Achatinella lorata
(O`ahu Tree Snail)

5-Year Review
Summary and Evaluation

U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
Honolulu, Hawai`i

5-YEAR REVIEW

Species reviewed: *Achatinella lorata* (O`ahu tree snail)

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1.0 GENERAL INFORMATION

1.1 Reviewers

Lead Regional Office:
Region 1, Endangered Species Program, Division of Recovery Jesse D'Elia, (503) 231-2071

Lead Field Office:
Pacific Islands Fish and Wildlife Office, Loyal Mehrhoff, Field Supervisor, (808) 792-9400

Cooperating Field Office(s):
N/A

Cooperating Regional Office(s):
N/A

1.2 Methodology used to complete the review:

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office of the U.S. Fish and Wildlife Service (USFWS), beginning on August 7, 2009. The review was based on the final rule to list the Hawaiian (O`ahu) tree snails genus *Achatinella* and the Recovery Plan for the Oahu Tree Snails of the Genus Achatinella (USFWS 1981, 1992), as well as a review of current available information. The Hawaiian Tree Snail Conservation Lab provided an initial draft of portions of the review and recommendations for conservation actions needed prior to the next five-year review. The draft 5-year review was then reviewed by the Recovery Program Leader and the Assistant Field Supervisor for Endangered Species before submission to the Field Supervisor for approval.

1.3 Background:

1.3.1 FR Notice citation announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2009. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 103 species in Hawaii. Federal Register 74(49):11130-11133.

1.3.2 Listing history

Original Listing
FR notice: [USFWS] U.S. Fish and Wildlife Service. 1981. Endangered and Threatened Wildlife and Plants; Listing the Hawaiian (O`ahu) Tree Snails of the Genus Achatinella, as Endangered Species. Federal Register 8(46):3178-3182.
Date listed: February 12, 1981
Entity listed: Genus
Classification: Endangered

Revised Listing, if applicable
FR notice: N/A
Date listed: N/A
Entity listed: N/A
Classification: N/A

1.3.3 Associated rulemakings:

Critical Habitat was not designated for the Hawaiian (O`ahu) tree snails genus *Achatinella* in 1981 when it was listed because it would make these animals more vulnerable to collection.

1.3.4 Review History:

Species status review [FY2010 Recovery Data Call (August 2010)]: Declining

Recovery achieved:
1 (0-25%) [FY2010 Recovery Data Call - August 2010]

1.3.5 Species' Recovery Priority Number at start of this 5-year review:
2

1.3.6 Current Recovery Plan or Outline
Name of plan: Recovery Plan for the Oahu Tree Snails of the Genus Achatinella
Date issued: June 20, 1992
Dates of previous revisions, if applicable: N/A

2.0 REVIEW ANALYSIS

2.1 Application of the 1996 Distinct Population Segment (DPS) policy

2.1.1 Is the species under review a vertebrate?

_____ ***Yes***
__X__ ***No***

2.1.2 Is the species under review listed as a DPS?

_____***Yes***

__X__ ***No***

2.1.3 Was the DPS listed prior to 1996?

_____***Yes***

_____ ***No***

2.1.3.1 Prior to this 5-year review, was the DPS classification reviewed to ensure it meets the 1996 policy standards?

____ ***Yes***

____ ***No***

2.1.3.2 Does the DPS listing meet the discreteness and significance elements of the 1996 DPS policy?

____ ***Yes***

____ ***No***

2.1.4 Is there relevant new information for this species regarding the application of the DPS policy?

_____***Yes***

__X__ ***No***

2.2 Recovery Criteria

2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria?

__X__ ***Yes***

_____ ***No***

2.2.2 Adequacy of recovery criteria.

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

__X__ ***Yes***

_____ ***No***

2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery?

__X__ ***Yes***

_____ ***No***

2.2.3 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 recovery plan states "the status of most Hawaiian tree snails is so poorly know that no downlisting or delisting objective can be established at this time. Eventually, through the development of populations in nature that are robust and free of the twin threats of predation and habitat destruction, steps should be taken to downlist the Hawaiian tree snails (or individual species) to Threatened."

