Interim Core Map Documentation for the Black Warrior Waterdog

Posted to EPA's Geoplatform: July 2025
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Documentation supplemented by the U.S. Environmental Protection Agency's (EPA) Office of Pesticide Programs

Species Summary

The Black Warrior waterdog (*Necturus alabamensis;* Entity ID #5065) is a large, aquatic, nocturnal endangered aquatic salamander and was listed as endangered in 2018 (FWS, 2018). The species is only found in permanent streams in the Black Warrior River basin in Alabama (FWS, 2018). There is a designated critical habitat for this species. Additional information is provided in **Appendix 1**.

Description of Core Map

The core map for the Black Warrior waterdog is based on critical habitat. The critical habitat for this species was recently developed by the U.S. Fish and Wildlife Service (FWS) and includes all known occupied habitat. **Figure 1** depicts the interim core map for the Black Warrior waterdog. Landcover categories within the core map area are included in **Table 1**. Landcover within the core map is predominantly a mix of different forests (deciduous, evergreen, mature) or pasture/hay. This species is entirely aquatic; therefore, these results are indicative of the landcover that surrounds the stream where it is found, rather than the actual habitat of the species. For example, the open water landcover classification only includes areas with less than 25% cover of vegetation, therefore, a stream surrounded by forests may fall under the forest landcover classification (USGS, 2024). Additionally, a review of the critical habitat showed occasional lack of precision in following the various streams' meanders, which propagates error in the land cover analysis.

The core map developed for the Black Warrior waterdog is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the Black Warrior waterdog. This core map incorporates information developed by FWS and made available to the public; however, the core map has not been formally reviewed by FWS. This interim core map may be revised in the future to incorporate expert feedback from FWS. This interim core map has a "limited" best professional judgment classification because it consists of the species' critical habitat without additions or subtractions. However, the core map is limited only to designated critical habitat based on interpretation of FWS documentation. This core map does not replace or revise any range or designated critical habitat developed by FWS for this species.

[1] CBD sent EPA a draft core map for this species before EPA released its mapping process document and example documentation. EPA supplemented the documentation and supporting analysis for consistency with EPA's most recent documentation examples made available after CBD developed its draft core map.

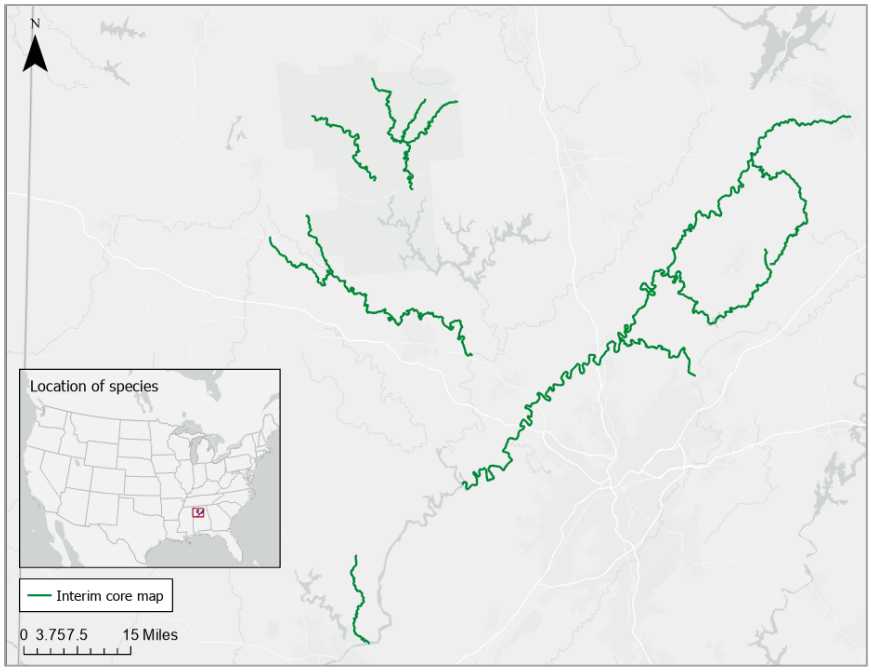

Figure 1. Interim core map for the Black Warrior waterdog. The interim core map consists of four separate units, which when combined include approximately 420 miles of streams and rivers.

Table 1. Percentage of Interim Core Map Represented by NLCD[2] Land Covers and Associated Example Pesticide Use Sites/Types.

