+eDNA detected)***	***31***
Sipsey Fork	Brushy Creek	Extant	***0***	***0***	***4***	***4 (+eDNA detected)***	***4***
Mulberry Fork	Mulberry Fork	Likely Extirpated	***136***	***0***	***1***	***0***	***0***
Mulberry Fork	Blackwater Creek	Extant	***0***	***0***	***5***	***0 (+eDNA detected)***	***0***
Mulberry Fork	Lost Creek	Likely Extirpated	***0***	***0***	***2***	***0***	***0***
Locust Fork	Slab Creek	Likely Extirpated	***0***	***0***	***1***	***0***	***0***
Locust Fork	Locust Fork	Extant	***0***	***"Several"***	***0***	***0 (+eDNA detected)***	***0***

Representation Unit	Population	Status	1910-1940	1980-1989	1990-2001	2010-2018	2019-2024
Locust Fork	Blackburn Fork	Extant	***0***	***16***	***2***	***0 (+eDNA detected)***	***0***
Upper Black Warrior River	North River	Likely Extirpated	***0***	***0***	***1***	***0***	***0***
Upper Black Warrior River	Yellow Creek	Extant	***0***	***0***	***1***	***1 (+eDNA detected)***	***0***
Upper Black Warrior River	Carroll Creek	Likely Extirpated	***0***	***0***	***1***	***0***	***0***
Upper Black Warrior River	Black Warrior River	Likely Extirpated	***1***	***0***	***0***	***0***	***0***
	Total		***137***	***17***	***77***	***19 (+eDNA)***	***35***
	Source	Service 2018	Viosca 1937; Bart et al. 1997	Ashton and Peavy 1985; Bailey 2000	Bailey 2000; Moreno et al. 2006	Godwin 2013; Godwin 2015; Godwin 2016; de Souza et al. 2016; Baker 2024	Jenkins and Godwin 2023; Baker 2024

Threats (Five-Factor Analysis) Summary

The status of a species is determined from an assessment of factors specified in section 4 (a)(1) of the Act, including: Factor A: the present or threatened destruction, modification, or curtailment of its habitat or range; Factor B: overutilization for commercial, recreational, scientific, or educational purposes; Factor C: disease or predation; Factor D: the inadequacy of existing regulatory mechanisms; Factor E: other natural or manmade factors affecting its continued existence. A summary of this assessment is detailed below.

The final listing rule described threats to the Black Warrior waterdog as loss of habitat and degradation of water quality from point and non-point source pollution, urbanization, legacy effects of past forestry operations and other land use practices, surface coal mining, sedimentation, and impoundments (Factor A; 83 FR 257). Recent information shows that these threats remain ongoing, severe, and occur throughout the species range, and we expect this threat to continue in the future.

The final listing rule found no indication that overutilization for commercial, recreational, scientific, or educational purposes (Factor B) or disease and predation (Factor C) poses a significant threat for the species. However, the increasing prevalence of novel diseases in other waterdog species (Glorioso et al. 2017, pp. 362) and amphibian taxa across North America (Rothmerel et al. 2008, p. 5) and the catastrophic consequences resulting from outbreaks of such diseases (Lips et al. 2006, pp. 3164-3166) indicate that this threat (Factor C) needs to be closely monitored.

The final listing rule cited the continued decline of many species, including the flattened musk turtle, fishes, and a number of mussels in the Black Warrior Basin, attributed to mining activities (Dodd et al. 1988, pp. 55–61; Mettee et al. 1989, pp. 12–13; Hartfield 1990, pp. 1–8, Bailey and Guyer 1998, pp. 77–83; Service 2000, pp. 12–13), even with the implementing regulations of the

Surface Mining Control and Reclamation Act of 1977, as amended December 22, 1987, in effect. Further, the final rule described the inadequacy of water quality standards and their enforcement to maintain conditions capable of supporting the Black Warrior waterdog. Both are examples of Factor D (83 FR 257) and remain ongoing, severe, and occur throughout the species range, and we expect this threat to continue in the future.

