

U.S. FISH AND WILDLIFE SERVICE SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME:

Cyclonaias aurea

COMMON NAME:

Golden Orb

LEAD REGION:

Region 2 (Southwest Region)

INFORMATION CURRENT AS OF:

November 12, 2018

STATUS/ACTION:

- Species assessment - determined either we do not have sufficient information on threats or the information on the threats does not support a proposal to list the species and, therefore, it was not elevated to Candidate status
- Listed species petitioned for uplisting for which we have made a warranted-but-precluded finding for uplisting (this is part of the annual resubmitted petition finding)
- Candidate that received funding for a proposed listing determination; assessment not updated
- New candidate
- Continuing candidate
- Listing priority number change
 - Former LPN:
 - New LPN:
- Candidate removal: Former LPN: 8
 - (F) Range is no longer a U.S. territory
 - (U) Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
 - (I) Insufficient information exists on taxonomy, or biological vulnerability, and threats to support listing.
 - (M) Taxon mistakenly included in past notice of review.
 - (N) Taxon does not meet the definition of "species." (see explanation below)
 - (X) Taxon believed to be extinct.
 - (A) More abundant than believed, diminished threats, or threats eliminated.

Date when the species first became a Candidate: October 6, 2011

PETITION INFORMATION:

Non-petitioned

Petitioned October 15, 2008

- 90-day substantial finding FR publication date: December 15, 2009
- 12-month warranted but precluded finding FR publication date: October 6, 2011

For petitioned candidate species:

- a. Is listing warranted? No
- b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? Yes
- c. Why is listing precluded?

PREVIOUS FEDERAL ACTIONS:

On June 25, 2007, the Service received a formal petition dated June 18, 2007, from Forest Guardians (now WildEarth Guardians), requesting that the Service: (1) Consider all full species in the Southwest Region ranked as G1 or G1G2 by the organization NatureServe, except those that are currently listed, proposed for listing, or candidates for listing; and (2) List each species as either threatened or endangered with critical habitat. The petitioned group of species included four Texas mussel species, one of which is included in this assessment: *Cyclonaias aurea*, golden orb. The Petition incorporated all analyses, references, and documentation provided by NatureServe in its online database at <http://www.natureserve.org/> into the petition. Included in NatureServe was supporting information regarding the species taxonomy and ecology, historical and current distribution, present status, and actual and potential causes of decline. The Service sent a letter dated July 11, 2007, to Forest Guardians acknowledging receipt of the petition and stating that the petition is under review by staff in the Southwest Regional Office.

On December 15, 2009, the Service published a 90-day finding that the petition presented substantial scientific information indicating that listing nine Texas mussels may be warranted (74 FR 66260). As a result of the finding, the Service initiated a status review for all nine species, including the golden orb.

On October 6, 2011, the Service published a 12-month finding on the June 18, 2007, petition to list the golden orb, but precluded by other higher priority listings (76 FR 62166).

ANIMAL/PLANT GROUP AND FAMILY:

Animalia, Mollusca, Bivalvia, Unionoida, Unionidae, Cyclonaias

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE:

- **Countries:** United States
- **States/US Territories:** Texas
- **US Counties:** Bandera, Bexar, Blanco, Caldwell, Comal, De Witt, Duval, Frio, Gillespie, Goliad, Gonzales, Guadalupe, Hays, Jim Wells, Karnes, Kendall, Kerr, La Salle, Live Oak, McMullen, Nueces, Refugio, San Patricio, Victoria, Wilson, Zavala

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE:

- **Countries:** United States
- **States/US Territories:** Texas
- **US Counties:** Bexar, Caldwell, Comal, Goliad, Gonzales, Guadalupe, Karnes, Kerr, Live Oak, McMullen, Refugio, San Patricio, Victoria, Wilson

LAND OWNERSHIP:

All of the known golden orb populations in the Guadalupe, San Marcos, and San Antonio River systems are adjacent to private land.

