

Tulotoma Snail
(Tulotoma magnifica)

5-Year Review:
Summary and Evaluation

U.S. Fish and Wildlife Service
Southeast Region
Ecological Services
Jackson, Mississippi

5-YEAR REVIEW

Tulotoma* snail /*Tulotoma magnifica

I. GENERAL INFORMATION

A. Methodology used to complete the review

In conducting this 5-year review, knowledgeable individuals were contacted for information pertaining to historical and current distribution of the tulotoma snail, its life history, and habitats where it is found. We also relied on available published sources, including the final rule listing the species under the Act, the Recovery Plan, and peer reviewed scientific publications. Data from unpublished survey reports, and notes and communications from other qualified biologists or experts, and unpublished field observations by Service, State and other experienced biologists were also incorporated. The resulting analysis was submitted for peer review to knowledgeable State, University and Museum experts (Appendix A).

B. Reviewers

Lead Region -- Southeast Region: Kelly Bibb, 404-679-7132

Lead Field Office -- Jackson, MS, Ecological Services: Paul Hartfield, 601-321-1125

Cooperating Field Office -- Daphne, AL, Ecological Services: Jeff Powell, 251-441-5858

C. Background

1. FR Notice citation announcing initiation of this review: June 14, 2005: 70 FR 113

2. Species status: Improving (2007, 2006, 2005 Recovery Data Call) Known populations remain stable or are increasing.

3. Recovery achieved: 3 (50-75% recovery objectives achieved) (2007, 2006, 2005 Recovery Data Call)

4. Listing history

Original Listing

FR notice: 56 FR 800

Date listed: January 9, 1991

Entity listed: Species

Classification: Endangered

5. Associated rulemakings: NA

6. Review History: Final Recovery Plan, 2000

Recovery Data Call 2007, 2006, 2005, 2004, 2003, 2002, 2001, 2000, 1999

7. **Species' Recovery Priority Number at start of review (48 FR 43098):**
8, which means threats are moderate, and recovery potential is high.

8. **Recovery Plan or Outline**

Name of plan: Mobile River Basin Aquatic Ecosystem Recovery Plan
U.S. Fish and Wildlife Service, Jackson, MS. 128 pp.
Date issued: November 17, 2000

II. **REVIEW ANALYSIS**

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

1. **Is the species under review listed as a DPS? No**
The tulotoma snail is an invertebrate, and therefore, not covered by the DPS policy,

B. **Recovery Criteria**

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

The Mobile River Basin Aquatic Ecosystem Recovery Plan contains benchmarks for downlisting and delisting tulotoma. These are discussed in section II.B.3, below. However, the criteria do not exactly satisfy the most recent Service guidelines for objective and measurable recovery criteria (see Section IV, Recommendations for Future Actions).

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 (and is there no new information to consider regarding existing or new threats)? No**

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.**

Recovery criteria for reclassification of tulotoma were not specified for tulotoma in the Recovery Plan, but improvement in the status was noted and reclassification was pending based on the results of a status review of trends and threats.

Reclassification criteria from the Recovery Plan:

The immediate recovery objective for the tulotoma snail is to reclassify the species from endangered to threatened status. Recent studies indicate that reclassification may currently be warranted. Since listing, two additional small Coosa River tributary tulotoma snail populations have been discovered, making a total of seven known populations within the drainage. The largest of these is found in the Coosa River, below Jordan Dam, Elmore County, Alabama. Since the tulotoma snail was listed, the Alabama Power Company (APC) has significantly increased minimum flows below Jordan Dam (FERC 1990). Results of a three year study by the APC indicate that this population is stable, reproducing, contains high numbers of individuals, and has the capacity to move into habitat made available by the increase in the minimum flow regime. Additionally, this study has provided valuable information regarding reproduction, fecundity, population demographics, and other important aspects of life history. Other studies funded by the State of Alabama have provided habitat information for several tributary populations. The tulotoma snail will be considered for reclassification from endangered to threatened status when a status review of these studies is completed and confirmation is obtained that a stable or increasing population occurs in the Coosa River below Jordan Dam. The estimated date for reclassification is 2002.