A threat cited in the final rule for the species under Factor E (83 FR 257) was reduced population size, fragmentation, reduced genetic diversity and the potential for inbreeding (Factor E). Further, the rule predicted that the effective population size was likely lower than the number need to maintain genetic diversity. As discussed above, effective population size appears limited and indicates there may be genetic concerns for the species (see Genetic Information above). Additionally, increased droughts due to climate change (Factor E, 83 FR 257) was identified as a future threat to the Black Warrior waterdog. Available information indicates the magnitude of this threat will continue to increase in the future. While changes in precipitation are difficult to predict for Alabama, increased temperatures will accelerate loss of soil moisture and are expected to increase the intensity of naturally occurring droughts (Runkle et al. 2022, p. 4). Alabama's second driest year on record was 2007 and the second driest three-year period occurred form 2006-2009 (Runkle et al. 2022, p. 3). While this period was succeeded by the second wettest year on record in 2009 (Runkle et al. 2022, p. 3), oscillation between extreme conditions is not expected to benefit the Black Warrior waterdog. Given the low abundance and disjunct populations, the species would be unlikely to rebound from prolonged droughts.

Synthesis

The Black Warrior waterdog is a large, aquatic salamander that retains well developed, feathered gills throughout its life. The Black Warrior waterdog is limited to the Black Warrior River watershed upstream of the Fall Line in northern Alabama. There are currently six extant and six presumed extirpated populations of the Black Warrior waterdog found in four subbasins in the Black Warrior River watershed. Of these six, the species can be found most consistently in two populations in the same subbasin (Sipsey Fork and Brushy Creek). However, available data suggests the species has low abundance even in the populations where they have been most consistently detected. Information on the genetics of the species indicates that there is overall low diversity; low genetic diversity, low abundance, and lack of connectivity continue to be a concern for this species. Loss and continued degradation of habitat and water quality attributed to adjacent land use continue to threaten the species throughout its range. Furthermore, low abundances and genetic diversity exacerbate population demographics of the species and limit natural recovery. Increases in severe drought continue to be a concern for future conditions of the species as does the potential for novel amphibian disease. Because of ongoing threats and the current condition of the species, the Black Warrior waterdog continues to meet the definition of an endangered species.

RECOMMENDED FUTURE ACTIVITIES

This species does not have a final recovery plan. While completing this status review, we have identified the following potential recovery activities which are included below.

Recovery Activities

1. Determine relative contribution of specific stressors to declines.
2. Identify and implement solutions for eliminating excessive sedimentation and restoring habitat quality.
3. Regularly monitor water quality parameters and identify and implement solutions to improve water quality into ranges suitable to the Black Warrior waterdog.
4. Protect and enhance habitat using available mechanisms including land acquisition programs, conservation agreements, and management agreements.
5. Conduct a comprehensive threats analysis in currently occupied streams.
6. Develop and initiate disease monitoring program and minimize effects of disease to the species.
7. Develop captive propagation plan that includes genetic conservation and release components.

Monitoring and Research Activities

1. Conduct life history and demographic studies.
2. Continue research on the species population genetics.
3. Conduct research to inform whether and how habitat can be enhanced through active management.
4. Monitor populations to assess long-term trends while considering and minimizing negative effects to habitat. Population monitoring should include habitat assessments.
5. Conduct field surveys to identify whether additional populations exist and better define range extent and estimate abundance of existing populations using traditional and eDNA methods.

REFERENCES

Ashton, R.E. and B. Peavy. 1985. Tenn-Tom Waterway *Necturus* Project. A report submitted to the Alabama Department of Conservation and Natural Resources.

Apodaca, J.J. and A.R. Krohn. 2021. Conservation genetics and population assessment for the federally endangered Black Warrior waterdog (*Necturus alabamensis*). A report submitted to the Alabama Department of Conservation and Natural Resources.

Baker, J. 2004. Personal communication. Biologist, Alabama Power Company. Electronic mail correspondence between Baker to Collins, Alabama Ecological Services Field Office, detailing recent observations of the Black Warrior waterdog. April 1, 2024.

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

Bailey, M.A. 2000. Habitat assessment of known occurrences, Black Warrior waterdog (*Necturus alabamensis*). Conservation Services Southeast report to U. S. Fish and Wildlife Service. Shorter, AL. 26 pp.

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.

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

de Souza, L.S., J.C. Godwin, M.A. Renshaw, and E. Larson. 2016. Environmental DNA (eDNA) detection probability is influenced by seasonal activity of organisms. PLoS ONE. doi:10.1371/journal.pone.0165273.

