Dark Pigtoe
(*Pleurobema furvum*)

5-Year Status Review:
Summary and Evaluation

Dark Pigtoe, photo by Alabama Aquatic Biodiversity Center

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

August 2025

5-YEAR STATUS REVIEW
Dark Pigtoe (*Pleurobema furvum*)

GENERAL INFORMATION

Current Classification: Endangered

Lead Field Office: Alabama Ecological Services Field Office, Daphne, AL: Katherine Loesser.

Reviewers:
Lead Regional Office: Southeast Region, Carrie Straight.

Date of original listing: April 16, 1993 (58 FR 14330; March 17, 1993)

Critical Habitat: Critical habitat final rule: July 1, 2004 (69 FR 40084).

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 dark pigtoe (*Pleurobema furvum*) biology, habitat, and threats to inform this status review.

We announced initiation of this review in the Federal Register on May 11, 2023 (88 FR 30324) with a 60-day comment period and received one comment. The one public comment was from the National Council for Air and Stream Improvement (NCASI) and discussed silvicultural best practices and impacts on water quality. The Service recognizes that best management practices from forestry, agriculture, development, transportation, and other industries can reduce threats to the dark pigtoe when they are widely used and properly implemented, and we have incorporated all information provided into this final document discussed in the Threats section, as appropriate. The primary sources of information used in this analysis were the final listing rule (Service 1993), critical habitat designation (Service 2004), original and revised recovery plan (Service 2000; Service 2019a, respectively), the previous 5-year review (Service 2019b), peer-reviewed reports, agency reports, unpublished survey data and reports, and personal communication with recognized experts. This review was completed by the Service's Alabama Ecological Services Field Office, Daphne, Alabama. All literature and documents used for this review are on file at the Field Office. All recommendations resulting from this review are the result of thoroughly reviewing the best available information on the dark pigtoe.

FR Notice citation announcing the species is under active review:
May 11, 2023 (88 FR 30324)

Species' Recovery Priority Number at start of 5-year review (48 FR 43098):

5. The dark pigtoe is a species with a high degree of threat and a low recovery potential.

Review History:
Two, 5-year reviews have been published by the Service, one in 2008 and another in 2019. Both reviews recommended no change in status (Service 2008 and 2019b).

REVIEW ANALYSIS

Listed Entity

Taxonomy and nomenclature

As stated in the previous 5-year review, *Pleurobema furvum* is recognized as a junior synonym of *P. rubellum* (warrior pigtoe) based on shell morphology (Williams et al. 2008; Williams et al. 2017) and genetic analysis (Campbell et al. 2008). New genetic information further supports this synonymy (Inoue et al. 2018), and it is recognized by experts in the field (e.g., Shelton-Nix 2017; P. Johnson pers. comm. 2024), other federal agencies (e.g., U.S. Forest Service), and state agencies (e.g., Alabama Department of Conservation and Natural Resources). Until the Service assesses this new information issues a formal rulemaking, we will continue to analyze the species in this review as it was listed.

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 definition limits listing of a DPS to only vertebrate species. Because the species under review is a not a vertebrate, the DPS policy does not apply.

Recovery Criteria

Recovery Plan or Outline

Recovery Plan for Mobile River Basin Aquatic Ecosystem, November 17, 2000 (Service 2000).

Amendment to the Recovery Plan for the Endangered Dark Pigtoe (*Pleurobema furvum*), September 27, 2019 (Service 2019a).

Recovery plans are not regulatory documents. They are intended to provide guidance to the Service, States, and other partners on methods of minimizing threats to listed species and on criteria that may be used to determine when recovery is achieved. If the recovery criteria defined in the plan are still valid, meeting recovery criteria can indicate that the species no longer requires protections under the Act. However, when recommending whether a listed species should be delisted, the Service must apply the factors in section 4(a) of the Act (84 FR 45020).

The recovery criteria (Service 2019a) establish that the dark pigtoe could be considered for delisting when the following criteria are met:

1. Five (5) populations in the Black Warrior River and Cahaba River sub-basins exhibit a stable or increasing trend, natural recruitment, and multiple age classes (Factors A, C, D, and E).