Example pesticide use sites/types	NLCD Class/Value	% Area	Total area for landcover type
Forestry	Deciduous Forest (41)	33%	59%
Forestry	Evergreen Forest (42)	16%	16%
Forestry	Mixed Forest (43)	10%	10%
Agriculture	Pasture/Hay (81)	16%	17%
Agriculture	Cultivated Crops (82)	1%	17%
Mosquito adulticide, residential	Open space, developed (21)	6%	12%
Mosquito adulticide, residential	Developed, Low intensity (22)	4%	12%
Mosquito adulticide, residential	Developed, Medium intensity (23)	1%	12%
Mosquito adulticide, residential	Developed, High intensity (24)	1%	12%
Invasive species control	Woody Wetlands (90)	2%	12%
Invasive species control	Emergent Herbaceous Wetlands (95)	0%	12%
Invasive species control	Open water (11)	2%	12%
Invasive species control	Grassland/herbaceous (71)	4%	12%

[2] Dewitz, J., 2023, National Land Cover Database (NLCD) 2021 Products: U.S. Geological Survey data release, https://doi.org/10.5066/P9JZ7AO3

Example pesticide use sites/types	NLCD Class/Value	% Area	Total area for landcover type
Invasive species control	Scrub/shrub (52)	4%	12%
Invasive species control	Barren land (rock/sand/clay; 31)	0%	12%

Evaluation of Known Location Information

There are four datasets with known location information for this species:

- Descriptions of locations provided by FWS;
- Occurrence locations included in iNaturalist;
- Occurrence locations included in the Global Biodiversity Information Facility (GBIF); and
- Occurrence locations included in NatureServe.

EPA evaluated these four sets of data to inform or support the core map. FWS provided the most refined descriptions of the occurrence information and confirmed that all known locations of extant populations are located within the range.

iNaturalist had four research grade observations, all of which occurred since 2017. Consistent with the species range, these observations occurred within Bankhead National Forest. NatureServe included eight documented areas, all of which were consistent with the location of the species range. GBIF's occurrence data included one additional occurrence of the species, however its location is outside of the United States and as such, is not being considered for the development of this species' PULA. **Appendix 1** includes more information on the available known location information.

Approach Used to Create Core Map

The developer compiled available information for the Black Warrior waterdog from FWS as well as observational information available from various publicly available sources (discussed in previous section). The information compiled for the Black Warrior waterdog is included in **Appendix 1**. Influential information that impacted the development of the core map included:

- Current existing populations occur in locations consistent with the critical habitat;
- The species' critical habitat is highly refined.

The developer used the compiled information to identify the core map type, including the species range, critical habitat, and known location information. Comparison of known location data to the range and critical habitat and suggests that the FWS known locations of currently existing (extant) populations are consistent with the location of the designated critical habitat. The species range follows geopolitical boundaries (i.e., counties) and is not likely limited to the

areas containing habitat of the species. The range is also much larger than the areas where known locations occur. Based on this information, the developer used the designated critical habitat as the core map (https://ecos.fws.gov/ecp/).

Discussion of Approaches and Data that were Considered but not Included in the Core Map

Alternative approaches and data not documented here were not explored in the development of this interim core map.

References

- de Souza, L. S., Godwin, J. C., Renshaw, M. A., & Larson, E. 2016. Environmental DNA (eDNA) Detection Probability Is Influenced by Seasonal Activity of Organisms. *PLOS ONE, 11*(10), e0165273.

- FWS. 2018. *Black Warrior waterdog (Necturus alabamensis) Species Status Assessment Version 1.0*. November 14, 2018. U.S. Fish and Wildlife Service.

- FWS. 2023. *Draft Recovery Plan for the Black Warrior Waterdog (Nexturus alabamensis)*. Alabama Ecological Services Field Office, U.S. Fish and Wildlife Service.

- USGS. 2024. *Annual National Land Cover Database (NLCD), Collection 1, Science Product User Guide*. **LSDS-2103**. October 2024. Earth Resources Observation and Science Center, U.S. Geological Survey, Department of the Interior. Available at: https://www.usgs.gov/media/files/annual-nlcd-collection-1-science-product-user-guide.

