

CANDIDATE ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Eua zebrina*

COMMON NAME: Tutuila tree snail; sisi vao

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: February 2003

STATUS/ACTION (Check all that apply):

New candidate

Continuing candidate

Non-petitioned

Petitioned - Date petition received: ____

90-day positive - FR date: ____

12-month warranted but precluded - FR date: ____

Is the petition requesting a reclassification of a listed species?

Listing priority change

Former LP: ____

New LP: ____

Latest date species first became a Candidate: November 15, 1994

Candidate removal: Former LP: ____ (Check only one reason)

A - Taxon more abundant or widespread than previously believed or not subject to a degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

F - Range is no longer a U.S. territory.

M - Taxon mistakenly included in past notice of review.

N - Taxon may not meet the Act's definition of a species. @

X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Partulidae (Snail)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: American Samoa (island of Tutuila)

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: American Samoa (island of Tutuila)

LEAD REGION CONTACT (Name, phone number): Scott McCarthy (503/231-6131)

LEAD FIELD OFFICE CONTACT (Office, name, phone number): Pacific Islands Office, Mike Richardson (808/541-3441)

BIOLOGICAL INFORMATION:

Eua zebrina is a member of the family Partulidae, which is widely distributed throughout the high islands of Polynesia, Melanesia and Micronesia in the south- and west-Pacific basin (Cowie 1992). Many of the 120 partulid species (Kondo 1968) are restricted to single islands or isolated groups of islands. The Samoan partulid tree snails are a good example of this endemism. The two large islands of Western Samoa (Savai'i and 'Upolu) are home to five partulid tree snails. Only one of these, *Samoana conica*, is found in American Samoa. Three additional partulid species are endemic to single islands in American Samoa; *Samoana abbreviata* (considered to be extinct) and *Eua zebrina*, both on the island of Tutuila, and *S. thurstoni* on the island of Ofu.

The biology of Samoan partulid tree snails has not been extensively studied. However, there is considerable information (reviewed by Cowie 1992) on the partulid tree snails of the Mariana Islands (Crampton 1925a; Hopper and Smith 1992) and the Society Islands (Crampton 1925b, 1932; Murray *et al.* 1982; Johnson *et al.* 1986a, b). This ancient family of snails is considered to be ovoviviparous, although viviparity may be a more accurate description, as considerable growth occurs *in utero*. Some species in the family are known to be self-fertile while other partulids, including *Samoana conica* of Tutuila, rely predominantly on out crossing (Johnson *et al.* 1986a). In the genus *Partula*, shell length at birth is 3-3.5 millimeters (mm) (0.12-0.14 inches (in.)) and sexual maturity is attained in less than 1 year at a shell length of 11-30 mm (0.43-1.18 in.), depending on the species. Adults live for about 5 years and give birth about every 20 days, producing about 18 offspring per year (Cowie 1992). Most members of the family are arboreal herbivores, feeding mainly on decaying plant material (Murray *et al.* 1982). One exception to this general feeding preference was reported by Cooke (1928) for *Eua zebrina*. He reported that this species feeds on other non-partulid snails during periodic visits to the forest floor. Cooke (1928) also suggested that habitat partitioning may occur among the three partulids of Tutuila. *Samoana conica* and *S. abbreviata* were commonly found on trunks and branches, and *Eua zebrina* was commonly found on leaves. A similar partitioning of habitat has been reported for the *Partula* of the Society Islands (Murray *et al.* 1982).

In a recent survey, only 34 individuals of *Eua zebrina* were seen alive; 11 at Sauma Ridge (122-168 meters (m) (400-551 feet (ft)) elevation) and 23 on Nu'usetoga Island (73 m (239 ft)) elevation; about 100 m (328 ft) offshore of Tutuila (Miller 1993). At both sites, the snails were found scattered on understory vegetation in a forest with an intact canopy 10-20 m (33-66 ft) above the ground. At Sauma Ridge, the alien predatory snail, *Euglandina rosea*, was found alive within meters of some of these snails. Shells of *Eua zebrina* and another Samoan partulid (*Samoana conica*) were found on the ground at several of the locations surveyed on Tutuila, along with numerous shells and an occasional live individual of *E. rosea*.

