

**Painted Snake Coiled Forest Snail
(*Anguispira picta*)**

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



Photo courtesy of David Withers, TDEC.

May 2022

**U.S. Fish and Wildlife Service
Southeast Region
Tennessee Ecological Services Field Office
Cookeville, Tennessee**

5-YEAR REVIEW
Painted Snake Coiled Forest Snail (*Anguispira picta*)

I. GENERAL INFORMATION

A. Methodology used to complete the review:

This 5-Year Status Review was completed by the species' recovery lead biologist in the U.S. Fish and Wildlife Service's (Service) Tennessee Ecological Services Office. Our sources of information for this 5-Year Status Review include the final rule listing this species under the Endangered Species Act (Act); the final Recovery Plan (Service 1982); and peer reviewed scientific publications, unpublished reports, and information and communications from qualified biologists or experts. All literature and documents used for this review are on file at the Tennessee Ecological Services Field Office in Cookeville, Tennessee.

The Federal Register notice announcing the initiation of this 5-Year Status Review and a 60-day public comment period was published on July 14, 2021 (86 FR 37178). The Service did not receive public comments during the comment period.

We did not consider this 5-Year Status Review to be "influential" under the Service's policy for Information Quality Guidelines and Peer Review; therefore, no external peer review was conducted. Per the guidelines, the Service will seek peer review when we can reasonably determine that dissemination of influential information "...will have or does have a clear and substantial impact on important public policy or private sector decisions, and thus, a decision or action to be taken by the Director", such as a change in listing status (i.e., delisting, downlisting, or uplisting of a species). Anthony Ford with the Tennessee Services Field Offices provided comments during an internal review.

B. Reviewers

Lead Regional or Headquarters Office – Contact name and phone number:
Southeast Region – Carrie Straight, (404) 679-7226

Lead Field Office – Contact name and phone number:
Tennessee Ecological Services Field Office – Santiago Martín, (931) 525-4987

C. Background

1. Federal Register Notice citation announcing initiation of this review:
July 14, 2021 (86 FR 37178)

2. Listing history

Original Listing

Federal Register Notice: 43 FR 28932

Federal Register Notice date: July 3, 1978

Effective listing date: August 2, 1978

Entity listed: Species

Classification: Threatened

3. Associated rulemakings:

The Service has not published additional rules in the Federal Register for this species.

4. Review History:

Each year, the Service reviews and updates listed species information for inclusion in the required Recovery Report to Congress. Through 2013, we did a recovery data call that included status recommendations such as “Stable, Decreasing or Increasing” for this animal. We continue to show that species status recommendation as part of our 5-year reviews. The most recent evaluation for this animal was completed in 2015.

Previous 5-Year Reviews:

5-Year Review of November 6, 1991 (56 FR 56882). In this review, different species were simultaneously evaluated with no species-specific, in-depth assessment of the five factors as they pertained to the different species’ recovery. No changes were recommended to the species’ threatened status.

5-Year Review noticed on September 20, 2005 (70 FR 55157) and completed on January 16, 2008. The Service did not recommend a change to the species’ threatened status.

5-Year Review noticed on March 25, 2014 (79 FR 16366) and completed on July 29, 2016. The Service did not recommend a change to the species’ threatened status.

5. Species’ Recovery Priority Number at start of review:

8, Indicating that the *A. picta* is categorized as a species, has a moderate degree of threat, and has high potential for recovery.

6. Recovery Plan:

Name of plan: Recovery Plan for Painted Snake Coiled Forest Snail.

Date issued: October 14, 1982

II. REVIEW ANALYSIS

A. Application of the 1996 Distinct Population Segment (DPS) policy

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 DPSs only to vertebrate species of fish and wildlife. Because the species under review is an invertebrate, the DPS policy is not applicable.