Appendix 1. Information Compiled for Species

1. **Recent FWS Documents/Links**
   5-Year Review (2024)
   Draft Recovery Plan (2023)
   Species Status Assessment (2018)
   Listing rule & critical habitat (2018)

2. **Background information**
   - **Status:** Federally listed as endangered on 2/2/2018

   - **Taxonomy**
     Kingdom: Animalia
     Subkingdom: Bilateria
     Infrakingdom: Deuterostomia

Phylum: Chordata
Subphylum: Vertebrata
Infraphylum: Gnathostomata
Superclass: Tetrapoda
Class: Amphibia
Order: Caudata
Family: Proteidae
Genus: Necturus – Mudpuppies, Waterdogs
Species: Necturus alabamensis

- **Resiliency, Redundancy, Representation**

Resiliency:

FWS (2018) states that there are currently two Black Warrior waterdog populations with high resilience, four with moderate resilience, none with low resilience, and five historical populations that are presumed to be extirpated. Highly resilient populations had good water quality (little pollution), good habitat, and abundant waterdogs. The presumed higher abundance of Black Warrior waterdogs in Sipsey Fork and Brushy Creek in Bankhead National Forest, relative to the lower numbers detected at other sites in the species' range, indicates the importance of federally owned land for the species' recovery and long-term survival. Of the populations where waterdogs are present but not abundant, water quality varies from poor to good, but none of the habitat is considered good.

Redundancy:

FWS (2018) states that redundancy for the Black Warrior waterdog is low. Redundancy refers to the ability of a species to withstand catastrophic events and is measured by the amount and distribution of resilient populations across the species range. Catastrophic events that could severely impact or extirpate entire waterdog populations include chemical spills, changes in upstream land use that alters stream characteristics and water quality downstream, new impoundments, and potential effects of climate change like drought.

FWS (2018) states that compared to the presumed historic range (the entire Black Warrior River Basin), redundancy of the Black Warrior waterdog has dramatically declined. There are no recent or historical records of waterdogs in several HUC8 subbasins within the Black Warrior River Basin, but the waterdog likely occupied suitable streams throughout this entire Basin.

Representation:

FWS (2018) states that representation for the Black Warrior waterdog is low. Representation refers to the breadth of genetic and environmental diversity within and among populations, which influences the ability of a species to adapt

to changing environmental conditions over time. Lacking genetic diversity data for the species, representative units for the waterdog were defined as subbasins (HUC8 hydrologic units), of which the waterdog occupies four, Sipsey Fork, Locust Fork, Mulberry Fork, and Lower Black Warrior. These hydrologic units were chosen based on groupings of waterdog locations in the literature (e.g., de Souza *et al.*, 2016) and input from species experts. Although unconfirmed, long-standing genetic differences may occur across these units as a result of differences in habitat, differences in underlying geology, and genetic isolation by distance. On the other hand, there could be little to no genetic differences across these units, and representative units may not be appropriate for this species. The approach used here to discuss representation thus should be refined as future studies reveal more about the genetic diversity and structuring within the species range.

- **Habitat Description**
  According to FWS (2018), it is critical for the Black Warrior waterdog's habitat to include cold, clean, flowing water, hard stable substrate with abundant rock crevices, and leaf packs for shelter and foraging.

- **Relevant Life History Information**
  Little is known about the life history or this species (FWS, 2018). However, they are fully aquatic – spending every life stage within streams (FWS, 2018).

- **Essential Physical Biological Features for Designated Critical Habitat**
  According to FWS (2018), the physical biological features for critical habitat are: abundant rock crevices and rock slabs, lead litter, instream flow with moderate velocity and continuous daily discharge that allows for a longitudinal connectivity regime inclusive of both surface runoff and groundwater sources and exclusive of flushing flows caused by stormwater runoff.

- **Relevant Pesticide Use Sites in FWS Documents**
  While specific use sites were not discussed, the threat of water quality pollution includes the presence of pesticides from agriculture within the watershed (FWS, 2018).

- **Threats**
  Threats to this species include: water quality declines associated with point and nonpoint source pollution, habitat loss from sedimentation and impoundments, current and past land uses, and in the future, changes to water chemistry and flow from climate change (FWS, 2018).

- **Delisting Criteria**
  FWS (2023) states that the Service may consider reclassifying the Black Warrior waterdog when the following conditions are met:

    1. All six currently extant populations (Blackburn Fork, Blackwater Creek/Browns Creek, Brushy Creek/Capsey Creek, Locust Fork, Sipsey Fork, and Yellow Creek) demonstrate a stable or increasing population trend, documented through standardized survey methods for a period of 20 years. Results of trapping surveys should indicate population abundance similar to those currently considered abundant with catch per unit effort estimates between 0.017-0.029 per trap night.
    2. There is evidence of successful recruitment to maintain a sustaining population, with recruitment defined as attainment of sexual maturity by young, within all currently occupied populations.
    3. Threats in the adjacent landscape have been ameliorated such that habitat quantity and quality improves the six extant populations throughout the range and at three additional healthy, and self-sustaining populations are established through discovery or reintroduction.
    4. Occupied patches within each of the six extant populations and three introduced populations are distributed in such a manner that 1) connectivity is sufficient to maintain genetic diversity and 2) the population is resilient to stochastic event (e.g., occupied patches occur in longer reaches and within multiple tributaries).
    5. Pathogen prevalence and disease incidence should occur at sufficiently low levels such that effects on population grown and demography are insignificant.