Delisting criteria from the Recovery Plan:

Delisting of the tulotoma snail will be considered when (1) a formal agreement has been developed with Alabama Power Company to maintain base flows below Jordan Dam that are protective for tulotoma, (2) four of the six known tributary snail populations (Choccolocco, Hatchet, Kelly, and Weogufka Creeks) are shown to be stable or increasing, and (3) community developed watershed plans are implemented to protect and monitor water and habitat quality in the four targeted watersheds. The estimated date for delisting is 2010, if recovery criteria are met.

Recovery criteria provided three benchmarks for delisting tulotoma; two of these have been met, and the third is in progress. (1) Alabama Power Company has applied for a new hydropower license from the Federal Energy Regulatory Commission authorizing continued minimum base flows below Jordan Dam that are protective of tulotoma. (2) The range of tulotoma in Hatchet, Kelly and Weogufka Creeks has increased since the species was listed; the Choccolocco Creek population has been stable; and another robust tributary population has been discovered in Weoka Creek. (3) A Lower Coosa River Basin Watershed group has been formed and a plan for the Lower Coosa Basin has been developed; however, specific tributary watershed plans have not been developed or implemented. There is currently no plan for adequately monitoring water or habitat quality in the tributary populations of tulotoma.

C. Updated Information and Current Species Status

1. Biology and Habitat –

a. Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends:

Tulotoma abundance is highest in the Coosa River below Jordan Dam, with minimum densities of 86 snails/m² where it occurs (Christman *et al.* 1996). Total population numbers below Jordan Dam were estimated to be over 109 million snails in 1995, with annual recruitment estimated at 163 million tulotoma (Christman *et al.* 1996). During 1992-1994, population surveys of tulotoma in Kelly Creek found average densities of 17.9 snails/m² with maximum density of 193 snails/m²; while average densities in Hatchet Creek averaged 10.5 snails/m² with maximum density of 262 snails/m² (Christman *et al.* 1996).

Christman *et al.* (1996) studied life history of tulotoma in the Coosa River below Jordan. Tulotoma are live born during the months of May-July, and at sizes of about 3-5 mm height of last whorl (HLW). They grow rapidly during their first year reaching sizes of 11 to 14 mm. Females become reproductively active during the spring/summer of their second year, producing an average of 16 offspring. Females that live beyond their second year grow more slowly, and produce an average 28 juveniles/year. Christman *et al.* (1996) found that few tulotoma survived longer than 2 years of life in the lower Coosa.

The Coosa River and tributary tulotoma populations have been surveyed over a 12 year period (1992-2004) and all populations, with the exception of Ohatchee Creek and recently discovered populations in the Alabama and middle Coosa rivers and Weoka Creek, have been found to be stable or increasing (DeVries 2005). Tulotoma abundance is highest in the Coosa River below Jordan Dam, and lowest in Kelly Creek (DeVries *et al.* 2003). Weoka Creek supports the most abundant tributary population, with average densities within sites ranging up to nearly 175 individuals/ rock (DeVries 2005). The species was rare when first discovered in Ohatchee Creek, and now appears to be extirpated from that stream drainage (DeVries 2005). Size of tulotoma varies between drainages with average larger sized individuals in Weogufka and Kelly Creeks, and smallest in Choccolocco Creek and the Coosa River (DeVries *et al.* 2003).