2. Populations (as defined in Criterion 1) continue to occur in the Sipsey Fork and Brushy Creek basins and an additional population occurs in either the North River or Locust Fork basin to protect against stochastic and catastrophic disturbance events (Factors A, C, D, and E).

3. Threats have been addressed and/or managed to the extent that the species will remain viable into the foreseeable future (Factors A, C, D, and E).

The Service believes these criteria are appropriate and relevant; however, no criteria have currently been met.

Biology Summary

The dark pigtoe is a small- to medium-sized mussel, occasionally reaching up to 60 mm in length. The largescale stoneroller (*Campostoma oligolepis*), Alabama shiner (*Cyprinella callistia*), blacktail shiner (*Cyprinella venusta*), creek chub (*Semotilus atromaculatus*), and blackspotted topminnow (*Fundulus olivaceus*) have been confirmed as suitable hosts for propagation (Haag and Warren 1997). A small batch infection trial, with brood stock from the Locust Fork, tested several potential hosts—Alabama shiner, blacktail shiner, and tricolor shiner (*Cyprinella trichoristia*)—but only produced nine juveniles (Johnson 2018). Additional host trials was conducted in 2023 with tricolor shiners, Alabama shiners, and adding striped shiners (*Luxilus chrysocephalus*), but only tricolor shiners successfully produced juveniles (n = 66; M. Buntin pers. comm. 2024). Tricolor shiners appear to be the preferred hosts for propagation, and they are easy to collect, maintain in tanks, and successfully transform juvenile dark pigtoe (M. Buntin pers. comm. 2024). However, it should be noted that tricolor shiners are likely insignificant hosts in the wild because they only occur across a small portion of the dark pigtoe's entire range (M. Buntin pers. comm. 2024).

Habitat and Range

The dark pigtoe inhabits sand, gravel, and cobble shoals with moderate to strong currents in small to medium sized streams and rivers. Most dark pigtoe historical records are restricted to the Black Warrior River mainstem and tributaries, though there is a single record from the Cahaba River mainstem above the fall line (Williams et al. 2008). Additionally, there are several historical ovate clubshell records (*Pleurobema perovatum*) from the Cahaba River (Williams et al. 2008), which may be misidentified dark pigtoe (P. Johnson pers. comm. 2025).

In the past 20 years, the dark pigtoe has been confirmed in the Sipsey Fork (Winston County), Brushy Creek (Winston/Lawrence County), Locust Fork (Blount/Jefferson County), and North River (Fayette County) drainages, all of which are designated as critical habitat for the dark pigtoe and occur within the Black Warrior River Basin (Service 2004; Service 2019b; Figure 1). McGregor et al. (2013) reported a weathered dead shell of a possible dark pigtoe from Davis Creek, a direct tributary to the Black Warrior River, near Tuscaloosa, Alabama.

Since the last 5-year review, there have been 15 new records of dark pigtoe, for a total of 70+ observed individuals from within the historic range (Figure 2). These records came from Sipsey Fork, Brushy Creek, and Locust Fork (Figure 2).

