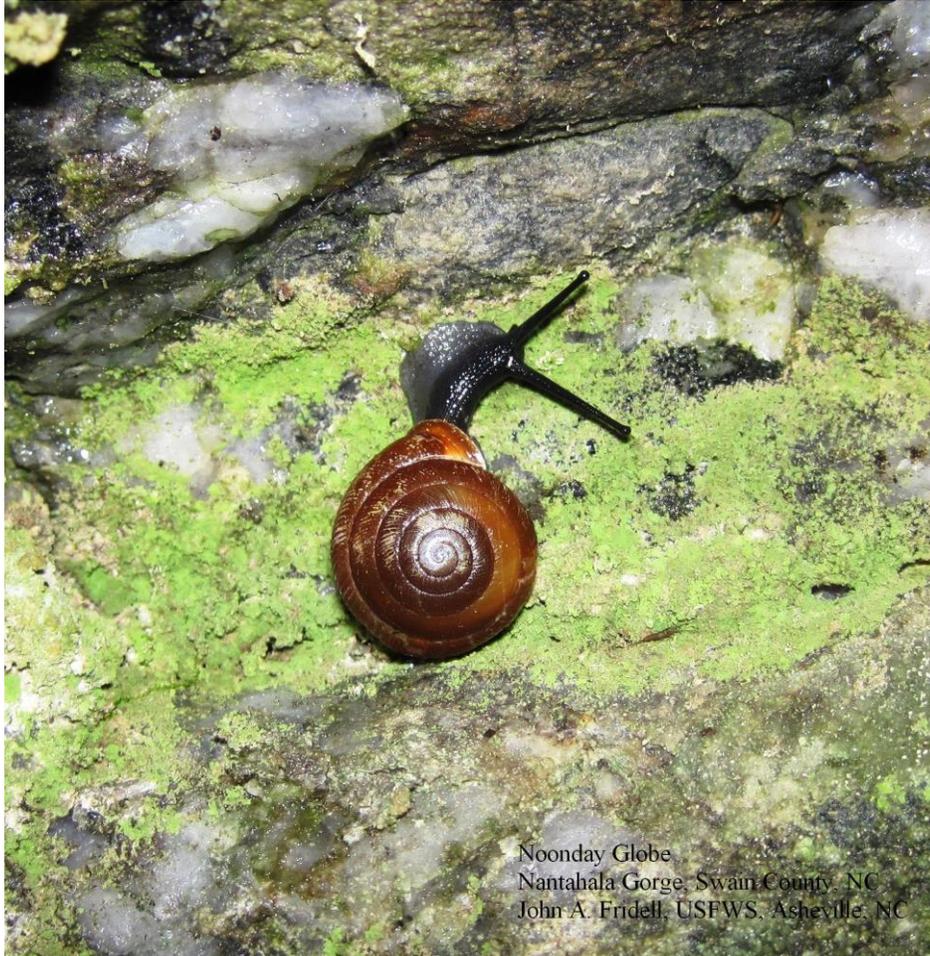


Noonday Globe
Patera (=Mesodon) clarki nantahala

5-Year Review:
Summary and Evaluation

2013



U.S. Fish and Wildlife Service
Southeast Region
Asheville Ecological Services Field Office
Asheville, North Carolina

5-YEAR REVIEW
Noonday Globe/*Patera clarki nantahala*

I. GENERAL INFORMATION

A. Methodology used to complete the review:

We announced initiation of this review and requested information in a published *Federal Register* notice with a 60-day comment period (72 FR 54057). No comments or information concerning the species were received from the public during the comment period. Pertinent data were obtained from the Recovery Plan, published papers, unpublished reports, and experts on this species. Once all data were collected for this species, the status information was compiled and the review was completed by the species' recovery lead biologist in the Asheville Ecological Services Field Office, North Carolina. In conducting this 5-year review, we relied on the best available information pertaining to historic and current distribution, life histories, genetics, habitats, and potential threats of this species. A draft of the 5-year review was peer reviewed by three biologists familiar with this species (see Appendix A). No part of the review was contracted to an outside party. Comments received during this review were evaluated and incorporated as appropriate.