In 2003, a number of colonies of tulotoma was found in the Coosa River, above and below the mouth of Kelly Creek (Garner *in litt.* 2003). Densities have not been estimated, however, they occur in the “hundreds” at some locations (Garner *in litt.* 2003, Lochamy *in litt.* 2005). A small colony of tulotoma was discovered during the summer of 2006 in the lower Alabama River downstream from Claiborne Lock and Dam (Garner *in litt.* 2006). Individual snails ranged in size from 4 to 22 mm. All were found under one rock. Relic shells were found over a

reach of this river over a mile long, but no other live tulotoma were found during several hours of searching.

b. Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):

Tissue samples of tulotoma from the Coosa River below Jordan Dam, Choccolocco, Kelly, Hatchet, and Weogufka Creeks were compared using electrophoretic analysis (DeVries *et al.* 2003). The Coosa River population was the most variable with highest mean number of alleles per locus, percentage of polymorphic loci, and mean heterozygosity. The lower Coosa River tulotoma population also had three alleles not found in other populations. Genetic similarity ranged from 0.88-0.97, and the populations clustered into two major groups: Hatchet Creek/ Coosa River; and Weogufka/ Choccolocco/ Kelly Creeks.

c. Taxonomic classification or changes in nomenclature: NA

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

When listed, tulotoma populations were known from the lower Coosa River below Jordan Dam, and Ohatchee, Weogufka, Hatchet, and Kelly Creeks. In the years since, populations have been discovered in Choccolocco Creek, Yellowleaf Creek, Weoka Creek, and most recently, in the Alabama River below Claiborne Lock and Dam (DeVries 2005, Garner *in litt.* 2006). In addition, the Kelly Creek population has been extended into the Coosa River above and below the confluence of the stream (Garner *in litt.* 2003, Lochamy *in litt.* 2005).

Spatial distribution and trends of the five tulotoma populations recognized when the species was listed have been monitored for 9-12 years (DeVries 2005). The lower Coosa River population is found throughout a 4.4 mile (mi) reach, and is stable or increasing. Tulotoma colonies appear to be stable within an 8.5 mi reach of Weogufka Creek, an 8.8 mi reach of Hatchet Creek, and a 3.6 mi reach of Kelly Creek. The Ohatchee Creek population appears to be extirpated.

Known extent of other populations discovered since listing include 0.5 mi in Choccolocco Creek, 0.25 mi in Yellowleaf Creek, 1.2 mi in Weoka Creek, and 5.0 mi in the middle Coosa River above and below the confluence of Kelly Creek (DeVries 2005; Garner *in litt.* 2005, Lockamy *in litt.* 2005). A single colony was recently discovered in the lower Alabama River, however, dead shells were found in appropriate habitat over a 1.0 mi reach (Garner *in litt.* 2006). All populations are isolated from each other by dams and impounded waters.

e. Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):

In all populations, distribution is limited by impoundment, and/or by other habitat conditions (e.g., small channel, lower flows, change in substrata, etc.). Due to their limited extent, all populations are susceptible to stochastic and chronic events (e.g., spills, drought and/or landuse runoff).

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

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

When listed, tulotoma was known from five small, localized and isolated populations inhabiting less than 2 percent of its 350 mile historical range. The Coosa River population of tulotoma was known to inhabit only about the lower half of a 6 mile riverine reach below Jordan Dam. This population was affected by, and vulnerable to, existing hydropower discharge regimes below Jordan Dam. The species was also known from four tributary populations in the Coosa drainage considered to be extremely localized and vulnerable to nonpoint source pollution.

In 1992, Alabama Power Company (APC) established minimum flows in the Coosa River below Jordan Dam. APC has installed a draft tube aeration system at Jordan Dam to ensure dissolved oxygen levels are maintained at or above state standards (Grogan *in litt.* 2005). The APC also funded studies to document the range, numbers, demographics, and life history of tulotoma in this portion of the Coosa River (Christman 1995). Numerous tulotoma colonies have been discovered or become established in the upper portion of the reach, while in the downstream portion, tulotoma has extended its range laterally within the channel in habitats made available by the constant minimum flows. Thousands of colonies consisting of millions of snails are now known to inhabit a six-mile reach of the Coosa River below the Dam (Christman *et al.* 1996, DeVries *et al.* 2003).