LEAD REGION CONTACT:

Susan Oetker, 404-679-7050, susan_oetker@fws.gov

LEAD FIELD OFFICE CONTACT:

Texas Coastal Ecological Services Field Office, Charrish Stevens, 281-212-1503, charrish_stevens@fws.gov

BIOLOGICAL INFORMATION:

Species Description

The golden orb, now known as pimpleback (Johnson *et al.* 2018, p. 12), is small, usually less than 82 millimeter (mm) (3.2 inches (in)) (Howells 2010, p. 5). Its shell shape ranges from oval to nearly round, subquadrate, and somewhat subrectangular, and is moderately compressed with a moderately thick shell (Howells 2010, p. 5). The outer shell usually has no sculpturing, except for concentric growth rings (Howells 2010, p. 5). In rare cases, some shells have hints of pustules on the central part of outer shell (Howells 2010, p. 5). External shell coloration varies from yellow-brown, gold, or orangish-brown to dark brown or black (Howells 2010, p. 5). Some individuals may show faint greenish rays. Internally, the nacre is white to bluish-white (Howells 2010, p. 5).

Taxonomy

The golden orb was originally described as *Unio aureus* by Lea in 1859 and later moved to the genus *Quadrula* in 1900 by Simpson (Howells *et al.* 1996, p. 108). Graf and Cummings (2007, p. 18) proposed moving it to the genus *Amphinaias*, but other freshwater mussel taxonomists recommended waiting for additional work to be completed on members of *Quadrula* before splitting the genus (Bogan 2011, pers. comm.). In 2017, Williams *et al.* (p. 46-47) moved golden orb along with other *Quadrula* spp. to the genus *Cyclonaias*. Changes in mussel taxonomy reflect a better understanding of mussel phylogenetic relationships obtained mainly from molecular genetic data (Williams *et al.* 2017, p. 34). Howells (2010, p. 5), Turgeon *et al.* (1998, p. 36), and Williams *et al.* (2017, p. 46-47) recognized golden orb as a taxonomically valid species at the time of their review of the species.

Recent genetic findings indicates that golden orb is synonymous with *Cyclonaias pustulosa* (pimpleback) (Johnson *et al.* 2018, p. 12); in other words, golden orb is the same species as the pimpleback. Johnson *et al.* (2018, p. 11) used an integrative taxonomic approach that utilized multi-locus sequence data (genetic information), morphometric analyses (examining shell shape), and geographic distributions to investigate species boundaries within the *C. pustulosa* (pimpleback) species complex (*C. houstonensis*, *C. aurea*, *C. mortoni* (western pimpleback), and *C. refulgens* (purple pimpleback)). Additionally, morphological characteristics used to describe golden orb described by Howells *et al.* 1996, p. 108) were generally subtle, and reevaluation of these characteristics among the other members of the pimpleback species complex showed no statistically significant variance associated with species-level taxonomy. The potentially distinguishing body characteristics and population isolation evaluated between pimpleback species complex contained no statistically significant differences to indicate that they were separate species (Johnson *et al.* 2018, p. 11). These findings support that four geographically isolated taxa (including *C. aurea*, golden orb) are not valid species. This conclusion has been supported by the scientific community, including the Freshwater Mollusk Conservation Society, and therefore the Service no longer considers golden orb to be a valid species under the Act.

Habitat/Life History

Not applicable

Historical Range/Distribution

Not applicable

Current Range/Distribution

Not applicable

Population Estimates/Status

Not applicable

Summary of Biological Information

The golden orb genus moved from *Quadrula* to *Cyclonaias* (Williams *et al.* 2017, pp. 46-47). More recently, it was synonymized with a more widespread species, *C. pustulosa*, pimpleback; therefore, golden orb is no longer a valid species (Johnson *et al.* 2018, p. 12).

DISTINCT POPULATION SEGMENT (DPS):

Not Applicable

SIGNIFICANT PORTION OF THE RANGE (SPR):

Not Applicable

THREATS:

An assessment of threats is not applicable because the taxon no longer meets the definition of "species" (i.e., the taxonomic classification of this mussel has changed; the golden orb is a synonym of the more widespread Pimpleback).