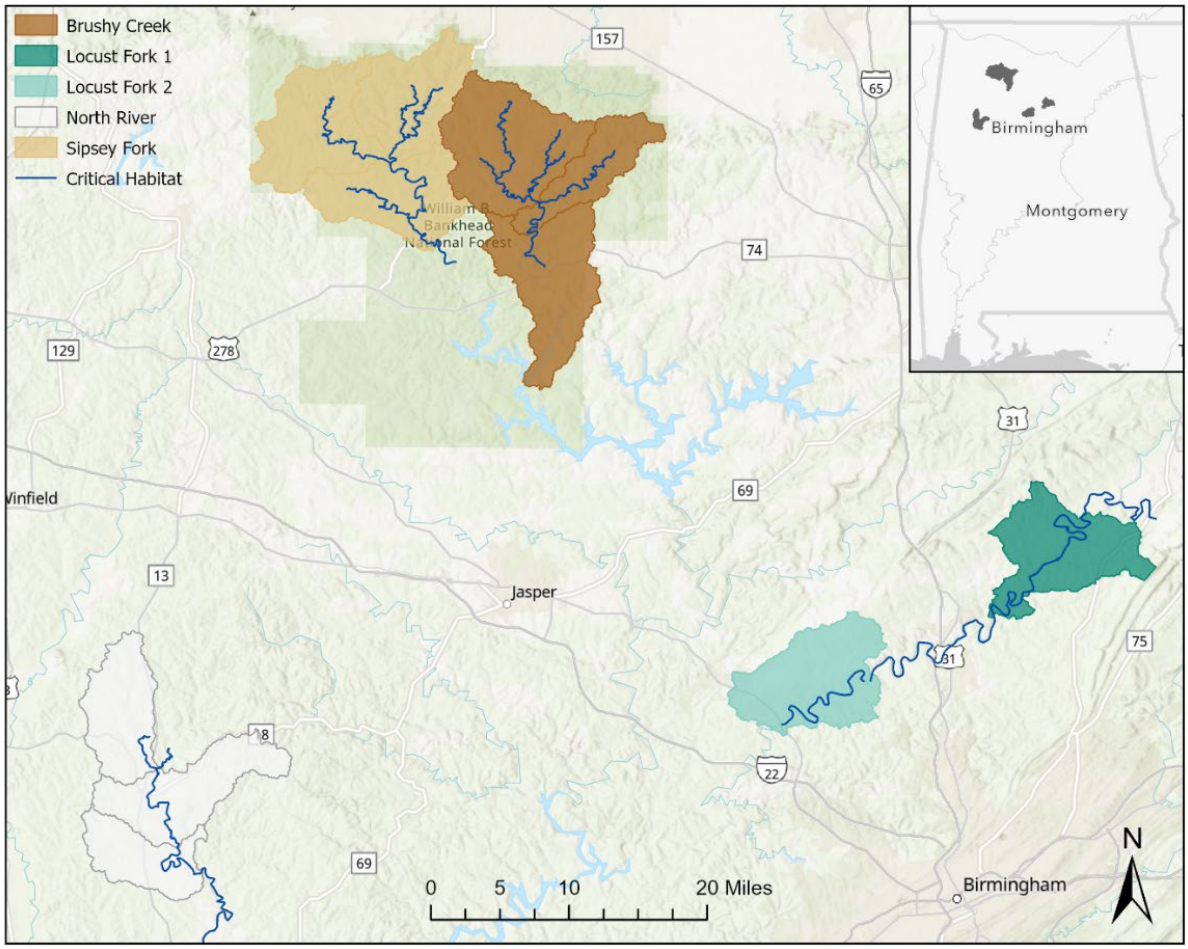

Figure 1. Map of the current range of the dark pigtoe.

Sipsey Fork

Sipsey Fork has had periodic dark pigtoe records since listing in 1993. In 2019, there were "quite a number" of dark pigtoe observed in the Sipsey Fork (P. Johnson pers. comm. 2019; Figure 1). These 2019 records suggest continued persistence of this population.

Brushy Creek

The Brushy Creek population has remained one of the most robust, continuing to show viability with recent recruitment and composition of multiple age classes (Moran 2015). Brushy Creek had the most recorded observations of any location since the last 5-year review and was the most frequently surveyed population during this period (Figure 2). All observations were made near areas with previous records, suggesting continued persistence.

In 2020, three individuals and one relic shell were documented in Brushy Creek (Moran 2020). In 2021, one individual was observed in Rush Creek (Johnson 2021) and 46 individuals were

observed in a reach surveyed in 2015 (Moran 2021). The total number of dark pigtoe individuals and catch per unit effort were higher in 2021 compared to 2015, and it was the second most abundant species recorded in the 2021 survey (Moran 2021), suggesting that the population may have recovered from the drought-induced setbacks of 2000 (Haag and Warren 2008). Both the 2015 (n = 29, shell length 28-57 mm) and 2021 (n = 46, shell length 26-50 mm) surveys provided evidence of recent recruitment through the presence of multiple age classes (Moran 2015, Moran 2021). In 2022, fresh dead and relic shells were found in Brushy Creek (Moran 2022) as well as three live individuals (Service 2022 unpublished data). Most recently, in 2023, three individuals (shell length 37-47 mm) were observed in Rush Creek (Moran 2023).