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

Franklin, I.R. 1980. Evolutionary change in small population in: M. E. Soule and B. A. Wilcox (eds.), Conservation Biology: An EvolutionaryEcological Perspective. Sunderland, Mass.: Sinauer Associates. pp. 135 – 140

Glorioso, B.M., J.H. Waddle, and C.L. Richards-Zawacki. 2017. Prevalence of *Batrachochydrium dendrobatidus* and *B. salamandrivorans* in the Gulf Coast waterdog, *Necturus beyeri*, from Southeast Louisiana, USA. Herpetological Review. 48(2): 360-363

Godwin, J. 2013. Black Warrior waterdog (*Necturus alabamensis*) status survey. Report submitted to U.S. Fish & Wildlife Service, Jackson, MS.

Godwin, J. 2015. Black Warrior waterdog (*Necturus alabamensis*) and flattened musk turtle (*Sternotherus depressus*) status survey using environmental DNA (eDNA). Report submitted to Alabama Department of Conservation and Natural Resources. 32 pp.

Godwin, J. 2016. Black Warrior waterdog survey *(Necturus alabamensis*) using environmental DNA and conventional sampling. Report submitted to U.S. Fish & Wildlife Service, Daphne, AL. 28 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. 8pp.

Jenkins, A.J., and J. Godwin. 2023. Flattened musk turtle and Black Warrior waterdog population status study in the Bankhead National Forest. Progress Report submitted to the U.S. Fish and Wildlife Service, Daphne, AL 44pp.

Lips, K.R., F. Brem, R. Brenes, J.D. Reeve, R.A. Alford, J. Voyles, C. Carey, L. Livo, A.P. Pessier, and J.P. Collins. 2006. Emerging infectious disease and the loss of biodiversity in a Neotropical amphibian community. Proceedings of the National Academy of Science. 103:3165–3170.

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.

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

Murphy, M.O. 2016. Population Genetic Structure of *Necturus maculosus* in Central and Eastern Kentucky. University of Kentucky. 53 pp.

Rothermel, B.B., S.C. Walls, J.C. Mitchell, C.K. Dodd Jr., L.K. Irwin, D.E. Green, V.M. Vazquez, J.W. Petranka, and D.J. Stevenson. 2008. Widespread occurrence of the amphibian

chytrid fungus *Batrachochytrium dendrobatidis* in the southeastern USA. Dis. Aquat. Org. 82:3–18.

Runkle, J., K.E. Kunkel, L.E. Stevens, R. Frankson, and S. Rayne. 2022. Alabama State Climate Summary 2022. NOAA Technical Report NESDIS 150-AL. NOAA/NESDIS, Silver Spring, MD, 4 pp. https://statesummaries.ncics.org/chapter/al/

Shepard, T.E., P.E. ONeil, S.W. McGregor, 'W.P. Henderson, Jr. 2002. Biomonitoring in the Mulberry Fork watershed, 1999-2002. Report submitted to the Alabama Department of Conservation and Natural Resources. 65 pp.

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

U.S. Fish and Wildlife Service (Service). 2018. Determination of Endangered Species Status for the Black Warrior Waterodog and Designation of Critical Habitat. Federal Register 83:257.

U.S. Fish and Wildlife Service (Service). 2018. Species Status Assessment of the Black Warrior Waterdog, v. 1.0.

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.

RESULTS / SIGNATURES

U.S. Fish and Wildlife Service
Status Review of the Black Warrior Waterdog

Status Recommendation:

On the basis of this review, we recommend the following status for this species. A 5-year review presents a recommendation of the species status. Any change to the status requires a separate rulemaking process that includes public review and comment, as defined in the Act.

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist:
____ *The species is extinct*
____ *The species does not meet the definition of an endangered or threatened species*
____ *The listed entity does not meet the statutory definition of a species*
_X_ No change needed

FIELD OFFICE APPROVAL:

Field Supervisor, Alabama Ecological Services Field Office, Fish and Wildlife Service

Approve WILLIAM PEARSON Digitally signed by WILLIAM PEARSON Date: 2024.06.28 14:10:58 -05'00'

LEAD REGIONAL OFFICE APPROVAL:
Acting for **Assistant Regional Director – Ecological Services, Fish and Wildlife Service**

Approve AARON VALENTA Digitally signed by AARON VALENTA Date: 2024.06.28 15:34:00 -04'00'