Cumulative Effects

Not applicable

Conservation Measures Planned or Implemented

Not applicable because the taxon no longer meets the definition of "species" (i.e., the taxonomic classification of this mussel has changed; the golden orb is a synonym of the more widespread pimpleback).

SUMMARY OF THREATS:

Not Applicable

FINDING:

Recent genetic studies (Johnson *et al.* 2018) revealed that individuals thought to be golden orb are actually member of a more widespread, common species, the pimpleback. These studies have been widely accepted by the relevant scientific community and the Service. Due to being synonymized with pimpleback, golden orb is no longer a valid species as defined in the Act. Therefore, it is no longer warranted for listing under the Act. We are removing the golden orb from candidate status.

BATCHED NOTICE LANGUAGE:

For species that are being removed from candidate status

Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)? No

RECOMMENDED CONSERVATION MEASURES:

Not applicable because the taxon no longer meets the definition of "species" (i.e., the taxonomic classification of this mussel has changed; the golden orb is a synonym of the more widespread pimpleback).

Priority Table

Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/Population	3

Moderate to Low	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/Population	6
	Imminent	Monotypic genus	7
		Species	8
		Subspecies/Population	9
Non-imminent	Monotypic genus	10	
	Species	11	
	Subspecies/Population	12	

Rationale for Change in Listing Priority Number: Not applicable

Magnitude: Not applicable

Imminence: Not applicable

Not applicable Have you promptly reviewed all of the information received regarding the species for the purpose of determination whether emergency listing is needed?

Emergency Listing Review

Not applicable Is Emergency Listing Warranted? Emergency listing is not warranted because the taxon does not meet the definition of "species" (i.e., the taxonomic classification of this mussel has changed, the golden orb is now considered synonymous with a more widespread species, the pimpleback).

Description of Monitoring:

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment:

Not applicable

Indicate which State(s) did not provide any information or comment:

Not applicable

State Coordination:

Not applicable

Literature Cited:

Bogan, A. E. 2011. Phone conversation regarding resurrected genus *Amphinaias*. North Carolina Museum of Natural History, Raleigh. June 10, 2011.

- Graf, D. L. and K. S. Cummings. 2007. Review of the systematics and global diversity of freshwater mussel species (Bivalvia: Unionoida). *Journal of Molluscan Studies* 73:291-314.
- Howells, R. G. 2010. Golden orb (*Quadrula aurea*): summary of selected biological and ecological data for Texas. *BioStudies*, Kerrville, Texas. 18 pp.
- Howells, R. G., R. W. Neck, and H. D. Murray. 1996. *Freshwater mussels of Texas*. Texas Parks and Wildlife Press, Austin, Texas. 218 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. 277 pp.
- Johnson, Nathan A., C.H. Smith, J.M. Pfeiffer, C.R. Randklev, J.D. Williams, and J.D. Austin. 2018. Integrative taxonomy resolves taxonomic uncertainty for freshwater mussels being considered for protection under the U.S. Endangered Species Act. *Science Reports* 8:15892. 16 pp.
- Simpson, C.T. 1900. Synopsis of the naiades, or pearly fresh-water mussels. *Proceedings of the United States National Museum* 22:501-1044.
- Williams, James D., A.E. Bogan, R.S. Butler, K.S. Cummings, J.T. Garner, J.L. Harris, N.A. Johnson, and G.T. Watters. 2017. A revised list of the freshwater mussels (Mollusca: Bivalvia: Unionoida) of the United States and Canada. *Freshwater Mollusk Biology and Conservation* 20:33-58

APPROVAL/CONCURRENCE:

Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: 
Regional Director, Fish and Wildlife Service

Date 2/22/19

Concur: 
Principal Deputy Director, Fish and Wildlife Service

Date 7-25-19

Do not concur: _____
Director, Fish and Wildlife Service

Date

Director's Remarks: