

Watercress Darter
(Etheostoma nuchale)

**5-Year Review:
Summary and Evaluation**



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

September 2022

5-YEAR REVIEW
Watercress Darter (*Etheostoma nuchale*)

I. GENERAL INFORMATION

A. 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](#)). In completing this 5-year review, we relied on the best available information pertaining to historic and current distributions, life history, and habitats of this species. Our sources include the most recent 5-year review (Service 2009), the recovery plan (Service 1993), peer reviewed scientific publications, unpublished field observations by Service, State and other experienced biologists, unpublished survey reports, and notes and communications from other qualified biologists or experts. A Federal Register notice announcing the review and requesting information was published on May 7, 2018 (83 FR 20092), and a 60-day comment period was opened. No comments were received. No part of this review was contracted to an outside party. This review was completed by the Service's lead Recovery biologist in the Alabama Ecological Services Field Office.

B. Reviewers

Lead Region – Southeast Region: Carrie Straight, 404-679-7226

Lead Field Office – Daphne, AL, Ecological Services: Jennifer Grunewald, 205-247-3726

C. Background

1. FR Notice citation announcing initiation of this review

83 FR 20092, May 7, 2018

2. Listing history

Original Listing

FR notice: 35 FR 16047

Date listed: October 13, 1970

Entity listed: Species

Classification: Endangered

3. Review History

The most recent 5-year review was completed August 28, 2009, which recommended no change in status (Service 2009).

Additionally, a 5-year review for this species was noticed on November 6, 1991 (56 FR 56882). In this review, the status of many species was simultaneously evaluated with no in-depth assessment of the five factors, threats, etc. as they pertained to the individual species. The notices summarily listed these species and stated that no changes in the designation of these species were warranted at that time. In particular,

no changes were proposed for the status of the species in this review. A similar 5-year review was completed in 1985 and no changes were proposed for the status of the watercress darter.

4. Species' Recovery Priority Number at start of review (48 FR 43098)

The recovery priority number is a 2 indicating it is a species with a high degree of threat and high recovery potential.

5. Recovery Plan

Name of plan: Watercress Darter (*Etheostoma nuchale*) Recovery Plan

Date issued: March 29, 1993

II. REVIEW ANALYSIS

A. 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.

B. Recovery Criteria

Based on the 1993 recovery plan, the criteria for delisting the watercress darter from threatened status are:

- (1) *five years of data documenting the existence of six viable populations, each inseparate discrete recharge areas; and,*
- (2) *long-term protection of the discrete recharge area for each of the six viable population.*

While the watercress darter has been discovered in six separate springs, there are currently only three confirmed genetic populations and one unconfirmed population (Cunningham Creek) that requires additional genetic testing. At this time, the criteria as described above for delisting the watercress darter have not been met.

C. Updated Information and Current Species Status

1. Biology and Habitat

a. Summary of New Information of Species Biology and Life History

Details of the history of the known springs can be found in the 1993 recovery plan and the 2009 5-year review (Service 1993, 2009). Since the previous 5-year review and recovery plan, watercress darters have been discovered in one new spring system (Cunningham Creek) and the documented range of the Roebuck Spring population has expanded. Watercress darters can now be found within six springs and comprise of four distinct genetic populations (Figure 1).