- **Recovery Actions**
  FWS (2023) states that the recovery efforts will focus on further investigating and addressing potential causes of population declines while continuing to stabilize populations using captive propagation and a head-starting program. To investigate and address potential cause for declines, recovery efforts will focus on reducing sediment input, improving water quality, conducting outreach to increase support for species, and conducting research to identify other factors that may be contributing to declines. Recovery efforts will aim to ameliorate threats that could reduce reproduction or recruitment of young into populations, increase stress to remaining individuals in the wild, or alter habitat such that survival is reduced. Particularly important toward recovery, is the protection of sites where the species occurs at high enough numbers that it can be reliably observed.

3. **Description of Species Range**

The four units which are designated as critical habitat encompass the species' known current range (FWS, 2018). FWS (2018) delineated 11 populations of Black Warrior waterdogs. Of these 11 populations, five have been presumed extirpated (Carroll Creek, Lost Creek, Mulberry Fork, North River, and Slab Creek) due to no captures or detections within the last 20 years (Figure 2).

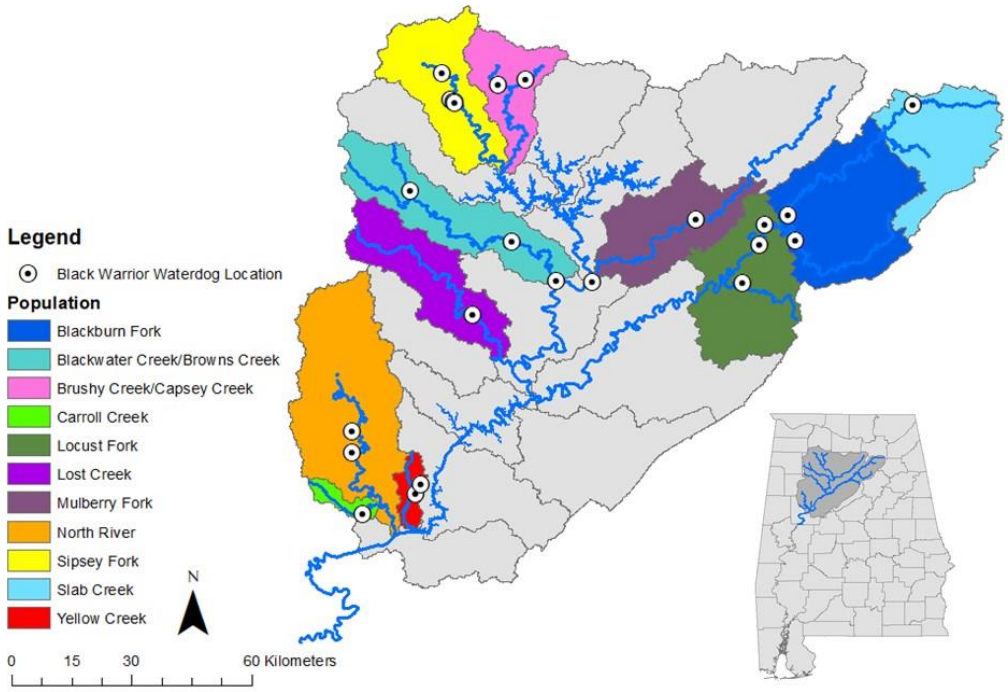

Figure 2. Black Warrior waterdog populations, defined by HUC10 hydrologic units (FWS, 2018).

4. **Critical Habitat**

As discussed in FWS (2018), there are four units which encompass the known current range of the Black Warrior waterdog and are designated as critical habitat, essential to the conservation of the species. These areas contain the essential PBFs (see bullet above).

5. **Additional Known Locations**

- iNaturalist
  - Searched on March 18, 2025.
  - Four research grade observations between November 2017 – August 2024.

- NatureServe
  - Searched on March 18,2025.

- NatureServe has eight observations that are generally consistent with the species critical habitat.

- **GBIF**
  - Searched 3/18/2025
  - In addition to iNaturalist and NatureServe observations, there was one observation that was inconsistent with the range and critical habitat of this species. This observation occurred outside of the United States and is not being considered for the interim core map development.