In 1991, the four known tributary populations of tulotoma were considered to be extremely localized and vulnerable to water quality or channel degradation. Studies and surveys since then have extended the range of the species into about 9 mi of stream channel in both Hatchet and Weogufka creeks, and about 4 mi in Kelly Creek (DeVries 2005). The Kelly Creek population has been extended into about a 5 mile reach of the middle Coosa River (Garner *in litt.* 2003, Lochamy *in litt.* 2005). Although the Ohatchee Creek population has apparently become extirpated, stream surveys have located four previously unknown populations. Tulotoma are now known to inhabit about a 0.5 mi reach of Choccolocco Creek, 0.25 mi of Yellowleaf Creek, 1.2 mi of Weoka Creek, and a single colony has been discovered in the lower Alabama River (DeVries 2005, Garner *in litt.* 2006).

Tributary populations of tulotoma remain vulnerable to water quality degradation. Lower Choccolocco Creek is on the State 303(d) list for organic pollution due to

contaminated sediments (ADEM 2006). Nonpoint source pollution has been identified as a concern in the Yellowleaf Creek and lower Coosa River watersheds (Alabama Clean Water Partnership (ACWP) 2005 Chapter 12). Both watersheds have been designated as High Priority Watersheds by the ACWP due to the high potential of nonpoint source pollution associated with expanding human population growth rates and urbanization. The headwaters of Yellowleaf Creek are about 5 km (3 mi) southeast of the greater metropolitan area surrounding Birmingham, and the watershed is highly dissected by county roads. The lower Coosa River is about 16 km (10 mi) north of the Montgomery greater metropolitan area. Although these watershed are currently meeting their designated uses, both are experiencing growth due to their proximity to major metropolitan areas.

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

Overutilization was not a threat when the species was listed, and is not currently a factor in the species status.

c. Disease or predation:

Neither disease nor predation are known to be factors in the species past or current status.

d. Inadequacy of existing regulatory mechanisms:

The persistence of tulotoma over time, and the improvement of some populations is an indication that existing regulatory mechanisms are adequately protecting the species. Tulotoma are now protected under State law from take or commerce.

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

Tulotoma populations are isolated from each other with virtually no possibility of genetic exchange between them. Populations are also restricted in distribution. Over time, this isolation will result in loss of genetic diversity within populations, and they may become more susceptible to environmental changes within their habitats.

Habitat fragmentation and population isolation have left tulotoma populations vulnerable to local natural or manmade catastrophic events. For example, a soybean spill in the upper Yellowleaf Creek drainage killed numerous fish, mussels, and snails during the summer of 2006 (P. Johnson, pers. comm. 2006). Effects of the spill on the Yellowleaf Creek tulotoma population are unknown.

D. Synthesis.

Tulotoma is currently known from eight separate populations inhabiting a cumulative total of about 35 miles of river and creek channels (approximately 10 percent of historical range). Five of these, lower Coosa River and Hatchet, Weogufka, Kelly, and Weoka creek populations are robust, consisting of thousands of colonies and millions of individual snails (Christman *et al.* 1996, DeVries 2005). A beneficial discharge regime

implemented by Alabama Power Company has improved the status of the snail below Jordan Dam (Christman *et al.* 1996, DeVries *et al.* 2003, DeVries 2005). Water and habitat quality appears to have remained relatively stable in the tributaries since listing, however, tributary populations continue to be vulnerable to nonpoint source pollution from silviculture, agriculture, sod farms, urbanization, and general construction activities, and to natural or manmade catastrophic events (e.g., storms, droughts, spills).

