White Wartyback
(*Plethobasus cicatricosus*)

Status Review:
Summary and Evaluation

White Wartyback, photo by Jeff Garner, Alabama Department of Conservation and Natural Resources (ADCNR)

U.S. Fish and Wildlife Service
South Atlantic-Gulf Region
Alabama Ecological Services Field Office
Daphne, Alabama

September 2022

STATUS REVIEW

White wartyback
(*Plethobasus cicatricosus*)

GENERAL INFORMATION

Current Classification: Endangered

Lead Field Office: Alabama, Ecological Services Field Office: Scott Lamont, 251-424-5857.

Reviewers: Alabama, Ecological Services: Jennifer Grunewald, 205-247-3726
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Lead Regional Office: Atlanta Regional Office, Carrie Straight, (404) 679-7226.

Date of original listing: June 14, 1976 (41 FR 24062)

Experimental population designation: October 15, 2007 (72 FR 52434)

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 biology, habitat, and threats of the white wartyback (*Plethobasus cicatricosus*) to inform this status review.

We announced initiation of this review in the Federal Register on July 14, 2021 (86 FR 37178) with a 60-day comment period. No comments were received. The primary sources of information used in this analysis were the species' recovery plan (USFWS 1984), the recent five-year review (USFWS 2016), current publications, and personal communication with recognized experts. This review was completed by the U.S. Fish and Wildlife Service, Alabama Ecological Services Field Office (AFO), Daphne, Alabama. All literature and documents used for this review are on file at the AFO. All recommendations resulting from this review are the result of thoroughly reviewing the best available information on the white wartyback mussel.

Peer Review: We have not received significant new information, interpreted previously reviewed information in a new, significant light since the last review and the level of public interest is low and non-controversial; therefore, no peer review was conducted.

FR Notice citation announcing the species is under active review:
July 14, 2021 (86 FR 37178)

Species' Recovery Priority Number at start of 5-year review (86 FR 37178): 5
Plethobasus cicatricosus is a species with a high degree of threat and a low recovery potential.

Review History:

Five-year Review: May 5, 2016 – No change in status was recommended

REVIEW ANALYSIS

Listed Entity

Taxonomy and nomenclature

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

Distinct Population Segment (DPS):

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 is not applicable.

Recovery Criteria

Recovery Plan

White wartyback (*Plethobasus cicatricosus*) Recovery Plan, September 19, 1984

The Recovery Plan establishes that the white wartyback could be considered for delisting when the following criteria are met:

> Criterion 1. A viable population of *Plethobasus cicatricosus* exists in the Tennessee River. This population is dispersed to an extent that it is unlikely that any one event would cause the loss of the entire population.
>
> Criterion 2. Through reestablishment and/or by discoveries of new populations, viable populations exist in two additional rivers. Each river will contain a viable population that is distributed such that a single event would be unlikely to eliminate *Plethobasus cicatricosus* from the river system. For reestablished populations, surveys must show that three year-classes including one year class 10 years old or older have been naturally produced within the river system.
>
> Criterion 3. The species and its habitat are protected from present and foreseeable human-related and natural threats that may interfere with the survival of any of the populations.

The delisting criteria have not been met. No recovery actions were implemented during this review's timeframe.

Biology and Habitat Summary

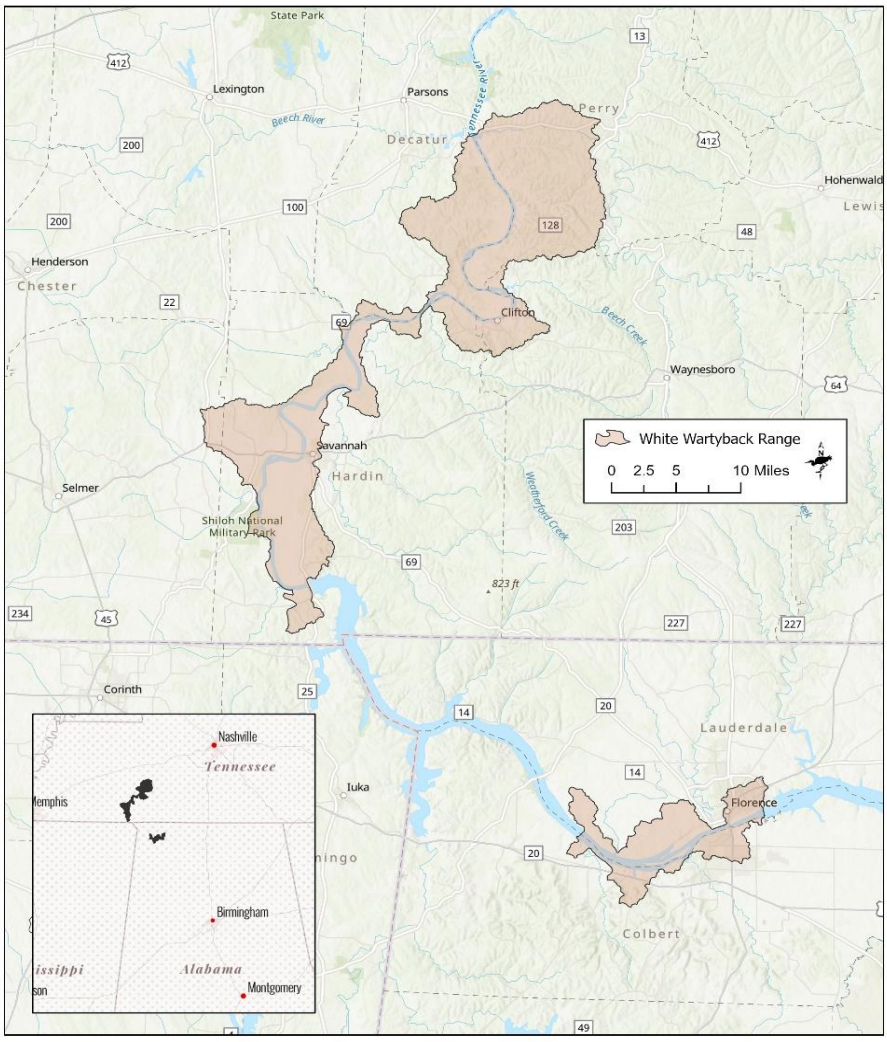

Figure 1. The current range of white wartyback range highlighted in peach shading in northwest Alabama and southern Tennessee.

A detailed review of the species' biology and habitat information can be found in the previous 5-year status review of this species (Service 2016).

In 2017-2018, Jeff Garner conducted field work in the Wilson Dam tailwater to determine presence of *Plethobasus cicatricosus* at this location. During the sampling by Garner, 37 mussel species were collected; however, only two individuals appeared to be *Plethobasus cicatricosus* (Garner 2018). The two mussels were more elongated posteriorly compared to four Plethobasus cyphyus that were also collected at the site. Samples were taken for DNA analysis but have not been tested at this time.

In 2017, Chad Lewis collected three live *Plethobasis* species near Savannah, Tennessee, with one thought to be *Plethobasus cicatricosus*. Samples were taken for DNA analysis but were not completed and are presently unavailable.

Threats (Five-Factor Analysis) Summary

A detailed review of the species' threats can be found in the 2016 white wartyback 5-year status review (Service 2016). 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 current threats is detailed below. The present or threatened destruction, modification, or curtailment of the habitat (Factor A) continues to be the primary threat to the white wartyback as described in the 2016 5-year status review (Service 2017).

Factor A:

Habitat Destruction

The white wartyback is primarily threatened by habitat destruction and modification, resulting from impoundment, sand and gravel dredging/mining, navigation activities, operation of water control facilities, and construction and operation of barge loading and fleeting facilities on the Ohio River and lower Tennessee River. A combination of these stressors may have contributed to the extirpation of this species from much of its former range in the Tennessee River (Tennessee, Alabama, Kentucky), Holston River (Tennessee), Cumberland River (Tennessee, Kentucky), Ohio River (Ohio, Illinois, Indiana, Kentucky, West Virginia), Wabash River (Indiana, Illinois), and Kanawha River (West Virginia). The only known extant members of this species are presently confined to a small population in the Tennessee River downstream of Wilson Dam between Tennessee River mile (TRM) 245 to TRM 256 in Lauderdale and Colbert counties, Alabama (Bogan and Parmalee, 1983; Garner and McGregor 2001; Williams et al., 2008) as well as in the Tennessee River near Savannah Tennessee (Koch and Lewis 2022).