B. Recovery Criteria

1. List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been achieved.

The recovery plan contains a recovery objective stipulating that “significant populations” need to be found outside of Buck Creek Cove to a degree that no further protection is needed to protect the species. At the time the recovery plan was written, the species was thought to be restricted to approximately 325 acres (ac) in the vicinity

of Buck Creek Cove. Withers (2003, 2004) extended the known range to occupy approximately 2,239 ac, distributed in a narrow vertical band along approximately 9.8 miles of the Cumberland Plateau escarpment in Crow Creek Valley (see Section II.C.1.e below).

The recovery plan also lists five conditions, presented below, that need to be met to be considered recovered, and are treated as recovery criteria. Only criterion 1 has been partially met through land protection, see discussion in Section II.C.2.a below.

Criterion 1 (Factor A). *Anguispira picta* and its habitat are protected from human-related threats and/or modifications that would endanger the species' existence.

Criterion 2 (Factor C and E). *No evident natural threats exist which would likely endanger the species' existence.*

Criterion 3. *A population monitoring program is established and conducted for 4 to 5 years to establish "normal" distribution and abundance for the species and no downward trend is evident.*

Criterion 4. *A means is established to assure that population monitoring will be conducted periodically after delisting.*

Criterion 5 (Factor B). *Collection of the species for scientific or other purposes is controlled or is proven not to threaten the species' continued existence.*

C. Updated Information and Current Species Status

1. Biology and Habitat

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

We are not aware of new information regarding *A. picta* biology or life history since the last 5-Year Status Review.

b. Abundance, population trends, demography:

No new information has been generated relative to the *A. picta* abundance, population trends, demographic features, or demographic trends since the last status review was completed. Our understanding of demographic factors contributing to population resiliency across the species range remains unchanged since the last status review (Service 2016). Service estimates that the total population of *A. picta* was approximately 1,568,221 snails (Table 1).

Table 1. Estimated acres of *A. picta* habitat in varying suitability classes, on the east and west sides of Crow Creek Valley, and corresponding estimates of abundance within those habitat classes (Service 2016).

Habitat Suitability Class	East	West	Total	Snails/Acre ^a	Estimated Snails
Excellent	146	44	190	2,643	502,170
Good	132	178	310	1,687	522,970
Moderate	250	221	471	619	291,549
Poor	412	200	612	411	251,532
Absent	--	371	371	0	0
Total	940	1014	1954		1,568,221

^aConversion factors for estimating number of snails/ac are from Table 2 of Eco-South, Inc. (2010).

The Tennessee Wildlife Resources Agency funded a pilot monitoring program for populations in Sherwood Forest State Natural Area that will attempt to design the best approach to monitor trends and better understand distribution and quality of habitat (Dinkins and Dinkins 2021). A future project will implement the monitoring program and will provide the Service up-to-date information for *A. picta* populations at Sherwood Forest State Natural Area.

c. Genetics:

No new information has been generated relative to *A. picta* genetics since the last status review was completed (Service 2016). Based on the best available information, *A. picta* is a valid species.

d. Taxonomic classification or changes in nomenclature:

No changes to taxonomic classification or nomenclature have occurred since this species was listed. Nomenclature is consistent and follows that in Turgeon et al. (1998) and continues to indicate that the species is a valid entity.

e. Distribution and trends in spatial distribution:

No new information has been generated relative to *A. picta* spatial distribution since the last status review was completed (Service 2016). Based on the best available information, the species' range remains constricted to portions of Cumberland Plateau escarpment on the west and east sides of the Crow Creek Valley.

f. Habitat or ecosystem conditions:

In 2016, The Conservation Fund (TCF) purchased approximately 3,895 ac on the east side of Crow Creek Valley from Sherwood Mining Company (Figure 1). This purchase was made possible by awards to the State of Tennessee from the U.S. Forest Service's Forest Legacy and the Service's Recovery Land Acquisition (RLA) grant programs, funding from TCF, and a grant from the

Open Space Institute. The State of Tennessee purchased the property from TCF and in 2020 designated the lands as the Sherwood Forest State Natural Area. Within the 3,895 ac parcel that TCF purchased, there are approximately 593 ac of habitat of varying quality occupied by *A. picta*, including 118 ac that are excellent quality (Table 2).