These criteria have not been met. The population of *Achatinella lorata* has not been seen since 1979 (USFWS 1992). This species is not in captivity. The threats of predation and habitat destruction are largely unmanaged.

2.3 Updated Information and Current Species Status

2.3.1 Biology and Habitat

2.3.1.1 New information on the species' biology and life history:

There is no new information on the biology and life history of *Achatinella lorata*.

2.3.1.2 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:

In 2002 two surveys were conducted in areas within the historical range of *A. lorata*. Additionally, in 2008 two more surveys were conducted in areas within the historical range of *A. lorata*. No living snails or shells of *A. lorata* were found during the surveys.

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

There is no new information on the genetics, genetic variation, or trends in genetic variation of *Achatinella lorata*.

2.3.1.4 Taxonomic classification or changes in nomenclature:

There has been no change to the taxonomic classification or nomenclature of *Achatinella lorata.*

2.3.1.5 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.):

Achatinella lorata was historically located on the leeward slopes of the southern Ko`olau Mountains (USFWS 1992). There is no new information on the spatial distribution or historic range of *Achatinella lorata.*

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

Survey reports did not provide habitat conditions (N Yuen, Biological Consultant, pers. comm. 2011).

2.3.1.7 Other:

None

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

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

Habitat degradation is a major threat to *Achatinella* spp.; however, the degree of habitat degradation varies within the historical range of each species. The tree-snail habitat within the historical range of *Achatinella lorata* continues to be threatened with the spreading of invasive plants into higher elevations by feral pigs (*Sus scrofa*) and goats, hunting, and hiking. Tree-snail host plants are threatened by invasions from *Psidium cattleianum* (strawberry guava), *Grevillea robusta* (silk oak), *Schinus terebinthifolius* (christmas berry), *Lantana camara*, *Clidemia hirta* (USFWS 1992), *Leucaena leucocephala* (koa haole), and *Miconia calvescens* (Weed Risk Assessments for Hawai`i and Pacific Islands 2011). Invasive plant species compete with host plant species for space and resources. Feral ungulates trample host plant species and spread the seeds of invasive plant species (USFWS 1992).

2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:

Illegal shell collecting is a continuing threat to the species.

2.3.2.3 Disease or predation:

Achatinella lorata is threatened by predation from the rosy wolf snail

(*Euglandina rosea)* and rats (*Rattus exulans, Rattus rattus,* and *Rattus norvegicus*) (USFWS 1992; Hadfield *et al*. 1993; Hadfield and Saufler 2009). *E. rosea* preys on all sizes of snails. Predation by *E. rosea* can result in the extirpation of a snail population in less than one year. When *E. rosea* preys on snails, the shell is left clean and undamaged. Rats prey on larger snails. When rats prey on snails, the shells are crushed (Hadfield *et al.* 1993).

The Jackson's chameleon (*Chamaeleo jacksonii*) has recently been documented as a predator of *Achatinella* spp. and may pose a major threat to their existence. Jackson's chameleons are found in the Ko`olau and Wai`anae Mountains (Holland *et al.* 2009); however, their impact on *Achatinella* spp. is not well documented.

The terrestrial snail *Gonaxis kibweziensis* was introduced around O`ahu to control *Achatina fulica* or African Snail. *Gonaxis kibweziensis* have been observed preying on *Achatina* egg clutches and juveniles under the length of 35mm and unidentified native terrestrial snails (Davis and Butler 1964). Carnivorous snails introduced to control other introduced snails pose a significant threat to *Achatinella* spp. Although released at various elevations around O`ahu (Davis and Butler 1964), they are mainly found in the lowland (B. Holland, University of Hawai`i, pers. comm. 2011a). In April 2011, this species was found in the back of Kuliouou Valley on O`ahu at 2,200 feet elevation (N. Yuen, pers. comm. 2011; Hawaiianforest.com 2011).

