

*Achatinella bulimoides*  
(*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 bulimoides* (O`ahu tree snail)

## TABLE OF CONTENTS

<b>1.0</b>	<b>GENERAL INFORMATION</b> .....	<b>3</b>
1.1	Reviewers .....	3
1.2	Methodology used to complete the review:.....	3
1.3	Background: .....	3
<b>2.0</b>	<b>REVIEW ANALYSIS</b> .....	<b>4</b>
2.1	Application of the 1996 Distinct Population Segment (DPS) policy .....	4
2.2	Recovery Criteria.....	5
2.3	Updated Information and Current Species Status .....	6
2.4	Synthesis.....	10
<b>3.0</b>	<b>RESULTS</b> .....	<b>11</b>
3.1	Recommended Classification:.....	11
3.2	New Recovery Priority Number: .....	12
3.3	Listing and Reclassification Priority Number: .....	12
<b>4.0</b>	<b>RECOMMENDATIONS FOR FUTURE ACTIONS</b> .....	<b>12</b>
<b>5.0</b>	<b>REFERENCES</b> .....	<b>13</b>
	Signature Page.....	15

**5-YEAR REVIEW**  
***Achatinella bulimoides* / O`ahu Tree Snail**

**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 O`ahu 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*  
 *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*  
 *No*

## **2.2 Recovery Criteria**

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

*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?**

*Yes*  
 *No*

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

*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 bulimoides* is not robust with only one individual observed in the past 3 years. Currently this species is not in captive propagation. 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 bulimoides*.

**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:**

The table below lists the surveys of the single known population of *Achatinella bulimoides* that have been conducted since 2004 (M. Hadfield, University of Hawai`i, pers. comm. 2010; US Army 2009).

<b>Date</b>	<b>Total No. of <i>A. bulimoides</i> found</b>
12-1-2004	0
5-5-2005	2
7-12-2005	3
10-20-2005	2
4-19-2006	5
8-31-2007	2

Additional surveys have not been conducted in that area (US Army 2009).

**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 bulimoides*.

#### **2.3.1.4 Taxonomic classification or changes in nomenclature:**

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

#### **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 bulimoides* is found at only one location on the windward cliffs of Punalu`u, below the Ko`olau Summit Trail and north of the Poamoho Trail summit (US Army 2009). Kamehameha Schools is the owner of this land (Hawai`i Statewide GIS Program 2009).

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

The tree-snail habitat present in the north Ko`olau summit area is in good condition. The area is characterized by tall native vegetation, but invasive grasses are present. Tree snails found in this location, live on native trees (M. Hadfield, University of Hawai`i, pers. comm. 2010).

#### **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 bulimoides* continues to be threatened by the spreading of invasive plants into higher elevations by feral pigs (*Sus scrofa*) and goats (*Capra hircus*), 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). The population of *A. bulimoides*, which is monitored by the U.S. Army Natural Resource Staff, is not managed for weed control and an ungulate fence is not present to keep feral pigs away (US Army 2009).

Portions of the historical range of *A. bulimoides* lie within the US Army's Kahuku Training Area, Kawaihoa Training Area, and Schofield Barracks East Range (USFWS 1992; USFWS 2003). Tree-snail species can be threatened directly and indirectly by training activities. Food disposed of during military troop activities leads to an increase in the size of rat populations. Seeds of non-native plants may be spread along the trails used by the Military via transportation on boots, equipment, or clothing. Dismounted troop movement in forested areas may result in the trampling of host plants and possibly tree snails. Discarded cigarettes, Military vehicles and other equipment used during training activities can be potential sources of fire ignition (USFWS 2003).

#### **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 bulimoides* 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 juvenile 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, Biological Consultant, pers. comm. 2011b; Hawaiianforest.com 2011).

The terrestrial snail *Oxychilus alliarius*, and the terrestrial flatworm *Geoplana septemlineata*, which reportedly eats 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 (OIP 2008) and in the Ko`olau Mountains (B. Holland, University of Hawai`i, 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).

The population of *A. bulimoides* is not managed for predator control; *E. rosea* exclosures are not present and rat-control efforts are not underway (US Army 2009).

#### **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. bulimoides* 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.