Table 2. Estimated acres of *A. picta* habitat, by suitability class in Sherwood Forest, retained by Sherwood Mining Company (SMC) for mining operations, and donated to State of Tennessee for conservation. Data source is Sherwood Mining Company, from data produced by Eco-South, Inc.

Habitat Quality	Sherwood Forest (3,895 ac)	SMC (194 ac)	Mitigation Unit (172 ac)	Total
Excellent	118.1	0.02	11.7	129.82
Good	80.4	9.3	27.7	117.4
Moderate	175.6	20.7	26.2	222.5
Poor	219.1	51.1	96.3	366.5
TOTAL ACRES	593.2	81.12	161.9	836.22

We analyzed land cover data to determine the extent of forested habitat within the range of *A. picta* (Table 3). This analysis was based on the Multi-Resolution Land Characteristics Consortium’s (MRLC) National Land Cover Data for the years 2001 and 2019 (www.mrlc.gov). We calculated the number of acres existing in broad cover classes in each of the two years and assessed changes in the amount of each class over the entire range of the species between 2001 and 2019. The range of the species was defined using polygons delineated by Withers (2003) to represent the population boundaries on the east and west sides of Crow Creek Valley and includes approximately 2,239 acres.

Table 3. Number of acres of forested habitats within range of *Anguispira picta* based on analysis using MRLC National Land Cover Dataset, 2001 and 2019.

Cover Class	2001	2019	Change
Deciduous Forest	2062	2077	+15
Evergreen Forest	0	6	+6
Mixed Forest	117	116	-1

Forested habitat is currently abundant within the known range of *A. picta* and remained stable during the period between 2001 and 2019, with a slight decline in acres of mixed forest (Table 4). Data for both 2001 and 2019 depict a landscape that was at least 98% forested habitat within the known range of *A. picta*. Within forested habitats, deciduous forest cover dominated by a wide margin. The species’ Recovery Plan describes the vegetation in which *A. picta* habitat is found as consisting of deciduous forest cover, and this cover type increased approximately half of one percent from 2001 to 2019.

At the microhabitat scale, Withers (2003) found evidence that populations of *A. picta* may tolerate limited forest canopy removal and a potentially wider range of humidity, indicating the species is able to either tolerate some level of timber harvest or to recolonize harvested areas once forest regeneration produces suitable conditions. Conversely, Withers found *A. picta* absent in areas containing apparently suitable habitat. Possible explanations for such absence could include differences in limestone mineralogy that prevent *A. picta* establishment and survival, absence of suitable forage, barriers to dispersal between patches of occupied and unoccupied suitable habitat, or failure to detect *A. picta* in spite of its presence. These observations demonstrate the need for investigations to determine how microhabitat characteristics, their arrangement on the landscape, trophic interactions, and dispersal ability of *A. picta* influence the species' distribution.

To better understand population trends as well as habitat quality and quantity, the Tennessee Wildlife Resources Agency funded a pilot monitoring program for populations in Sherwood Forest State Natural Area (Dinkins and Dinkins 2021). A future project will implement the monitoring program and will provide the Service up-to-date information on habitat quality and quantity in Sherwood Forest State Natural Area and provide information on the effect of environmental covariates (i.e., humidity, last rain day, monthly rain data, time of day, and temperature) on snail density estimates.

2. Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms):

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

We have no new information about present or threatened destruction, modification or curtailment of *A. picta*'s habitat or range. The best available information continues to indicate that timber harvest, residential development and limestone quarrying continue to be the primary drivers negatively affecting *A. picta* habitat (Service 2016). The present or threatened destruction, modification or curtailment of *A. picta*'s habitat or range has been minimized through the protection of approximately 50 percent of *A. picta*'s total population inhabiting the Sherwood Forest State Natural Area (Service 2016).

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

The overutilization for commercial, recreational, scientific, or educational purposes was not considered to be a limiting factor in the final listing rule. We have no new information to indicate that this has changed.

c. Disease or predation:

Disease or predation were not considered to be a limiting factor in the final listing rule. We have no new information to indicate that this has changed.

d. Inadequacy of existing regulatory mechanisms:

Protections afforded to *A. picta* through regulatory mechanisms have not changed since the last status review (Service 2016). Existing regulatory mechanisms have been inadequate in fully protect the species and its habitats. For example, timber harvest, residential development, and limestone quarrying are not regulated unless they would result in the discharge of fill materials into the waters of the United States, in which case they would require a section 404 permit from the U.S. Army Corps of Engineers under the Clean Water Act. The information available to us at this time does not indicate that the magnitude or imminence of this threat is likely to be appreciably reduced in the foreseeable future.

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

The best available information continues to indicate that severe forest fire and climate change pose a threat to the species (USFWS 2016). In its Fifth Assessment Report, the Intergovernmental Panel on Climate Change (IPCC) concluded that warming of the climate system is unequivocal (IPCC 2014). Droughts in the Southeast are likely to increase in frequency, duration, and intensity (NCILT 2012). Dale et al. (2009) modeled the effects of climate change, land use change, and invasive species on forests of the Cumberland Plateau and Mountains in northern Tennessee and southern Kentucky. They predicted that forest biomass on the Cumberland Plateau would initially decline, and also predicted an increase in evapotranspiration from the region's forests through 2080. There is uncertainty about the specific effects of climate change on *A. picta*; however, species with limited ranges, fragmented distributions, and small population sizes are thought to be especially vulnerable to the effects of climate change (Byers and Norris 2011). These predicted changes in forest composition and water use suggest that habitat changes could occur throughout the range of *A. picta*, both at the forest stand scale and at the scale of microhabitats the species occupies, but we cannot predict how the species will respond to these changes based on available data.

D. Synthesis:

Anguispira picta is a narrow-range, Tennessee endemic snail that inhabits limestone outcrops in portions of the Cumberland Plateau escarpment. Specifically, the species range is estimated to be approximately 2,239 ac in the west and east sides of the Crow Creek Valley in Franklin County, Tennessee.

The species appears to be stable, with an estimated total population greater than 1.5 million individuals (see section II.C.1.b). However, a monitoring program is needed to improve the population estimate and assess population trends over time, as well as improve our understanding of habitat quantity and quality. The Tennessee Wildlife Resources Agency funded a pilot monitoring program for the population in Sherwood Forest State Natural Area, which, once implemented, will help the Service assess *A. picta* population trends and habitat availability in this protected area (Dinkins and Dinkins 2021).

Forested habitat is currently abundant within the known range of *A. picta* and remained stable during the period between 2001 and 2019, with at least 98% forested habitat within

the known range of *A. picta*. Currently, approximately 593 ac of habitat is currently protected by the Sherwood Forest State Natural Area, but additional habitat protection is also a priority to ensure that the population on the western side of Crow Creek Valley is protected from incompatible land uses, such as limestone quarrying.

Despite recent conservations gains through land acquisition (see section II.C.1.f), a significant portion of the total population of the species occurs on private lands where it is vulnerable to resource extraction, including limestone quarrying and timber harvest. Residential development on the Cumberland Plateau has emerged as an additional threat to *A. picta* habitat since the species' Recovery Plan was completed but is not currently adversely affecting the species or its habitat. Other emerging threats are severe forest fires and climate change through changes at the forest stand scale and at the scale of microhabitats the species occupies, but we cannot predict how the species will respond to these changes based on available data.

Due to the *A. picta*'s narrow range; the lack of long-term monitoring data; its continued vulnerability to threats, which have been minimized through land acquisition and protection; and our poor understanding of some threats, we believe that *A. picta* continues to meet the definition of threatened (i.e., any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range). The recovery priority number for the *A. picta* should remain at 8, indicating that *A. picta* is categorized as a species, has a moderate degree of threat, and has high potential for recovery.