Locust Fork

There have been three dark pigtoe records in the Locust Fork upstream of I-65 (referenced here as Locust Fork 1) since the last 5-year review (Figures 1 and 2). Individuals were observed in 2019 (n = 3; M. Buntin pers. comm. 2024), 2020 (n = 2; Buntin et al. 2021), and 2024 (n = 4; M. Buntin pers. comm. 2024), and all were <2.5 river miles from the previous records for this population (observed in 2014-2015). One of the 2024 individuals was a gravid female. The individual was brought to the Alabama Aquatic Biodiversity Center, released approximately 3500 mature glochidia to use for host trials, then was returned to the collection site. The trial was then conducted with tricolor shiners, striped shiners, and Alabama shiners (*Cyprinella callistia*), but only tricolor shiners successfully produced juveniles (n = 66; M. Buntin pers. comm. 2024).

One individual likely representing a second Locust Fork population was discovered downstream of I-65 (referenced here as Locust Fork 2) in 2020 (Buntin et al. 2021; Figure 1, Figure 2). It was 48 mm long and <5 years old, based on its annuli, suggesting that recruitment may be occurring at this site (Buntin et al. 2021). The last known dark pigtoe observation in this section of Locust Fork was in 1958, though the fresh triangular kidneyshell (*Ptychobranchus greenii*) shells documented by Gangloff (2016) were likely misidentified dark pigtoe (Buntin et al. 2021).

North River

Historically, the dark pigtoe was one of the most abundant mussel species in the North River system from 1991 to 1996. However, a survey in 2008 found only a single live individual in Clear Creek (out of 61 sampling sites; McGregor and Wynn 2008), indicating a sharp decline in abundance throughout the system (O'Neil et al. 2010). The Clear Creek record is the last known record of dark pigtoe in the North River watershed; therefore, the population in this system may be in danger of extirpation. We are unaware of any surveying efforts in the North River since the last 5- year review (2019; Figure 2).