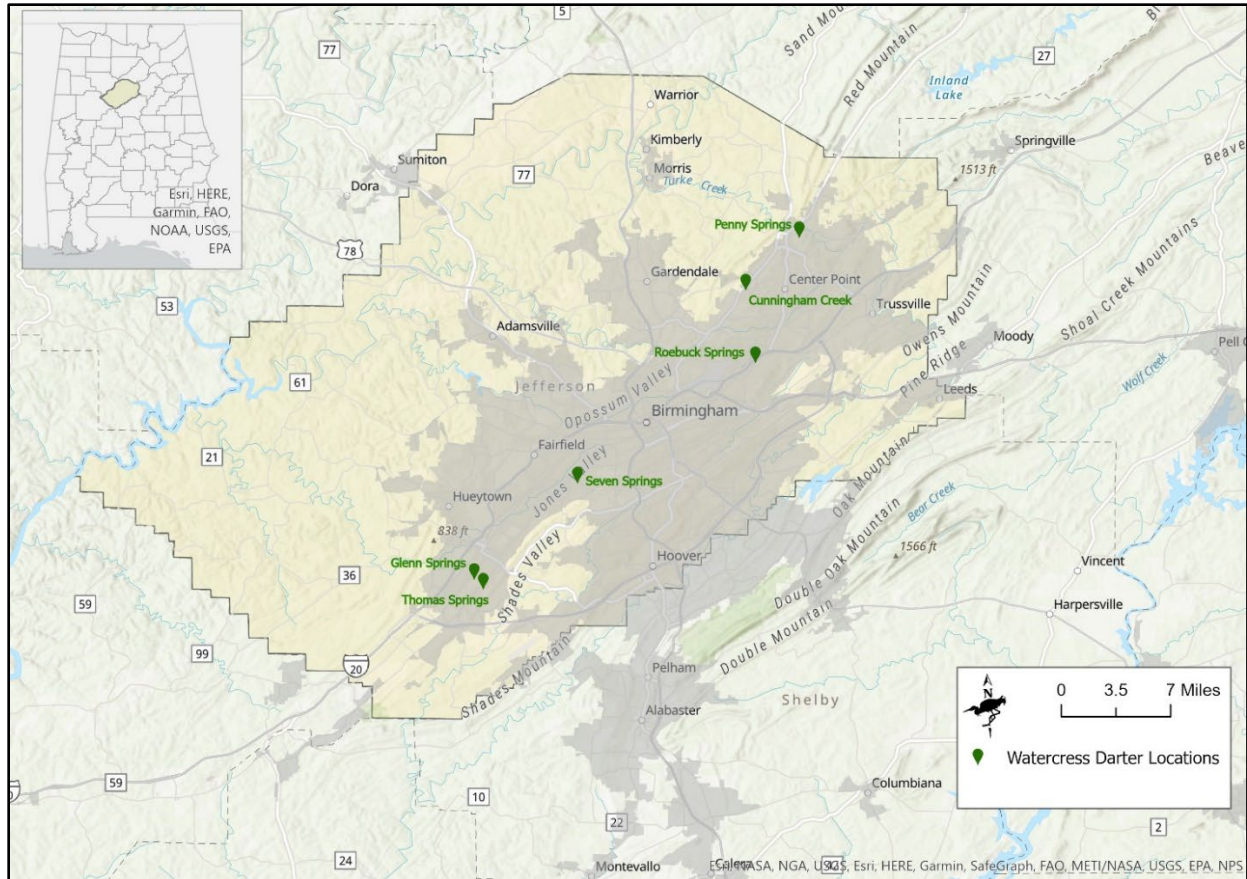


Figure 1. Location of springs with occurrences of watercress darter.

b. Abundance, population trends, demography

Glen Spring is a privately owned 2-acre tract of land located in Bessemer, Alabama. It is the type locality for the species. Development of the spring pool by the landowner and the Service in 1970 of a small rock dam decreased the spring run flow and increased the water level and habitat in the spring pool. Since then, management of the lower spring has included invasive vegetation removal, mowing, and brush control and opening of the canopy to promote growth of aquatic vegetation.

Thomas Spring in the Watercress Darter National Wildlife Refuge (WDNWR) is also located in Bessemer, Alabama. Total size of the refuge is about 23 acres which includes a 0.25-acre pond (upper pool or Pool 1) where a population of watercress darter was found in 1976. A second pond (middle pool or Pool 2) was constructed on the refuge in 1983 by the Service to provide additional habitat for the darter. The second of the two spring-fed ponds, and a third, small depression pond (Pond 3) and the interconnected spring-run flow into Halls Creek.

In 2018, a Cooperative Recovery Initiative (CRI) grant funded recovery work at the WDNWR. The main scope of the work was to provide stability to levee(s) of two existing pool habitats: middle pool (Pool 2) and lower pool (Pool 3); remove

a failed water control structure on the middle pool; and improve connectivity for watercress darter passage between pools and enhance habitats downstream or adjacent to the pools. The project is expected to have long-term beneficial effects by providing additional habitat for the darters, increasing population resilience, genetic diversity and species variability. Post project monitoring occurred after project completion. Sampling of the pools post-construction in 2018 over the course of the eight site visits resulted in the finding of only 19 specimens. Sampling of the pools proved to be difficult due to thick vegetation and heavy amounts of silt (McGregor and West, 2021). Collection was also hampered by heavy algal growth and personnel availability to conduct surveys. While some improvements to the habitat at the project site were observed, the limited data was insufficient to make a definite determination that the project was successful and that monitoring should end (McGregor and West, 2021).

Roebuck Spring is located on the Vacca Campus of the State of Alabama – Department of Youth Services (DYS) and on Hawkins Recreation Center, in Birmingham (Roebuck), Alabama. The spring basin comprises approximately 1.28 acres of impounded waters whose source is the headwaters of Roebuck Springs.

In September of 2008, a dam at the base of the Roebuck Spring pool was removed by the City of Birmingham in order to control what they perceived as excessive water levels at the tennis courts. The dam's removal resulted in the death of an estimated 11,760 watercress darter individuals (Duncan et al. 2008, Moss 2008). Additionally, dead and decaying aquatic vegetation, snails, and crayfish were present along the spring run, among exposed rocks near the springhead and along both shorelines within the spring basin. Ninety-eight live watercress darters were sampled in the reduced spring run (Duncan et al. 2008, Moss 2008) and efforts to reduce the damage to the spring pool, spring run, and watercress darter habitat began immediately (Service 2008, unpublished data). A water control structure was installed by the City in 2009 in the spring head pool and FLT received funds to build a bioretention filter and vegetated biofilter to reduce and filter runoff from the Don Hawkins Recreation Center parking lot. The bioretention filter and vegetated biofilter were installed in 2018.

In February 2013, a second kill event occurred, when debris was cleared at the water control structure within Roebuck Spring pool and the water level receded too quickly, stranding watercress darters within the pool. The mortality of 465 watercress darters was documented during this event.

A new record has also expanded the watercress darter population in Roebuck Spring. Watercress darters were documented in a tributary to Roebuck Spring run in 2020 (C. Greene, pers. comm. 2020). This new location for the species and is currently considered to be part of the Roebuck Spring population. Additional studies are needed to better understand this location and species movement within this area.

Penny (Tapawingo) Springs, in Northeast Jefferson County, Pinson, Alabama is within the range of the watercress darter, but is not a natural historical site for the species. In 1988, Penny (Tapawingo) Spring was one of three springs where watercress darters were introduced from Roebuck Spring in an attempt to expand the species' range (Howell 1988, Service 1993). The site has been referenced as "Tapawingo" Springs in previous documents. This was the name of the community swimming pool that was fed by Penny Springs. We will use "Penny" Springs as the name of this location going forward.

Penny Springs was the only reintroduction site of the three where the species thrived. Penny Springs is now owned and managed by the Freshwater Land Trust (FLT). The Service assisted the FLT in the removal of buildings, a concrete swimming pool, and planting vegetation for erosion control within the spring basin.

Seven Springs was discovered on the property of Faith Apostolic Church in Birmingham (Powderly), Alabama in 2003. Seven Springs has a spring pool and run that supports a small population of watercress darters.

In November 2021, the FLT acquired a 26.1-acre conservation easement downstream of Faith Apostolic Church in the Powderly neighborhood of Birmingham. The conservation easement contains approximately 228 feet of Seven Springs and will allow for continued habitat restoration for the watercress darter by reducing future erosion and sedimentation. Acquiring this conservation easement will help maintain watercress darter habitat. Although significant gains have been made in the conservation of the Seven Spring site, very little has been done to improve conditions within the recharge area. Point and non-point source runoff is still a threat, particularly related to urbanization and maintenance activities of roads, ditches and utility easements.

Cunningham Creek, a new site for the watercress darter (Figure 1), was discovered in a small spring located on the property of an industrial manufacturing plant northeast of Tarrant City, Alabama in 2014. The spring, located at the headwaters of the Cunningham Creek watershed, flows into a spring-fed swampy area located beside and southwest of industrial complex. Although only a single specimen was collected at the time, an examination of the area revealed it to be ideal habitat for darters (Howell et al. 2016).