III. RESULTS

A. Recommended Classification:

- Downlist to Threatened
- Uplist to Endangered
- Delist (Indicate reasons for delisting per 50 CFR 424.11):
 - Extinction
 - Recovery
 - Original data for classification in error
- No change is needed

B. New Recovery Priority Number: 8

The Service does not recommend a change to the Recovery Priority Number.

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

- Implement conservation actions recommended in the *A. picta* Recovery Plan (Service 1982) or the Tennessee Wildlife Action Plan (<https://www.tn.gov/content/tn/twra/wildlife/action-plan.html>).

V. REFERENCES

- Byers, E. and S. Norris. 2011. Climate change vulnerability assessment of species of concern in West Virginia. West Virginia Division of Natural Resources, Elkins, West Virginia. 72 pp.
- Dale, V.H., K.O. Lannom, M.L. Tharp, D.G. Hodges, and J. Fogel. 2009. Effects of climate change, land-use change, and invasive species on the ecology of the Cumberland forests. *Canadian Journal of Forest Research* 39:467-480.
- Dinkins, G. and B. Dinkins. 2021. Development of Monitoring Program for *Anguispira picta* in Sherwood Forest Year 1 – Program Development, Habitat Mapping and Pilot Study. Report for the U.S Fish and Wildlife Service and Tennessee Wildlife Resources Agency. 16 pp.
- Eco-South, Inc. 2010. Habitat Conservation Plan for the Expansion of the Sherwood Limestone Mine in support of an U.S. Department of the Interior, Fish and Wildlife Service, Incidental Take Permit Application for the Painted Snake Coiled Forest Snail (*Anguispira picta*). Unpublished draft document prepared by Eco-South, Inc., for Sherwood Mining Company. 57 pp. and appendices.
- International Panel on Climate Change (IPCC). 2014. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.
- North Carolina Interagency Leadership Team (NCILT). 2012. Climate Ready North Carolina: Building a Resilient Future. Raleigh, NC. 152 pp.
- U.S. Fish and Wildlife Service (Service). 1982. Recovery Plan for Painted Snake Coiled Forest Snail. 26 pp.
- U.S. Fish and Wildlife Service (Service). 2016. Painted Snake Coiled Forest Snail (*Anguispirapicta*) 5-Year Review: Summary and Evaluation. 21 pp.
- Turgeon, D. D., J. F. Quinn, Jr., A. E. Bogan, E. V. Coan, F. G. Hochberg, W. G. Lyons, P. M. Mikkelsen, R. J. Neves, C. F. E. Roper, G. Rosenberg, B. Roth, A. Scheltema, F. G. Thompson, M. Vecchione, and J. D. Williams. 1998. Common and scientific names of aquatic invertebrates from the United States and Canada: Mollusks. 2nd Edition. American Fisheries Society Special Publication 26, Bethesda, Maryland: 526 pp.
- Withers, D. I. 2003. Distributional surveys for the painted snake coiled forest snail (*Anguispira picta*). Final Report, Revenue Grant #1448-40181-02-G-051. 19 pp.
- Withers, D. I. 2004. Distributional surveys for the painted snake coiled forest snail (*Anguispira picta*). Addendum to Final Report, Revenue Grant #1448-40181-02-G-051. 11 pp.

U.S. FISH AND WILDLIFE SERVICE
5-Year Review of the Painted Snake Coiled Forest Snail
(*Anguispira picta*)

Current Classification: Threatened.

Recommendation resulting from the 5-Year Review:

- Downlist to Threatened**
- Uplist to Endangered**
- Delist**
- No change needed**

Review Conducted By: Santiago Martín, Tennessee Ecological Services Field Office.

FIELD OFFICE APPROVAL:

Daniel Elbert, Tennessee Ecological Services Field Office, Fish and Wildlife Service

Approve _____ Date _____

*Since 2014, Field Supervisors in the Region have been delegated authority to approve 5-year reviews that do not recommend a status change.