The terrestrial snail *Oxychilus alliarius* and the terrestrial flatworm *Geoplana septemlineata*, which reportedly eat snails (USFWS 1992), may threaten *Achatinella* spp.; however, predation on *Achatinella* spp. by *G. septemlineata* and *O. alliarius* has not been observed (USFWS 1992).

Additionally, the flatworm *Platydemis manokwari* is a known predator of land and arboreal snails on many Pacific islands (Hopper and Smith 1992; Sugiura 2009). *Platydemis manokwari* is known to occur on O`ahu from low elevations up to Mount Ka`ala in the Wai`anae Mountains (US Army 2008) and in the Ko`olau Mountains (B. Holland, pers. comm. 2011b); however, predation by *P. manokwari* on *Achatinella* spp. has not been documented. There are no known diseases that threaten *Achatinella* spp. (USFWS 1992). It is unknown what impacts skinks and birds may have on *Achatinella* spp. (B. Holland, pers. comm. 2011a).

2.3.2.4 Inadequacy of existing regulatory mechanisms:

None.

2.3.2.5 Other natural or manmade factors affecting its continued

existence:

Species like *A. lorata* that are endemic to small portions of a single island are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a few populations and individuals by random demographic fluctuations, localized catastrophes such as hurricanes, landslides, flooding, and disease outbreaks, and climate change effects for example lowland predators moving to higher elevations.

Current climate change analyses in the Pacific Islands lack sufficient spatial resolution to make predictions on impacts to this species. The Pacific Islands Climate Change Cooperative (PICCC) has currently funded climate modeling that will help resolve these spatial limitations. We anticipate high spatial resolution climate outputs by 2013.

This species is not in captive propagation and there are no other conservation measures being taken at this time for *A. lorata*.

2.4 Synthesis

In the 1992 recovery plan for the O`ahu tree snails of the genus *Achatinella*, *A. lorata* was classified as having the status of probably extant. *Achatinella lorata* was historically located on the leeward slopes of the southern Ko`olau Mountains. The most recent sighting of *A. lorata* was in 1979 at Tantalus-Pauoa Flats (USFWS 1992). In 2002 two surveys were conducted in areas within the historical range of *A. lorata*. Additionally, in 2008 two more surveys were conducted in areas within the historical range of *A. lorata*. No living snails or shells of *A. lorata* were found during the surveys.

The degree of habitat degradation varies within the historical range of the O`ahu tree snails. The presence and abundance of invasive plant species and feral ungulates, hunting, and hiking have resulted in habitat degradation and loss. Tree-snail host plants are threatened by invasions from invasive plants. Feral pigs threaten tree-snail host plants by trampling them.

Predation by *Euglandina rosea* and rats are major threats to *A. lorata*. The Jackson's chameleon has recently been identified as a predator of *Achatinella* spp. and may pose a major threat to their existence. The terrestrial flatworm *Geoplana septemlineata* and the terrestrial snails, *Oxychilus alliarius* and *Gonaxis kibweziensis,* may threaten *Achatinella* spp. The flatworm *Platydemis manokwari* is a predator of arboreal snails on many Pacific islands and does occur on O`ahu. It is unknown what impacts skinks and birds may have on *Achatinell*a spp. (B. Holland, pers. comm. 2011a).

Species like *A. lorata* that are endemic to small portions of a single island are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a few populations and individuals by random demographic fluctuations; localized

catastrophes such as hurricanes, landslides, flooding, and disease outbreaks; and climate change effects such as lowland predators moving to higher elevations.

Current climate change analyses in the Pacific Islands lack sufficient spatial resolution to make predictions on impacts to this species. The Pacific Islands Climate Change Cooperative has currently funded climate modeling that will help resolve these spatial limitations. We anticipate high spatial resolution climate outputs by 2013.

Due to no recent observations of this species in the wild, no captive population, an extremely limited historical spatial distribution, and the absence of management actions to mitigate threats to this species, it is recommended that *A. lorata* remain classified as endangered.