The population on Nu=usetoga Island was probably isolated from an ancestral parent population of the main island of Tutuila in prehistoric time. No live *Euglandina rosea* or *Gonaxis kibweziensis* were found on this offshore islet. Thus, the *Eua zebrina* on this island are, for the moment, safe from predatory snails. However, predation by rats is a problem, and several rat-damaged shells were found.

There is very little data that can be used to assess long-term temporal changes in the snail fauna of American Samoa. However, qualitative comparisons can be made between a 1993 survey (Miller 1993) and surveys done in 1975 (Solem 1975 and Christensen 1980). Of the 15 endemic

species recorded alive in 1975, living individuals of five species and the shells of two additional species were seen in 1993. This qualitative comparison plus the more recent survey data indicate that the native snail fauna have declined dramatically and that the partulid tree snails and several other terrestrial and arboreal species are on the verge of extinction. A current estimate of the number of *Eua zebrina* remaining on Tutuila is less than 1,000.

The declines of these native snails have resulted from: (1) predation by introduced snails and rats; (2) loss of habitat to forestry and agriculture; and (3) loss of forest structure to hurricanes and alien weeds that establish after these storms. These threats may interact to greatly exacerbate the loss of populations and species.

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

Loss of habitat to agriculture and to storms has greatly reduced the native habitat of Samoan snails. All live *Eua zebrina* tree snails were found on understory vegetation beneath remaining intact forest canopy. No snails were found in areas bordering agricultural plots or in forest areas that were severely damaged by three recent hurricanes (1987, 1990, and 1991). Under natural historic conditions, loss of forest canopy to storms did not pose a great threat to the long term survival of these snails. Enough intact forest with healthy populations of snails would support dispersal back into newly regrown canopy forest. However, the presence of introduced alien weeds such as mile-a minute vine (*Mikania micrantha*) and weedy tree species such as *Funtumia elastica* may reduce the likelihood that native forest will become re-established in areas damaged by hurricanes (Whistler 1992). This loss of habitat to storms is greatly exacerbated by an expanding agriculture needed to support one of the world's highest human population growth rates (Craig *et al.* 1993). Agricultural plots have spread from low elevation up to middle and some high elevations on all the islands, greatly reducing the forest area and thus reducing the resilience of the forest and its populations of native snails. These reductions also increase the likelihood that future storms will lead to the extinction of populations or species that rely on the remaining canopy forest.

B. Overutilization for commercial, recreational, scientific, or educational purposes.

In the past, snails were used in ornamental products. This is no longer a major threat since populations of *E. zebrina* are now difficult to locate. However, at the present time, collecting a few adult snails can remove a large percentage of the reproductive population in a bush or tree, thereby driving that population closer to extinction. Collecting of tree snails must now be viewed as a threat to the further survival of the species.

C. Disease or predation.

The alien giant African snail, *Achatina fulica*, was introduced into American Samoa prior to 1977. This snail is a crop pest and an intermediate host of the rat lung worm, *Angiostrongylus cantonensis*, which can cause human eosinophilic meningoencephalitis (Alicata 1962 and Mead 1979). The most commonly recommended biological control agent of the giant African snail is

the predatory snail *Euglandina rosea*. However, *E. rosea* is also a host to the rat lung worm (Wallace and Rosen 1969) and occupies a wider range of habitats than does the giant African snail (van der Schalie 1969; Mead 1961), potentially spreading the rat lung worm through a wider area. It is not known if the parasite can be maintained in populations of native snails or if a parasite load would have negative effects on snail reproduction.

In an effort to eradicate the giant African snail, alien predatory snails, *Euglandina rosea* and *Gonaxis kibweziensis*, were introduced in 1980 and 1977, respectively. *A. fulica* and *E. rosea* have spread throughout the main island of Tutuila and have also spread to the island of Ta'u. By 1984, *E. rosea* was considered to be well established on Tutuila (Eldredge 1988). *Gonaxis kibweziensis* is present only on Tutuila and seems to be in decline.