In 2016, researchers returned to the location and an area just below the spring-fed swamp. Although no watercress darters were captured in February, netting large, deep, water-filled truck tire ruts uncovered the presence of the endangered rush darter (*Etheostoma phytophilum*) in spawning condition (Howell et al. 2016). Later in February, researchers returned to the location and netted Cunningham Creek one hundred meters downstream of the spring-fed swampy area where two male watercress darters were captured. In March, researchers returned and

collected six female and one male watercress darter in breeding colors. Below this location, Cunningham Creek changes morphology from a slow flow, low-gradient and mud-sand-gravel bottom stream, to a rapid flow, high-gradient stream with large, angular chert rocks and upturned rock strata (Howell et al. 2016). No watercress darters were collected in the rapid-moving water of the creek. Although both Penny Springs and Cunningham Creek is a tributary of Turkey Creek, this new location likely represents a distinct population from introduced watercress darters established in Penny Springs.

c. Genetics

These springs are all within the Valley and Ridge Physiographic Province which are all part of the Black Warrior River system in Jefferson County, Alabama (Boschung and Mayden 2004). Glen, Thomas, and Seven Springs are tributaries to Valley Creek, a tributary to the Black Warrior River, while Roebuck Spring is a tributary to Village Creek, which joins the Locust Fork River, a tributary to the Black Warrior River (Figure 1). The Locust Fork River and Valley Creek both join the Black Warrior to the west. Since the species is found in two distinct tributaries to the Black Warrior River, at some point within the species' history, watercress darters may have been distributed more widely (Duncan et al. 2010).

Based on microsatellite analysis, Fluker et al. (2010) proposed treating the different populations of watercress darters as three genetically distinct units:

- 1) Glen Spring/Thomas Spring (WDNWR);
- 2) Seven Spring; and
- 3) Roebuck Spring/Penny Springs.

Fluker et al. (2010) also suggests that any future propagation / translocation efforts should take into account these units. With the discovery of watercress darters in Cunningham Creek, four genetically distinct units may now exist.

d. Taxonomic classification or changes in nomenclature:

No changes have been made to the taxonomic classification or nomenclature of the watercress darter and the Service still considers it a valid taxon.

e. Distribution and trends in spatial distribution:

In 2014, a new site for watercress darter was found in Cunningham Creek, which likely represents a new population. In addition, a new location in a tributary to Roebuck Springs was also found in 2020.

2. Five-Factor Analysis

Details of the threats to watercress darter can be found in the 1993 recovery plan and the 2009 5-year review (Service 1993, 2009).

a. Present or threatened destruction, modification or curtailment of its habitat or range:

Protection of the specific habitat attributes associated with these six springs is essential for the recovery of the species. Maintaining adequate surface and subsurface water quality, water quantity and flow, protection of the habitat substrate and vegetation, along with protection of the immediate recharge areas, are essential for the species to recover. Even though the six spring heads and most of the spring runs are protected by the use of best management practices such as vegetative buffer zones; neighboring properties are highly urbanized with little protection of the immediate recharge area of the Valley and Ridge aquifer system upon which all these spring systems depend.

The limited range of the watercress darter is within the industrial areas of the city of Birmingham. Because of this, the threat from surface and subsurface water quality and quantity degradation is potentially the greatest impact facing the species. Surface water contamination and increased water temperatures may be preventing the species from occupying potential habitats at the spring runs confluences with parts of Village, Turkey, Valley, Nabors, and Hall's creeks. Additionally, lack of appropriate management of the springs and within the recharge zones of those springs could continue to impact the species, as was seen in Roebuck Spring in 2008 and again in 2013.

b. Overutilization for commercial, recreational, scientific, or educational purposes:

In general, small species of fish such as the watercress darter are not utilized for either sport or bait purposes and are unknown to the public. Therefore, take of these species by the public has not been a problem. There is a possibility of collections by aquarists for those sites out of the public eye.

c. Disease or predation:

Predation undoubtedly occurs within all spring sites of the watercress darter. To the extent that disease or predation of watercress darters occurs, it becomes a more important consideration as the total population decreases in number.

Roebuck Spring continues to harbor a population of exotic virile crayfish (*Faxonius virilis*) (Duncan et al. 2008). Carroll and Gibbons (2009) believed that the virile crayfish could exacerbate the recovery of the watercress darter within the spring pool and have a significant impact on the species in the spring run. During the 2008 fish kill event virile crayfish were seen preying on stranded watercress darters and are also believed to be a competitor of watercress darters (Fluker et al. 2009). Trapping efforts were conducted to control virile crayfish at Roebuck Springs (Fluker et al. 2009). Trapping studies found that the virile crayfish population size was cyclical and rebounded once the trapping efforts stopped (Duncan pers. comm. 2022).

d. Inadequacy of existing regulatory mechanisms:

The watercress darter and its habitats are afforded some protection from water quality and habitat degradation under the Clean Water Act of 1977 (33 U.S.C. 1251 et seq.) and the Alabama Water Pollution Control Act, as amended, 1975 (Code of Alabama, §§ 22-22-1 to 22-22-14). The watercress darter is also protected by the State of Alabama (220-2-.92). They are protected against take, capture, and possession unless a party has an appropriate scientific collection permit or written permit from the State. Enforcement of these laws could benefit the watercress darter through reducing sediments in the springs and streams. However, the effectiveness of existing environmental laws and regulations protecting fish species in headwater streams, springs and seepages is not known because of inconsistencies in enforcement.

e. Other natural or manmade factors affecting its continued existence:

The species is vulnerable to catastrophic events such as chemical spills or modification of the spring basin due to the accessibility of the spring sites.

Excessive beaver activity can have negative impacts on watercress darter habitat and active management is required to keep beaver populations in check. Seven Springs has experienced negative impacts from beaver activity in past years (Fix and Kuhajda, 2019).

The loss of approximately one-half of the genetic component, based on the 11,760 watercress darter individuals lost at Roebuck Spring (Fluker and Kuhajda 2009, Duncan et al. 2008) may present genetic risks and corresponding population problems (Hallerman 2003) in the spring pool. Genetic diversity of the watercress darter populations has likely declined due to isolation over time of the populations and may have been exacerbated by large die-offs as was noted in 2008.

D. Synthesis

The watercress darter is a small darter endemic to the springs and nearby tributaries in the Black Warrior watershed of Alabama. Since the last 5-year review, one new population of darter were found in Cunningham Creek and an additional site was discovered in a tributary to Roebuck Spring. There are currently six populations belonging to at least four genetic groups. However, the removal of the dam and debris at Roebuck Spring in 2008 and 2013, reduced the watercress darter population at this site, increased mortality of the species by predation, reduced reproduction potential, and likely reduced the long-term viability of this genetically unique population. At the writing of the recovery plan, the Roebuck Spring population was the most robust population of the six spring sites. The species continues to be impacted by continued urbanization and the deterioration of water quality (both surface and subsurface waters). Because of the watercress darter's limited distributions and small populations, the species is vulnerable to random natural or human induced events such as droughts, spills and especially spring basin modifications. Therefore, the watercress darter continues to meet the definition of an endangered species under the Act.

III. RECOMMENDATIONS FOR FUTURE ACTIVITIES

Details of the recovery actions for the watercress darter can be found in the 1993 recovery plan and the 2009 5-year review (Service 1993, 2009). New recommendations are provided below:

- Continue to work with the Freshwater Land Trust in conservation and management of Penny Springs, lower Seven Springs run/Nabors Branch system and additional upland habitat improvements at other watercress darter locations.
- Conduct genetic analysis at the Cunningham Creek location to better determine/confirm the genetic distinctiveness of this population.
- Assess Thomas Creek population (WDNWR) to better determine post restoration project benefits.
- Survey tributaries to Roebuck Spring and Village Creek to better understand species distribution.
- Evaluate and implement connectivity improvements for watercress darter passage where applicable.
- Work with Lakewood Homeowner's Association, to assess if measures could be put in place to officially recognize the protection needed for Glen Springs

IV. REFERENCES

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of Watercress Darter (*Etheostoma nuchale*)

Current Classification: **Endangered**

Recommendation resulting from the 5-Year Review

Downlist to Threatened

Delist

No change is needed

New Recovery Priority Number- 2c

Recovery Priority Number will be changed from a 2 to a 2c to reflect that the recovery of the species is, or may be, in conflict with construction or other development projects or other forms of economic activity related to the species' proximity to Birmingham Alabama.

Review Conducted By: Jennifer Grunewald and Scott Lamont, Alabama Ecological Services Field Office

FIELD OFFICE APPROVAL:

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

Approve