Factor B:

Overutilization

The white wartyback occurs in areas that are open to commercial harvest of mussels. This species is not, however, commercially valuable. Rare mussels may sometimes be taken incidentally by inexperienced commercial mussel dealers, but there is no evidence to indicate that incidental catch has resulted in significant declines in numbers of white wartybacks or is threatening survival of the species.

Factor C:

Disease or Predation

We do not consider disease or predation to be threats at this time. Although there have been reported mussel die-offs in recent years in the occupied stretch of the Tennessee River below Wilson Dam, most have impacted common species such as *Ellipsaria lineolate*, *Quadrula pustulosa,* and *Quadrula quadrula*. None have reported white wartyback as a victim (Starliper et al. 2011). Though muskrat, mink, and raccoons are likely the primary predators of freshwater mussels in the Southeast, it is unlikely these species prey on white wartyback in the deeper waters of the Tennessee river. Freshwater drum likely also consume mussels, but we have no information indicating drum predation is causing significant declines in large river mussel populations, including the white wartyback. Similarly, over the last decade, highly invasive molluscivorous fishes, like the black carp (*Mylopharyngodon piceus*), have invaded waters of the eastern United States, including the Tennessee River in north Alabama (NPS, 2019). Though these fish feed primarily on mollusks, the rarity of white wartybacks within the dense mussel beds where they occur make them unlikely to suffer predation and there is currently no evidence that they have impacted the white wartyback at this time (Greene and Armstrong 2022).

Factor D:

Inadequacy of Regulatory Mechanisms

Given that the white wartyback is extremely rare, and the population has been determined to be declining, we do not know at this time if existing regulation and enforcement to protect the species are adequate. State laws prohibit take of the species for scientific purposes without a collecting permit, but the species are not protected from take for other purposes. Also, implementation of best management practices (BMPs) to reduce sedimentation in streams is inconsistent (i.e., it is voluntary for some activities and mandatory for others) and unproven to be effective with respect to this species. Other activities which may affect white wartyback, such as sand and gravel mining, are regulated in Alabama.

The Clean Water Act (CWA) is the primary federal law in the United States governing water pollution. One role of the CWA is to regulate the point source discharge of pollutants to surface waters, achieved through the permitting process of the National Pollutant Discharge Elimination System (NPDES). The NPDES permit process is usually delegated by the Environmental Protection Agency (EPA) to its state cohort. In Alabama this authority has been delegated to the Alabama Department of Environmental Management (ADEM) and in Tennessee to the Tennessee Department of Environment and Conservation (TDEC). Currently, ADEM (Alabama Administrative Code, Title 22, Section 22-22-1 et seq.) and TDEC (Tennessee Code Annotated, 69-3-101 et seq.) require that discharges not exceed state water quality standards. Since there is no information on the species' sensitivity to common pollutants, it is unknown if federal (e.g., CWA) and state water quality laws are protective of the white wartyback.

Factor E:

Other Natural or Manmade Factors

Because the white wartyback is only known to occur in two locations and has been extirpated from most, if not all, of its former range, its existence is likely much more dependent on the quality and quantity of water released by Wilson Dam and the surrounding landscape than at any time in its past or since its listing.