After an initial increase lasting up to several years, the populations of giant African snails typically go into decline (Mead 1961). Available data does not definitively show that reductions in population size are due to predation by carnivorous snails (Mead 1961; Hadfield and Kay 1981; Christensen 1984; Eldredge 1988). In fact, *Euglandina rosea* is probably not of great importance as a predator of giant African snails (Mead 1961), preferring instead to feed on small snails (Cook 1989 and Griffiths *et al.* 1993), which include most of the native snails on the Pacific islands to which it has been introduced. The lack of evidence for predatory control of the giant African snail has not stopped the intentional spread of snail predators like *E. rosea* into and throughout the Pacific basin, although numerous studies show that *E. rosea* feeds on endemic island snails and is a major agent in their declines and extinctions (van der Schalie 1969; Colman 1977; Hart 1978; Howarth 1983, 1985, and 1991; Clarke *et al.* 1984; Pointier and Blanc 1984; Murray *et al.* 1988; Hadfield and Mountain 1981; Hadfield 1986; Hadfield *et al.* 1989 and 1993; Kinzie 1992). At present, the major threat to long-term survival of the native snail fauna in American Samoa is predation by *Euglandina rosea*.

Recent surveys recorded partulid tree snail shells that were damaged in a fashion that is typical of rat predation; the shell is missing a large piece of the body whorl or the apex. Old shells may be weathered in a similar fashion, except that the fracture lines are not sharp and angular. Signs of rat predation were seen at the sites with the largest remaining populations of partulid tree snails (Sauma Ridge and Nu'usetoga Island). Studies in Hawaii (Hadfield *et al.* 1993) have shown that both rats and *Euglandina rosea* can quickly devastate tree snail populations. Live trapping in Hawaii has implicated the Polynesian rat (*Rattus exulans*), although *R. rattus* and *R. norvegicus* may also be significant threats to native snail populations. All three species have been introduced throughout the Pacific islands.

D. The inadequacy of existing regulatory mechanisms.

Currently, no formal or informal protection is given to *Eua zebrina* by the Federal or American Samoa governments or by private individuals or groups.

E. Other natural or manmade factors affecting its continued existence.

Random environmental events, such as hurricanes and droughts, could affect the continued existence of the *Eua zebrina* due to the small numbers of populations and individuals that

remain. This is especially true due to several life-history features of this and all other *Partulid* tree snails (Cowie 1992). Adults require eleven months to reach sexual maturity, reproductive rates are low, eggs are not laid as in most terrestrial snails, but the young are born live, and dispersal is very limited with most individuals remaining in the tree or bush into which they were born. All of these traits make these snails very sensitive to any random event that could lead to a reduction or loss of reproductive individuals.

FOR RECYCLED PETITIONS:

- a. Is listing still warranted? ____
- b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? ____
- c. Is a proposal to list the species as threatened or endangered in preparation? ____
- d. If the answer to c. above is no, provide an explanation of why the action is still precluded.

LAND OWNERSHIP: Land ownership in American Samoa generally follows a historic village tradition. Large sections of land around each village is controlled by that village for the use of the village residents. The Nu=usetoga Island population of *Eua zebrina* is within the bounds of Masefau Village, while the Sauma Ridge population of this snail is within the bounds of Amalau Village.

PRELISTING: None

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LISTING PRIORITY (* after number)

THREAT

Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2*
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude:

Imminence:

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all additions of species to the candidate list, removal of candidates, and listing priority changes.

Approve: Rowan Gould March 6, 2003
Regional Director, Fish and Wildlife Service Date

Concur: _____
Director, Fish and Wildlife Service Date

Do not concur: _____
Director, Fish and Wildlife Service Date

Director's Remarks:

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Date of annual review: 2/03

Conducted by: _____

Comments:

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