Threats under Factors a and e (above) have been reduced by improvement in the lower Coosa River population of tulotoma since the species was listed; an increase in the extent and sizes of three of the four tributary populations known at the time of listing; and the discovery of a lower Alabama River population and three new Coosa River tributary populations. Threats under Factors a and d have been reduced by Alabama Power Company establishing minimum flows below Jordan Dam, implementing measures to reduce the threat of accidents and spills below generation facilities, and sponsoring important studies on life history, fecundity, abundance and demographics of tulotoma.

III. RESULTS

A. **Recommended Classification:**

Although tulotoma are only known to inhabit 35 miles of stream and river channels, any individual event is unlikely to seriously impact all eight surviving populations simultaneously. The large numbers of snails, the number of surviving populations, the nature of their river and large stream habitats, and the improvement in their status makes it unlikely that tulotoma will become extinct within the foreseeable future. Therefore, the best scientific and commercial data available indicate that tulotoma is no longer an endangered species. Tulotoma remains extirpated from a significant portion of its historical range. Surviving drainage populations are isolated and remain vulnerable to changes in water quality, land use runoff, toxic spills, as well as floods and droughts. Therefore, threatened status is currently appropriate for the species.

 X **Downlist to Threatened**

B. **If a reclassification is recommended, indicate the Listing and Reclassification Priority Number (FWS only):**

Reclassification (from Endangered to Threatened) Priority Number: 4

IV. RECOMMENDATIONS FOR FUTURE ACTIONS.

- **Develop and implement a monitoring plan for all populations.**
- **Work with local communities to develop and implement watershed management plans protective of tulotoma populations and their aquatic habitats.**

V. REFERENCES.

- Alabama Clean Water Partnership. 2005. Lower Coosa River Basin Management Plan. Delaney Consultant Services, Inc. Montgomery, AL. Chapter 9; Chapter 12, pg. 10.
- Alabama Department of Environmental Management. 2006. Draft 2006 section 303(d) list. Alabama Department of Environmental Mangement. Montgomery, AL. 10 pp.
- Christman, S.P., F.G. Thompson, and E.L. Raiser. 1995. *Tulotoma magnifica* (Conrad) (Gastropoda: Viviparidae) status and biology in the Coosa River below Jordan Dam, Alabama. Final Report to Alabama Power Company. Birmingham, AL. 63 pp.
- Christman, S.P., E.L. Mihalcik, and F.G. Thompson. 1996. *Tulotoma magnifica* (Conrad, 1834) (Gastropoda: Viviparidae) status and biology in the Coosa River, Alabama. Malacological Review 29: 17-63.
- DeVries, D.R. 2005. Evaluating changes in the *Tulotoma magnifica* populations in the Coosa River and its tributaries during 1992 through 2004. Final Report to U.S. Fish and Wildlife Service, Jackson, MS. 50 pp.
- DeVries, D.R., D.L. Armstrong, Jr., M. Topoloski, W.E. Pine, III, J.A. Johnson, R.A. Dunham, L. Robison, J. Dibona, K. Norgren, P. Hartfield and S. Cook. 2003. Distribution, habitat use, and genetics of *Tulotoma magnifica* (Gastropoda: Viviparidae). Southeastern Naturalist 2(1): 35-58.
- FERC. 1990. Federal Energy Regulatory Commission order on appeal and on requests for rehearing of denial of stay and for declaratory order (Project Number 618), November 20, 1990.
- U.S. Fish and Wildlife Service. 1991. Endangered and threatened wildlife and plants: endangered status determined for the tulotoma snail. Federal Register 56(6): 797-800
- U.S. Fish and Wildlife Service. 2000. Mobile River Basin aquatic ecosystem recovery plan. Atlanta, GA. 128 pp.
- Other:**
- Garner, J. 2003. Re: Logan Martin. 8/15/2003 email.
- Garner, J. 2006. Tulotoma in Alabama River. 8/06/2006 email.
- Grogan, J.D. 2005. Re: Five-year review of twenty-five southeastern species, including tulotoma snail. 8/15/2005 letter.