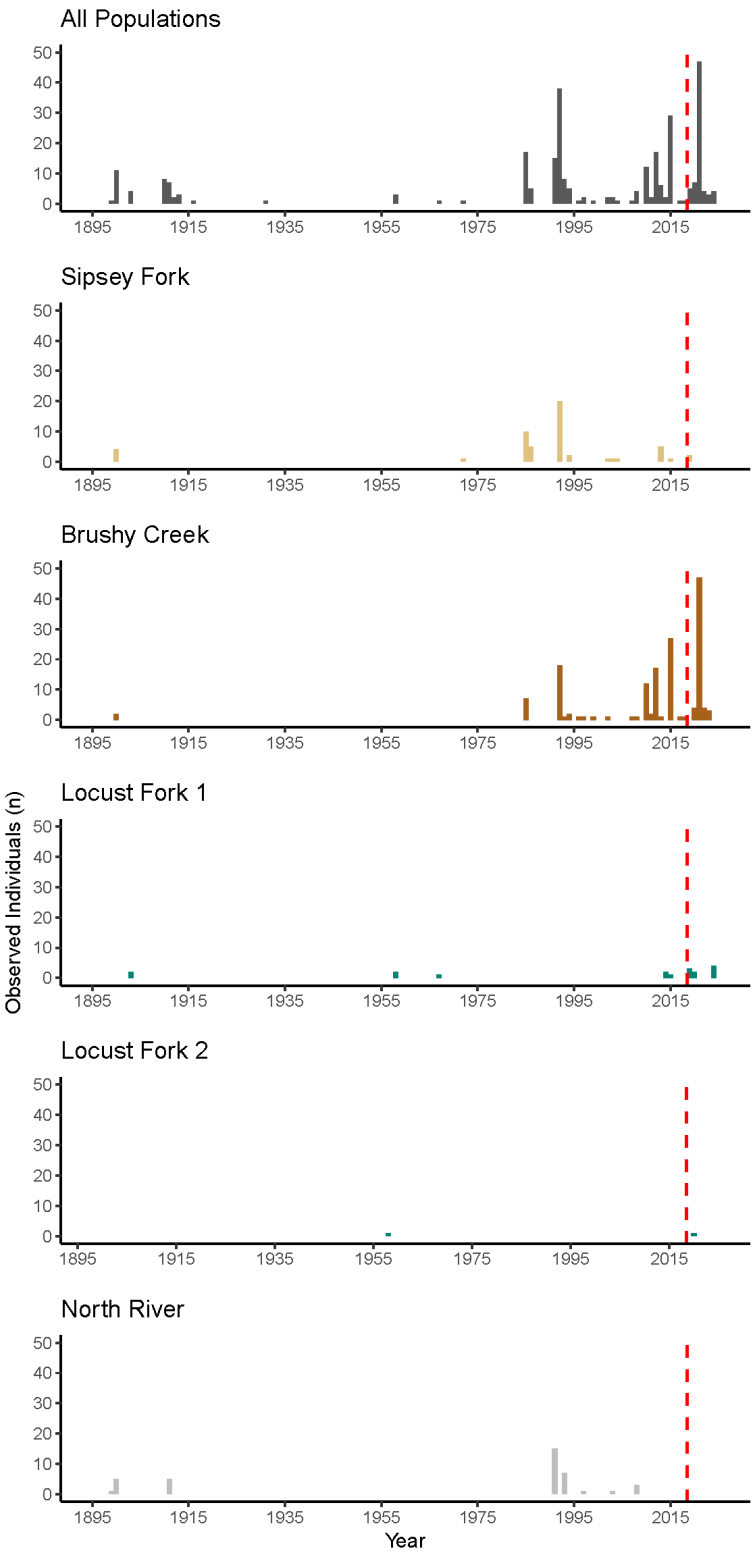

Figure 2. Known records of dark pigtoe individuals (live and dead, with date information) observed over time across all populations and within each current population. In instances where the number of individuals was not specified, n = 1 was assumed, unless the record suggested multiple individuals (e.g., "a few," "many"), in which case n = 2 was assumed. The dashed red line indicates the timing of the previous 5- year review.

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. A summary of this assessment is detailed below.

Factor A: The present or threatened destruction, modification, or curtailment of its habitat or range

The final listing rule considered habitat modification, water quality degradation, and sedimentation as major threats to the dark pigtoe (Service 1993), and these threats continue to impact the species. The dark pigtoe is a lotic (flowing water) species that requires adequate water velocity and substrates free from fine sediments; it does not tolerate lentic (standing or still water) conditions. The construction of dams and impoundment of large reaches within the Black Warrior River system led to lentic conditions including habitat reduction, and resulting in extirpation from the impounded river mainstem, and population fragmentation that persist today. Habitat fragmentation leads to population isolation, which can decrease genetic diversity and reproductive and recruitment potential. It can also separate the dark pigtoe from host fishes, which can also experience fragmentation and isolation from impoundments limiting movement across the landscape. The Sipsey Fork and Brushy Creek reaches in Bankhead National Forest are the most intact habitat and continue to have the most robust dark pigtoe populations. While the rediscovery of a second Locust Fork population expands the known range of the dark pigtoe since listing, populations remain small and isolated from each other.

With no impoundments, Locust Fork contains suitable habitat, yet water quality remains degraded due to persistent domestic and industrial pollution, mining, agriculture, and animal feeding operations in the basin (Alabama Department of Environmental Management (ADEM) 2024, P. Johnson pers. comm. 2024, Shepard et al. 2004). In some portions of Locust Fork, sewage effluent has historically caused dissolved oxygen levels to drop to fatal levels for aquatic organisms (Alabama Water Improvement Advisory Commission (AWIC) 1949). Additionally, discharges from coal by-product plants in the basin have had toxic effects (AWIC 1949). Shepard et al. (2004) observed elevated conductivity and lowered pH in the Locust Fork resulting from surface mining runoff. Conductivity pulses, pH changes, and increased heavy metal concentrations from mine runoff can negatively impact mussels both directly (e.g., causing altered growth and increased mortality) and indirectly (e.g., decreasing food quality and fish host abundance; Merovich et al. 2020, Naimo 1995). Like sewage effluent, animal feeding operations create runoff that causes nutrient loading in aquatic habitats, which can result in mussel mortality. Human and animal waste can also increase pathogens in aquatic systems. Recently, several tributaries and a main stem reach of the Locust Fork were added to the Alabama § 303(d) list for excessive levels of *Escherichia coli* stemming from wastewater systems, agriculture, and animal feeding operations (ADEM 2024).