3.0 RESULTS

3.1 Recommended Classification:

____ Downlist to Threatened
____ Uplist to Endangered
____ **Delist**
____ *Extinction*
____ *Recovery*
____ *Original data for classification in error*
__X__ No change is needed

3.2 New Recovery Priority Number: N/A

Brief Rationale: N/A

3.3 Listing and Reclassification Priority Number: N/A

Reclassification (from Threatened to Endangered) Priority Number: ____
Reclassification (from Endangered to Threatened) Priority Number: ____
Delisting (regardless of current classification) Priority Number: ____

Brief Rationale: N/A

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

- Identify the actions to take when *Achatinella lorata* is found in the wild.
- Survey areas with suitable habitat, within the historical range of *A. lorata.*
- Identify areas within the historical range of *A. lorata* to construct predator proof exclosures where snails found in the wild could be moved into.

- Survey and monitor the presence and abundance of *Euglandina rosea*, rats, *Geoplana septemlineata*, *Platydemis manokwari*, *Oxychilus alliarius*, and Jackson's chameleons within the specie's historical range (Recovery Actions 311, 313, and 315).
- Assess the impacts of *Euglandina rosea*, rats, *Geoplana septemlineata*, *Platydemis manokwari*, *Oxychilus alliarius*, and Jackson's chameleons on *Achatinella* spp.
- Assess the impact of feral pigs and other ungulates on tree-snail habitat.
- Collect anecdotal information on other potential predators of *Achatinella* spp. such as *Gonaxis kibweziensis*, skinks, and birds.
- Design and implement more effective predator elimination techniques within the historical range of *A. lorata* (Recovery Actions 31 and 312).
- Control feral ungulates within the historic range of *Achatinella* spp.
- Remove invasive plant species responsible for habitat degradation (Recovery Action 3274).

5.0 REFERENCES

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[USFWS] U.S. Fish and Wildlife Service. 1981. Endangered and threatened wildlife and plants; listing the Hawaiian (Oahu) tree snails of the genus Achatinella as endangered species. Federal Register 8(46):3178-3182.

[USFWS] U.S. Fish and Wildlife Service. 1992. Recovery Plan O`ahu Tree Snails of the Genus *Achatinella*. Region 1, Portland, OR. 64 pp.

[USFWS] U.S. Fish and Wildlife Service. 2003. Biological opinion of the U.S. Fish and Wildlife Service for routine military training and transformation of the 2nd brigade 25th infantry division (light) U.S. Army installations Island of O`ahu. Unpublished, 351 pp.

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PERSONAL AND WRITTEN COMMUNICATIONS

Holland, Brenden. 2011a. Department of Zoology, University of Hawai`i at Mānoa, Honolulu, Hawaii. Telephone Conversation to Joy Browning U.S. Fish and Wildlife Service, dated April 14, 2011. Subject: *Gonaxis kibweziensis*

Holland, Brenden. 2011b. Department of Zoology, University of Hawai`i at Mānoa, Honolulu, Hawai`i. Electronic message regarding *Platydemis manokwari*. Received by Joy Browning, U.S. Fish and Wildlife Service. Dated July 8, 2011.

Yuen, Nathan. 2011. Biological Consultant, Honolulu, Hawai`i. E-mail message to Joy Browning, U.S. Fish and Wildlife Service, dated April 13, 2011. Subject: O`ahu Tree snail surveys and *Gonaxis kibweziensis.*

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

Current Classification: E

Recommendation resulting from the 5-Year Review:

_____ Downlist to Threatened
_____ Uplist to Endangered
_____ Delist
__X__ No change needed

Appropriate Listing/Reclassification Priority Number, if applicable:_____

Review Conducted By:
Joy Hiromasa Browning, Fish and Wildlife Biologist
Jess Newton, Endangered Species Recovery Program Leader
Assistant Field Supervisor for Endangered Species

Approved _____ Date 8/29/11
Field Supervisor, Pacific Islands Fish and Wildlife Office