As a result of past consultations between the Tennessee Valley Authority (TVA) and the Service, TVA altered the water release schedule at Wilson Dam in 2006 to improve water quality for federally listed threatened and endangered mussel species (USFWS 2006). Specifically, water more frequently flushed over mussel beds in the Tennessee River during summer months was expected to improve water quality parameters known to be important to freshwater mussel species (e.g., discharge, water temperature, and dissolved oxygen) and to dilute those parameters known to be limiting for mussels (e.g., copper, zinc, aluminum, arsenic, manganese, ammonia and chlorine concentrations). Since TVA altered the water release schedule to improve water quality in the Wilson Dam tailwater, mussel densities for most nonlisted species have progressively increased (Garner 2012). However, because they are rarely detected in any annual surveys of this area and because some species have declined since TVA amended the water release schedule at Wilson Dam, it is impossible to determine or infer whether white wartyback is responding favorably to this action. Additionally, the white wartyback is likely in an extreme genetic bottleneck and experiencing inbreeding depression. Due to the low haplotype diversity that is most likely present, the species is susceptible to climate change and other changes within its habitat.

Synthesis

Surveys performed by state and federal agencies, as well as partners, have failed to observe white wartyback in most portions of its former range. The only known extant populations of white wartyback are known from a reach of the Tennessee River downstream of Wilson Dam, in Alabama and near Savannah Tennessee. Surveys over the last few decades have only detected a few individuals of this species and evidence of reproduction is scant. Those individuals that persist in this reach of river do so in suboptimal habitat that is at perpetual risk of alteration by activities at Wilson Dam, non-point source pollution and area discharge into the Tennessee River, or, potentially, by extreme weather events and climate change. Thus, we conclude the white wartyback has low estimated viability or potential for recovery.

RECOMMENDED FUTURE ACTIVITIES

A detailed discussion of recovery actions and criteria are presented in the Recovery Plan (Service 1984).

Recovery Activities

1. The Service should continue working with TVA to ensure hydropower and flood control operations at Wilson Dam and associated monitoring are implemented.

2. Increase the probability of successful reproduction and propagation by collecting adults and placing them in aggregations below Wilson Dam to increase the odds it will increase their reproductive success during spawning. Consider use of in vitro propagation.

3. If viable population numbers are discovered, the Lower French Broad and Lower Holston Rivers have been designated an experimental population location (FR 71, Number 113, Jun 13 2006).

Monitoring and Research Activities

1. Conduct additional mussel surveys to confirm the presence of the white wartyback in locations where it is known; or believed to be found. Surveys should be conducted in the Tennessee River below Wilson Dam and near Savannah Tennessee both above and below Pickwith Dam. Confirm species identification using DNA analysis.

2. Initiate efforts aimed at identifying potential fish hosts, obtaining individuals, and improving techniques necessary for captive propagation of the species.

3. Once captive propagation techniques have been tested using a surrogate species, pursue captive propagation efforts when individuals of this species are found.

4. Initiate a study of the dietary needs and metabolism of large river obligate species to better understand the niche and needs of white wartyback in the system.

5. Research trans location techniques and risks for this species.

6. Improve utilization of existing legislation and regulations (federal and state endangered species laws, water quality requirements, stream alteration regulations, etc.) to protect the species and its habitat.

7. Continue efforts to reduce non-point pollution from agricultural activities by working through the U.S. Fish and Wildlife Partners for Fish and Wildlife, U.S. Department of Agriculture Farm Bill, and other landowner incentive programs to implement BMPs.

8. Investigate role of point source pollution impacts to freshwater mussel species in the Wilson Dam tailwater, specifically those emanating from the wastewater treatment plant located at Seven-mile Island.

9. Implement eDNA survey methods to determine presence of species in waterways.

RESULTS / SIGNATURES

U.S. Fish and Wildlife Service
Status Review of white wartyback (*Plethobasus cicatricosus*)

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
____ 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: 2023.01.09 09:26:34 -06'00'

REFERENCES

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Personal Communication

Dave Armstrong and Chris Greene, Alabama Department of Conservation and Natural Resources. Email regarding the impact of Asian carp species on the white wartyback

mussel. Received 2022.

Chad Lewis (Lewis Environmental Consulting) and Leroy Koch (USFWS). Email inquiring about *Plethobasus cicatricosus* below Pickwick Dam in Tennessee. Received 2022.