A nutrient Total Maximum Daily Load (TMDL) has been established for several sections of the Locust Fork (ADEM 2017), and any resulting water quality improvement should benefit the dark pigtoe. Impacts from these water quality threats may be lessening, as Locust Fork habitat quality and mollusk populations have improved over time (Buntin et al. 2021). However, Locust Fork still does not support Environmental Protection Agency-recognized designated uses, indicating

water quality still needs improvement (ADEM 2024). As development, mining, and agricultural operations continue in the basin, degraded water quality remains an ongoing threat to the species.

Sedimentation also continues to threaten the dark pigtoe. Poorly designed road crossings and other land use practices that do not implement appropriate and effective best management practices (e.g., adequate riparian buffers) can lead to excessive sedimentation that limits host fish movement (and therefore mussel recruitment and distribution) and can directly impact mussel survival through decreased foraging efficiency and suffocation. In the North River drainage, there are 35 documented high sedimentation risk sites (O'Neil et al. 2015), making sedimentation a continuing threat. Sedimentation is also a persistent threat in the Locust Fork (Buntin et al. 2021, Shepard et al. 2004). As discussed above best management practices from land-disturbing practices can reduce threats to the dark pigtoe when they are implemented properly and maintained.

Factor B: Overutilization for commercial, recreational, scientific, or educational purposes

Commercial harvest was not considered a threat to the dark pigtoe in the final listing rule (Service 1993), and we have no new evidence to suggest that it has become one. The rule did find that dark pigtoe populations are vulnerable to take for fish bait, curiosity, or vandalism, due to their localized range and exposure during low flow periods, though we have no new information that would indicate this factor has become a significant threat since listing.

Factor C: Disease or predation

The final listing rule noted that freshwater mussel diseases are virtually unknown (Service 1993); however, since then research has revealed multiple potential freshwater mussel pathogens in other parts of the United States (Grizzle and Brunner 2009). In more recent years, several cases link pathogens to significant declines in North American freshwater mussel populations, including in the upper Tennessee River basin (Richard et al. 2020, Richard et al. 2022, Richard et al. 2023). More research is needed to fully assess the potential threats of diseases to the dark pigtoe.

The final listing rule also indicated that muskrat (*Ondatra zibethicus*) predation may jeopardize the recovery of some endangered mussels and might cause local extirpation of rare mussel species (Service 1993). Muskrat predation on mussels had been observed in drainages where dark pigtoe were found at the time of listing. We have no new evidence to suggest that predation has become a significant threat for this species.

Factor D: Inadequacy of existing regulatory mechanisms

The State of Alabama designated the dark pigtoe as a critically imperiled (rank S1) species and protects it under the Invertebrate Species Regulation (Alabama Administrative Code, § 220-2-.98). This rule makes it unlawful to take or attempt to take, capture, or kill dark pigtoe without a scientific collection permit. However, as noted in the final listing rule (Service 1993), enforcement of these permit requirements remains challenging.

The species is also afforded some protection from water quality and habitat degradation under the Clean Water Act of 1972 (33 U.S.C. 1251 et seq.) and the Alabama Water Pollution Control

Act, as amended, of 1975 (Code of Alabama, §§ 22-22-1 to 22-22-14). As mentioned above, a nutrient Total Maximum Daily Load was established for the Locust Fork (ADEM 2017). Pollutant regulations are assumed to be protective of freshwater mollusks, but these species may be more susceptible to some pollutants than test organisms commonly used in bioassays (Gibson et al. 2018, Augspurger et al. 2003). Similarly, the Federal Insecticide, Fungicide, and Rodenticide Act of 1947 (7 U.S.C. 136 et seq.) is intended to protect against "unreasonable human health or environmental effects," but freshwater mussels are not specifically tested for toxicity thresholds. Therefore, a lack of adequate information on water quality criteria, pollutant, and pesticide toxicity continues to prevent existing regulatory mechanisms from fully protecting federally listed mollusks like the dark pigtoe.