Conservation measures for this species include captive propagation. Individuals of *Achatinella bulimoides* have been maintained in the captive-propagation lab at the University of Hawai`i at Mānoa since 2005. In 2005, three trips were taken to the windward cliffs of Punalu`u, below the Ko`olau summit trail and north of the Poamoho trail summit, and collections of *A. bulimoides* were made. In total, seven adults were

collected to initiate the captive propagation of *A. bulimoides* (M. Hadfield, University of Hawai'i, pers. comm. 2010). An additional collection was made in April 2006; three adult *A. bulimoides* were brought into the lab from the same location as previous collections (US Army 2009). The lab population of *A. bulimoides* has steadily increased, reaching 39 individuals as of December 2009 (M. Hadfield, University of Hawai'i, pers. comm. 2010).

Tree snails are brought into the captive-propagation facility because they are highly endangered in the field. Conditions in the lab duplicate conditions in the field, as much as possible. Environmental data were gathered from field sites in order to reproduce similar conditions in the lab. The temperature (average between 16° C and 20° C), humidity, rainfall, day length (12 hours), and substratum (native host-tree species) found in the field, are reproduced as best as possible in the environmental chambers in which the captive-reared snails live. The snails are provided leafy branches of *Metrosideros polymorpha*. The epiphytic black mold *Cladosporium* sp, which is the snails' food source, is propagated in the lab and added as an additional food source. Most of the species in the facility initially experience an adaptation period, in which there is very low reproductive output. In some species, the adaptation period is followed by an increase in reproductive output and population size (Hadfield *et al.* 2004).

Climate change may also pose a threat to this species. However, 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.

## 2.4 Synthesis

In the 1992 recovery plan for the O`ahu tree snails of the genus *Achatinella*, *A. bulimoides* was classified as having the status of probably extant, having last been seen in 1985. *Achatinella bulimoides* was historically located on the windward and leeward slopes of the northern Ko`olau Mountains. The area within the historical range where there have been recent sightings of *A. bulimoides* is located on the windward cliffs above Punalu`u, below the Ko`olau Summit Trail and north of the Poamoho Trail summit.

The most recent field sighting of *A. bulimoides* was in August 2007; two live snails were found at the only currently known population of *A. bulimoides*. The Army Natural Resource Staff (ANRS) has surveyed for *A. bulimoides*, because portions of its historical range lie within the US Army's Kawaihoa Training Area and Schofield Barracks East Range, where there are current populations of other species of *Achatinella*. The ANRS

has been monitoring the only current known population of *A. bulimoides* since 2004 and has conducted six surveys of this population.

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.

Tree-snail habitat and snails located within US Army lands can be threatened directly and indirectly by Military training activities. Food disposed of during military troop activities leads to an increase in the size of rat populations. Seeds of non-native plants may be spread along the trails used by the Military via transportation on boots, equipment, or clothing. Dismounted troop movement in forested areas may result in the trampling of host plants and possibly tree snails. Discarded cigarettes, Military vehicles and other equipment used during training activities can be potential sources of fire ignition.

Predation by *Euglandina rosea* and rats are major threats to *A. bulimoides*. 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 snail *Oxychilus alliarius*, *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 *Achatinella* spp. (B. Holland, University of Hawai`i, pers. comm. 2011).

Species like *A. bulimoides* 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.

The Hawai`i Tree Snail Conservation Lab captive-propagation program at the University of Hawai`i at Mānoa has maintained individuals of *A. bulimoides* since 2005. A total of ten *A. bulimoides* was brought into the lab in 2005 and 2006. The population has slowly increased, reaching 39 in December 2009.

Due to the lack of data and the present circumstance of *A. bulimoides*, it is recommended that *A. bulimoides* remains 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**

- Routinely survey and monitor areas with currently existing populations of *Achatinella bulimoides*.
- Survey areas with suitable habitat, within the historical range of *A. bulimoides*.
- If additional *A. bulimoides* individuals or populations are found in the wild, its geographical position and area should be mapped (Recovery Action 22).
- Immediately implement the best available predator control measures if an individual(s) is found.
- Continue and possibly expand captive-propagation efforts with the intended goals of increasing the population size in a predator-free environment and eventually reintroducing captive-reared *A. bulimoides* into the wild (Recovery Action 12 and 13).
- Develop reintroduction plans for future releases into predator free sites in the wild.
- Identify suitable habitat sites that may serve as potential reintroduction sites for captive-reared *A. bulimoides* (Recovery Action 51).
- Identify sites where *A. bulimoides* are present that may be potential locations for predator enclosure fences.
- Identify areas within the historical range of *A. abbreviate* to construct predator proof enclosures 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. bulimoides* (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

Hadfield, M.G., S.E. Miller, and A.H. Carwile. 1993. The decimation of endemic Hawaiian tree snails by alien predators. *American Zoologist*. 33: 610-622.