Lochamy, J.S. 2005. Tulotoma location. 11/03/2005 email to J. Powell, Daphne, AL.

Provided Information:

Jeff Garner, Alabama Department of Conservation and Natural Resources

Jeff Powell, U.S. Fish and Wildlife Service

James S. Lochamy, Alabama Power Company

John Grogan, Alabama Power Company

Peer-Reviewers –

Mr. Jeff Garner
Alabama Department of Conservation and Natural Resources

Dr. Paul Johnson
Alabama Department of Conservation and Natural Resources

Dr. Dennis DeVries
Auburn University

Dr. F.T. Thompson
Florida Museum of Natural History

Dr. A.E. Bogan
North Carolina Museum of Natural History

**U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of TULOTOMA**

Current Classification Endangered
Recommendation resulting from the 5-Year Review

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

Appropriate Listing/Reclassification Priority Number, if applicable 4

Review Conducted By Paul Hartfield

FIELD OFFICE APPROVAL:

Acting Lead Field Supervisor, Fish and Wildlife Service, Jackson, MS

Approve *[Signature]* Date 9-21-06

Cooperating Field Supervisor, Fish and Wildlife Service, Daphne, AL

Concur *[Signature]* Date 10/12/06

Not concur _____ Date _____

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.

Acting Lead Regional Director, Fish and Wildlife Service

Approve *[Signature]* Date 2/29/08

**APPENDIX A: Summary of peer review for the 5-year review of the tulotoma snail
(*Tulotoma magnifica*)**

A. Peer Review Method:

The 5-year review was emailed to five potential reviewers with known knowledge of and interest in tulotoma and snails of the Mobile River Basin. Reviewers were solicited for comments on the accuracy of the data used, identification of any additional information that was not considered in the review, as well as comments on conclusion and recommendations. Reviewers included State, University, and Museum biologists.

B. Peer Review Charge:

Gentlemen:

On June 14, 2005, the U.S. Fish and Wildlife Service published a notice in the Federal Register announcing a 5-year review of 25 federally listed species, including the tulotoma snail. The purpose of the 5-year review is to summarize new information for the species, ensure that the classification of species as threatened or endangered is accurate and reflects the best available information, and to identify actions required to conserve the species.

You have been identified as knowledgeable about the tulotoma snail and the Mobile River Basin. In order to ensure that the best available information has been used to conduct this 5-year review, we now request your peer review of the attached document. The format is standardized, and we are seeking comments on the accuracy of the data used, identification of any additional new information that has not been considered in this review, and our conclusion and recommendations. Also note that this review will not be published, but will become a part of the tulotoma snail administrative record.

We appreciate your interest in furthering the conservation of rare plants and animals by becoming directly involved in the review process of our Nation's threatened and endangered species. Your review and comments will also become a part of the administrative record for these 11 mussel species, and you can be certain that your information, comments, and recommendations will receive serious consideration.

We hope that you view this peer review process as a worthwhile undertaking. Please give me a call if you have any questions or if you need copies of the references cited (601-321-1125). Also feel free to respond by email (paul_hartfield@fws.gov) or letter, whichever is most convenient. Thank you for your assistance.

Sincerely,

Paul Hartfield
Endangered Species Biologist
U.S. Fish and Wildlife Service

6578 Dogwood View Parkway
Jackson, MS 39213



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C. Summary of Peer Review Comments/Report

Comments were received from two of the five solicited reviewers.

Dr. Art Bogan, North Carolina Museum of Natural History recommended capitalizing the common name of tulotoma, and provided several edits to the text and citations.

Dr. Dennis DeVries, Auburn University, concurred with the accuracy of the information, analysis, conclusions, and recommendations.

Jeff Garner, Alabama Department of Conservation and Natural Resources, concurred with the information and recommendations.

D. Response to Peer Review –

Dr. Bogan was informed that it has been Service policy to use lower case for most common names. All other editorial suggestions he recommended were incorporated into the final review.