In addition, Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into waters of the United States, including wetlands with a continuous surface connection to relatively permanent bodies of water that are themselves navigable waters or tributaries to them. Any activities in wetlands and waterways meeting this definition are regulated under this program, such as water resource projects, infrastructure development, and mining projects. The cumulative effects of these actions on the finite amount of riverine habitat may have a larger impact and is usually not assessed on a permit-by-permit case.

There is a continued persistence of animal feeding operations, surface mining, and development on the landscape, and existing regulatory mechanisms remain inadequate to fully address resulting threats such as pollution, sedimentation, and habitat degradation. Therefore, threats arising from the inadequacy of regulatory mechanisms to protect the dark pigtoe and its habitat remain ongoing, severe, occur throughout the species range, and are expected to continue in the future.

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

Nonnative species
The introduced Asian clam or freshwater golden clam (*Corbicula fluminea*) is widespread throughout the Mobile River basin and may be an "important but overlooked factor in widespread native mussel declines" (Haag et al. 2021). In high densities, it can remove substantial amounts of seston (suspended particles) from the water column, reducing food sources and negatively impacting mussel growth (Ferreira-Rodríguez et al. 2018; Haag et al. 2021). Additionally, as stated in the final listing rule, Asian clam may disrupt the predator-prey dynamic between muskrats and native mussels. Asian clam's high reproductive and growth potential might provide an abundant food source for muskrats, eliminating the need for migration once native mussel numbers decreased (Heard 1975). Consequently, predation pressure would continue regardless of the abundance of native mussels. The sudden decline of certain mussel species in other Gulf Coast drainages coincided with the appearance of Asian clam (Heard 1975). However, the onset of significant perturbations around the same period makes it difficult to determine if Asian clam contributed to the declines or not (Pursifull et al. 2021). Recently, one section of Brushy Creek saw an increase in dark pigtoe from 2015 to 2021 and a concurrent decrease in Asian clam, suggesting one population with improved conditions (Moran 2021).

Another highly competitive exotic species, the zebra mussel, *Dreissena polymorpha*, was identified in the final listing rule as having the potential to enter the Black Warrior River

drainage (Service 1993). Since the last 5- year review, zebra mussels have been documented in the Black Warrior River; however, only in streams below the fall line and outside of the currently, presumed range of the dark pigtoe (Garner iNaturalist Observations 2020 and 2024).

Temperature, Precipitation, and Hydrology Changes
An additional threat since listing is the effect of changing water temperature and hydrology. Changing trends in water temperature and precipitation patterns can increase flooding, prolong droughts, and/or reduce stream flows which can all negatively influence freshwater mussel habitat (Nobles and Zhang 2011). Alabama's average annual temperatures are projected to increase, which could result in increases in water temperature (Runkle et al. 2022). This could also alter fundamental ecological processes, thermal suitability of aquatic habitats for resident species, and species' ranges. For thermally sensitive mussel species, temperature increases within forecasted changes of 3.6–5.4°F may exceed their ability to adapt (Payton et al. 2016).

Increases in extreme precipitation events are also projected for the future in Alabama (Runkle et al. 2022). However, even if extreme rainfall events occur, it may have little impact on groundwater recharge - given intense rainfall is likely to exceed the rate at which the soil can absorb water, resulting in additional rainfall runoff. This runoff can increase turbidity and deliver excessive pollutants and nutrients into streams, especially in cases where the riparian areas are disturbed and impervious surface cover is high (Lall et al. 2018). Subsequent declines in water quality are likely to negatively affect dark pigtoe individuals.

The increases in average annual temperature, increases in loss of soil moisture, and insufficient groundwater recharge will also increase the likelihood of intensive droughts (Runkle et al. 2022). Extreme drought, combined with limited habitat and small population sizes, can potentially threaten these mussels, especially those located in small drainages (e.g., in the Sipsey Fork). Haag and Warren (2008) found that impacts from severe drought were correlated to watershed size, with small streams suffering abundance declines of 65-83%, while the larger streams (larger buffering capacity) showed less significant change in pre- and post-drought abundances. Droughts can have negative impacts on water quality (e.g., dissolved oxygen) and waste dissemination of point source discharges. Droughts may also reduce the amount of habitat available to mussels through dewatering, fragment stream sections into isolated pools, and/or cause direct mortality by stranding mussels. However, in some cases in Alabama, droughts can also concentrate host fish and therefore, increase the probability of glochidia (larval mussel) to host contact.