Hadfield, M.G., B.S. Holland, and K.J. Olival. 2004. Contributions of ex situ propagation and molecular genetics to conservation of Hawaiian tree snails. *Experimental approaches to conservation biology*. Gordon, M.S.; Bartol, S.M. [Eds]. University of California Press. Chapter pagination: 16-34.

Hadfield, M.G. and J.E. Saufler. 2009. The demographics of destruction: isolated populations of arboreal snails and sustained predation by rats on the island of Moloka'i 1982-2006. *Biological Invasions*. 11: 1595-1609.

Hawai'i Statewide GIS Program. 2009. Large Landowners download [web application]. Office of Planning, Department of Business, Economic Development, and Tourism, State of Hawai'i. Available online at <Hawaii.gov/dbedt/gis>.

Holland, B.S., S.L. Montgomery, and V. Costello. 2009. A reptilian smoking gun: first record of invasive Jackson's chameleon (*Chamaeleo jacksonii*) predation on native Hawaiian species. *Biodiversity and Conservation* (online first: DOI 10.1007/s10531-009-9773-5).

Hopper, D.R. and B.D. Smith. 1992. Status of tree snails (Gastropoda: Partulidae) on Guam, with a resurvey of sites studied by H.E. Crampton in 1920. *Pacific Science*. 46: 77-85.

Sugiura, S. 2009. Potential impacts of the invasive flatworm *Platydemus manokwari* on arboreal snails. *Biological Invasions*. 11: 737-742.

[US Army] U.S. Army Garrison, Hawai'i Directorate of Public Works Environmental Division. 2008. Final implementation plan for O'ahu training areas: Schofield Barracks Military Reservation, Schofield Barracks East Range, Kawaihoa Training Area, Kahuku Training Area, and Dillingham Military Reservation. 624 pp.

[US Army] U.S. Army Garrison. 2009. Hawai'i Makua Collection Monitoring and Nursery Database. U.S. Army Garrison, Directorate of Public Works, Environmental Division, Schofield Barracks, Hawai'i. Unpublished.

[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 2<sup>nd</sup> brigade 25<sup>th</sup> infantry division (light) U.S. Army installations Island of O`ahu. Unpublished, 351 pp.

Weed Risk Assessments for Hawai`i and Pacific Islands. 2011. Weed risk assessments for Hawai`i and Pacific islands [web application]. Curt Daehler, Honolulu, Hawai`i. Available online at <<http://www.botany.hawaii.edu/faculty/daehler/wra/>>. Accessed 13 April 2011.

## **PERSONAL AND WRITTEN COMMUNICATIONS**

Hadfield, Michael. 2010. Department of Zoology, University of Hawai`i, Honolulu, Hawai`i.

Holland, Brenden. 2011a. Department of Zoology, University of Hawai`i at Mānoa, Honolulu, Hawai`i. Telephone Conversation regarding *Gonaxis kibweziensis*. Conversation with Joy Browning U.S. Fish and Wildlife Service. Dated April 14, 2011.

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.

Miller, Stephen. 2011. U.S. Fish and Wildlife Service, Honolulu, Hawai`i. Electronic message regarding *Gonaxis kibweziensis*. Received by Joy Browning, U.S. Fish and Wildlife Service. Dated April 14, 2011.

**Signature Page**  
**U.S. FISH AND WILDLIFE SERVICE**  
**5-YEAR REVIEW of *Achatinella bulimoides***

**Current Classification:**           E          

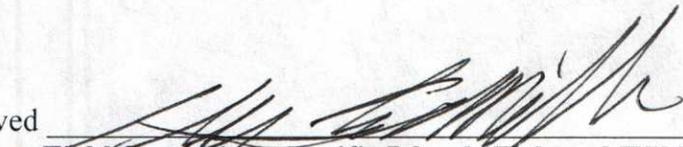
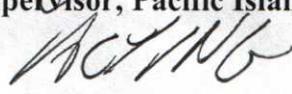
**Recommendation resulting from the 5-Year Review:**

- Downlist to Threatened
- Uplist to Endangered
- Delist
- 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 8/2/11  
  
Field Supervisor, Pacific Islands Fish and Wildlife Office