B. Reviewers

Lead Region: Southeast Region, Atlanta, Georgia - Kelly Bibb, 404/679-7132.

Lead Field Office: Ecological Services Field Office, Asheville, North Carolina - John Fridell, 828/258-3939, Ext. 225.

C. Background:

- 1. Federal Register Notice citation announcing initiation of this review:**
72 FR 54057; September 21, 2007
- 2. Species status:** Declining. Although the majority of the species' habitat occurs within the boundaries of Nantahala National Forest, loss of habitat associated with development of adjacent private lands and private in-holdings, highway maintenance activities, spread of invasive, non-native vegetation and prolonged drought appear to have reduced the species' range and numbers.
- 3. Recovery achieved:** 1 (1= 0-25% species recovery objectives achieved)
- 4. Listing history**

Original Listing

FR notice: 43 FR 28932

Date listed: July 3, 1978

Entity listed: subspecies

Classification: threatened

5. **Associated rulemakings:** None.

6. **Review History:**

Final Recovery Plan, 1984

Recovery Data Call: 1998-2013

Five Year Review: November 6, 1991.

In this review (56 FR 56882), different species were simultaneously evaluated with no species-specific, in-depth written assessment of the five factors as they pertained to the different species' recovery. In particular, no changes were proposed for the status of this snail in the review.

7. **Species' Recovery Priority Number at start of review (48 FR 43098):** 9

This means a subspecies with moderate threats and high recovery potential.

8. **Recovery Plan**

Name of plan: Recovery Plan Noonday Snail (*Mesodon clarki nantahala*)

Date issued: September 7, 1984

II. REVIEW ANALYSIS

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

The Endangered Species Act (ESA or 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 DPS to only vertebrate species of fish and wildlife. Because the species under review is an invertebrate (snail), the DPS policy is not applicable.

B. Recovery Criteria

1. **Does the species have a final, approved recovery plan containing objective, measurable criteria?** Yes.

2. **Adequacy of recovery criteria.**

a. **Do the recovery criteria reflect the best available and most up-to date information on the biology of the species and its habitat?** Yes.

b. Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria? Yes.

3. List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information:

The U.S. Fish and Wildlife Service's (Service) recovery plan for the noonday globe (Service 1984) states that the species will be considered for delisting when the following criteria are met:

1. *Patera (=Mesodon) clarki nantahala* and its habitat are protected from human-related or foreseeable natural threats that would jeopardize the species' existence.

The noonday globe is known to be endemic only to the southeast side of the Nantahala River Gorge in the Nantahala National Forest, Swain County, North Carolina (Service 1984; J. Fridell, Service, Asheville, NC, personal observation 1985, 1993, 2012 and 2013). The species has been documented from the vicinity of Silver Mine Creek at the northern end of the gorge, southwest to the vicinity of the North Carolina Highway 19 Bridge crossing of the Nantahala River near the southern end of the gorge (Fridell, personal observation 1985, 1993, and 2013). Within this area of the gorge, the species has been found at scattered sites along the southeast slope of the gorge from the southeast side of NC Highway 19 to near the top ridge of the gorge (Fridell personal observation 1985). The steep southeastern side of the gorge is forested with a mix of various species of hardwood trees and hemlock (*Tsuga canadensis*) and has a rich herbaceous undergrowth - strikingly different in richness from the surrounding slopes, due to underlying calcareous rock and its northern exposure (Braun 1967). Rhododendron (*Rhododendron* sp.) and dog hobble (*Leucothoe fontanesiana*) are also found in the understory. The southeast side of the gorge is very steep and its cliffs are interrupted frequently by small streams, waterfalls, seeps and springs. Because of their aspect, the cliffs are heavily forested and are most often shaded. The forest floor often has a thick humus layer and there is much exposed rock. The noonday globe appears to be most abundant on and around moist rock outcrops, often covered with a variety of bryophytes and fungi, along the streams and scattered seeps draining the southeastern slope, but can also be found in thick leaf litter and humus layers around the base of ferns and underneath rhododendron and dog hobble, and other moist habitats (Fridell pers. obs. 1985). Moist conditions appear to be critical for the species. No estimates of population size have been attempted because of the difficulty in determining total occupied/available habitat due the steepness of the southeast slope of the gorge, but the species appears to be relatively abundant within the gorge, though extremely restricted in overall range. Feeding, growth, and numerous other aspects of the species' life history remain unknown.

The U.S. Forest Service (USFS) has designated the southeast slope of Nantahala Gorge (the portion of the gorge occupied by the noonday globe) as a National Forest Special-Interest Management Area (Nantahala Gorge/Bowing Spring Management Area). In accordance with this designation, the USFS does not conduct any logging activities within the gorge.

At the time of listing, the North Carolina Department of Transportation's (NCDOT) plan for widening of NC Highway 19 through the Nantahala Gorge was identified as the primary threat to existence of the noonday globe. Plans for the widening of the highway were subsequently dropped and, at least currently, no longer pose a threat to the species. However, the Nantahala River and Nantahala Gorge are extremely popular recreational areas and much of the private land adjacent to USFS lands within the gorge has been developed or is being developed to cater to rafters, kayakers, hikers and other recreational users. In addition to the direct loss of noonday globe habitat, the forest clearing and disturbance associated with this development is contributing to spread of kudzu (*Pueraria lobata*), Japanese honeysuckle (*Lonicera japonica*), and other invasive, non-native plants that have eliminated suitable habitat for the snail within portions of the disturbed areas of the gorge. Also, NCDOT routinely conducts vegetative clearing for right-of-way and ditch maintenance along US Highway 19. This clearing and disturbance adversely affects noonday globe habitat in a narrow corridor along the highway and also appears to be contributing to the spread of invasive, non-native plants within the gorge.

Additionally, because the noonday globe requires cool, moist habitat, impacts to the forest canopy associated with wildfire, non-native insect tree pests, and drought potentially pose a significant threat to the species. Any significant opening of the forest canopy could result in increased sunlight penetration and increased air temperature and circulation, resulting in drying of the noonday globes' habitat in the understory. Persistent, prolonged (summer of 2007- early 2009), severe to exceptional drought conditions resulted in at least a temporary loss of habitat for the species (Fridell pers. obs. 2008 and 2009). Surveys of select sites during 2010, 2012 and 2013 indicated a reduction in the numbers of noonday globes at these sites versus the numbers observed prior to the prolonged drought period; however, the snail appeared to be recovering in numbers at these sites (Fridell pers. obs. 2013), though additional surveys will be needed to confirm this.

2. A population monitoring program is established and conducted for at least five years to establish distribution and baseline abundance for the species and that no downward trend is evident.

Although a detailed monitoring program has not been established for the noonday globe, periodic monitoring at various sites within the gorge indicate a loss in suitable habitat associated with development, road maintenance, and spread of

invasive, exotic plants. Also prolonged drought conditions appear to have resulted in at least a temporary significant reduction in the moist habitat conditions required by the snail and likely an associated drop in population levels (Fridell pers. obs. 2008, 2009, and 2011). The snail's ability to withstand prolonged dry conditions and its dispersal rates/travel distances necessary for recolonizing areas once they again become suitable is unknown.

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

Once we are near to meeting the other recovery criteria for delisting of the noonday globe, we will work with our partners to implement a detailed monitoring plan for monitoring the status of the snail following delisting.

4. Collection of the species for scientific or other purposes is controlled or is proven not to threaten the species' continued existence.

There is currently no information available that indicates collection of the species for scientific or other purposes poses a threat to the species.

C. Updated Information and Current Species Status

1. Biology and Habitat

a. Abundance, population trends (e.g., increasing, decreasing, stable), demographic features, or demographic trends:

(See I.B.3. #1 above)

b. Genetics, genetic variation, or trends in genetic variation:

A study of the genetic relationship between occurrences of the noonday globe within various sites within the gorge and overall health of the species within the gorge is needed.

c. Taxonomic classification or changes in nomenclature:

Clench and Banks (1932) named this taxon *Polygyra (Triodopsis) nantahala*. Pilsbry (1940) later relegated it to a subspecies of *Mesodon clarki*. Emberton (1991) reclassified *Mesodon clarki* to *Patera clarki*.

d. Spatial distribution, trends in spatial distribution, or historic range (e.g. corrections to the historical range, change in distribution of the species' within its historic range, etc.):

(See I.B.3. #1 above)

e. Habitat or ecosystem conditions:

(See I.B.3. #1 above)

2. Five-Factor Analysis

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

Currently, the primary factors affecting and/or threatening the noonday globe and its habitat are associated with commercial development (off of USFS lands) at the northern end of the gorge, and the NCDOT's maintenance of US Highway 19, which runs between the Nantahala River and the southeast slope of the Nantahala Gorge (see B.3.1. above). Private lands within the gorge continue to be developed, primarily to cater to rafters, kayakers, hikers and other recreational users. Forest clearing and disturbance associated with this development results in the direct loss of noonday globe habitat and appears to be contributing to encroachment of kudzu, Japanese honeysuckle, and other invasive, exotic plants that eliminate suitable habitat for the snail within disturbed areas of the gorge. Also, vegetative clearing associated with the NCDOT's routine right-of-way and ditch maintenance along US Highway 19 within the gorge adversely affects noonday globe habitat in a narrow corridor along the highway and also appears to be contributing to the spread of invasive, non-native plants within the gorge.

In addition, because of the extremely restricted range of the noonday snail, a forest fire or other significant impact affecting the health of the forest canopy or understory, and/or moisture levels on the southeastern slope of the Nantahala Gorge could have a devastating effect on the status of the snail and could potentially result in the species' extirpation.

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

There is currently no information available that indicates collection of the noonday globe for scientific or other purposes poses a threat to the species. Also, although the Nantahala River Gorge is a popular recreation area, because of its steepness, there is little recreational use of the southeastern slope of the gorge where the noonday globe is found.

c. Disease or predation:

The effects of disease and predation on the noonday globe are currently unknown.

d. Inadequacy of existing regulatory mechanisms:

The state of North Carolina recognizes the noonday globe as a state-threatened species and prohibits the collection of the species for scientific purposes without a valid state collecting permit. However, the state's regulations do not provide any protection to the species from other forms of take or any protection to its habitat, except on state-owned lands (NC ST § 113-331 to 113-350).

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

Because the noonday globe requires cool, moist habitat, wildfire, drought, and exotic insect tree pests continue to pose a significant threat to the species. Persistent (summer of 2007- spring 2009), exceptional drought conditions resulted in at least a temporary loss of habitat of the species. The extent of impacts on population levels and reproduction is currently unknown and cannot be determined until conditions improve.

D. Synthesis

The noonday Globe has been documented only from the southeast side of the Nantahala River Gorge in Swain County, North Carolina. Although the majority of the species' habitat occurs within the boundaries of Nantahala National Forest, loss of habitat associated with development of adjacent private lands and private in-holdings, highway maintenance activities, spread of exotic vegetation and prolonged drought appear to have reduced the species' range and numbers. Additional comprehensive surveys are needed to determine the extent of the effects these activities have had on the snail and available suitable habitat.

III. RESULTS

A. Recommended Classification:

 X No change is needed

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

1. Improve planning, coordination, and efficacy of recovery activities with key partners (e.g., USFS, NCWRC, NCNHP, local conservation NGOs, researchers, etc.) by meeting at least biennially to share information and review and recommend priority recovery actions.
2. Formalize and implement a detailed population and habitat monitoring plan for the species.

3. Continue analyzing threats to the species and measures for off-setting these threats.
4. Continue surveys for previously unknown occurrences of the species.
5. Determine intra- and inter-population genetics. This information is necessary to estimate the relative viability of the population(s).
6. Continue habitat use and life history studies of the species.
7. Continue working with partners to control the spread of non-native species and restore degraded habitat.

V. REFERENCES

- Braun, E.L. 1967. Deciduous forests of eastern North America. Hafner Publishing Company, New York. 596 pp.
- Clench, W.J., and G.S. Banks. 1932. Descriptions of some land snails of southwestern North Carolina. *The Nautilus* 46(1):14-18.
- Emberton, K.C. 1991. The genitalic, allozymic and conchological evolution of the Tribe Mesodontini (Pulmonata: Stylommatophora: Polygyridae). *Malacologia* 33(1-2):78-178.
- Pilsbry, H.A. 1940. Land Mollusca of North America (North of Mexico). Volume 1, Part 2. Academy of Natural Science. Philadelphia. Monograph No. 3.
- U.S. Fish and Wildlife Service. 1984. Recovery plan for the noonday snail *Mesodon clarki nantahala*. Prepared by Van Devender, A.S., Atlanta, Georgia. 30 pp.

**U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW
Noonday Globe (*Patera clarki nantahala*)**

Current Classification: Threatened
Recommendation resulting from the 5-Year Review

 X **No change is needed**

Review Conducted By: John A. Fridell, Asheville Ecological Services Field Office, Asheville, NC

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

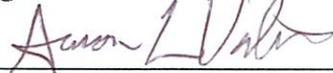
Approve  Date 9-11-13

The lead Field Office must ensure that other offices within the range of the species have been provided adequate opportunity to review and comment prior to the review's completion. The lead field office should document this coordination in the agency record.

REGIONAL OFFICE APPROVAL:

The Regional Director or the Assistant Regional Director, if authority has been delegated to the Assistant Regional Director, must sign all 5-year reviews.

^{for}
Lead Regional Director, Fish and Wildlife Service

Approve  Date 10-28-13

Appendix A. Summary of peer review for the 5-year review of noonday globe (snail) (Patera clarki nantahala)

Peer Reviewers:

Amy S. Van Devender, 797 Little Laurel Rd. EXT, Boone, NC 28607

Sheryl A. Bryan, Fisheries and Wildlife Biologist, US Forest Service, 160A Zillicoa Street, Asheville, NC 28801

Le'Andra J. Smith, Zone Wildlife Biologist, Nantahala National Forest, 90 Sloan Road, Franklin, NC 28734

A. Peer Review Method: Peer review was requested from three knowledgeable individuals.

A draft 5-year review of the noonday globe was sent to each of the reviewers, as an attachment to an email, requesting their review and any changes or additions that should be included in the document. Responses were received from all three peer reviewers.

B. Peer Review Charge: See attached guidance.

C. Summary of Peer Review Comments/Report: Peer reviewer responses were supportive of the information and conclusions presented in this review and only a few minor editorial changes were recommended.

D. Response to Peer Review: The Service was in agreement with all comments received from peer reviewers. Comments were incorporated into the 5-year review where appropriate.

Guidance for Peer Reviewers of Five-Year Status Reviews
U.S. Fish and Wildlife Service, Asheville Ecological Services Field Office

As a peer reviewer, you are asked to adhere to the following guidance to ensure your review complies with U.S. Fish and Wildlife Service (Service) policy.

Peer reviewers should:

1. Review all materials provided by the Service.
2. Identify, review, and provide other relevant data apparently not used by the Service.
3. Not provide recommendations on the Endangered Species Act classification (e.g., endangered, threatened) of the species.
4. Provide written comments on:
 - Validity of any models, data, or analyses used or relied on in the review.
 - Adequacy of the data (e.g., are the data sufficient to support the biological conclusions reached). If data are inadequate, identify additional data or studies that are needed to adequately justify biological conclusions.
 - Oversights, omissions, and inconsistencies.
 - Reasonableness of judgments made from the scientific evidence.
 - Scientific uncertainties by ensuring that they are clearly identified and characterized, and that potential implication of uncertainties for the technical conclusions drawn are clear.
 - Strengths and limitation of the overall product.
5. Keep in mind the requirement that the Service must use the best available scientific data in determining the species' status. This does not mean the Service must have statistically significant data on population trends or data from all known populations.

All peer reviews and comments will be public documents and portions may be incorporated verbatim into the Service's final decision document with appropriate credit given to the author of the review.