Given the small, isolated nature of dark pigtoe populations, threats from these other natural or manmade factors remain ongoing, severe, occur throughout the species range, and are expected to continue in the future.

Synthesis

The dark pigtoe (*Pleurobema furvum*) is a small to medium sized mussel (typically <60 mm long) that occurs in streams and rivers in the upper Black Warrior River system of Alabama. Its name has been synonymized with warrior pigtoe (*Pleurobema rubellum*) based on shell morphology and genetic analysis. There are currently five extant populations, though one of them (North River) has had no new records since 2008. The Sipsey Fork and Brushy Creek

reaches in Bankhead National Forest are the most intact habitat and continue to have the most robust dark pigtoe populations. While the 2020 rediscovery of a second Locust Fork population downstream of Interstate 65 expands the known range of the dark pigtoe since listing, the Locust Fork populations still remain small and isolated from each other. Habitat fragmentation, water quality degradation, and drought are persistent threats to the species that occur across the species range and are expected to continue. Because of these ongoing and future threats and the species' vulnerability, the dark pigtoe continues to meet the definition of an endangered species.

RECOMMENDED FUTURE ACTIVITIES

A detailed discussion of recovery actions and criteria are presented in the species' recovery plan (Service 2000) and recovery plan amendment (Service 2019a). During this status review new and/or targeted potential recovery activities were identified and are included below.

Recovery Activities

- Protect water quality within drainages known to support habitat for this species through cooperative agreements, conservation land acquisitions (e.g., reserves or easements), and best management practices (e.g., forestry conservation practices), targeting priority parcels identified by conservation partners in each strategic habitat unit.
- Develop partnerships with farmers, mining companies, landowners, land users, groups like Black Warrior Riverkeeper, The Nature Conservancy, and other interested and affected parties to identify and implement management activities that improve water quality in the Locust Fork.
- Continue working with partners like the Geological Survey of Alabama, Alabama Department of Conservation and Natural Resources, the Alabama Clean Water Partnership and other local landowners, land users, and other interested and affected parties to finalize and execute the proposed action plan for restoration (e.g., reduce sediment loading, riparian buffer maintenance or augmentation, mitigate the water quality impacts of animal production) in the North River strategic habitat unit and across the Mobile Basin (O'Neil et al. 2010; O'Neil et al. 2025).
- Work with partners like the U.S. Forest Service and the Alabama Power Company to promote the continued protection and enhancement of habitat within Bankhead National Forest (Sipsey Fork and Brushy Creek) and surrounding lands.
- Increase public awareness of freshwater mussels, their threats, and ways to conserve them through outreach materials, festivals, outings, and other methods.

Monitoring and Research Activities

- Survey the newly discovered Locust Fork population for additional members, and survey the North River to determine if a population still exists.
- Develop and implement a plan to quantify and monitor surviving populations and suitable habitat conditions over time. Populations should be monitored periodically, and data collected should include the number of individuals, shell length, and abiotic conditions/water quality parameters.

- Collect and analyze genetic data to determine relationships within and between populations and identify suitable populations for augmentation and/or reintroduction.
- Conduct toxicological and biological tolerance levels (dissolved oxygen, pH, temperature, conductivity, etc.) to better assess water quality standards and encourage the use native species for test organisms rather than ultra tolerant non-native species.

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RESULTS / SIGNATURES

U.S. Fish and Wildlife Service
Status Review of Dark Pigtoe (*Pleurobema furvum*)

Status Recommendation:

On the basis of this review, we recommend the following status for this species (50 CFR § 424.11). 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.
____ Delist:
____ *The species is extinct.*
____ *The species is recovered.*
____ *New information indicates 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, U.S. Fish and Wildlife Service

Approve WILLIAM PEARSON Digitally signed by WILLIAM PEARSON Date: 2025.09.02 10:52:50 -05'00'