5-YEAR REVIEW

Short Form Summary

Species Reviewed: Akiapolaau (*Hemignathus munroi*)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2013. Endangered and threatened wildlife and plants; Initiation of 5-year Status Reviews of 44 species in Oregon, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 78(24):8185-8187.

Lead Region/Field Office:

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawaii

Name of Reviewer(s):

Jay Nelson, Fish and Wildlife Biologist, PIFWO
Michelle Bogardus, Maui Nui and Hawaii Island Team Manager, PIFWO
Marie Bruegmann, Plant Recovery Coordinator, PIFWO
Kristi Young, Programmatic Deputy Field Supervisor, PIFWO

Methodology used to complete this 5-year 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 May 5, 2015. The review was based on a review of current, available information since the last 5-year review for akiapolaau (USFWS 2010). The evaluation by Jay Nelson, Fish and Wildlife Biologist, was reviewed by the Island Team Manager, followed by the Plant Recovery Coordinator. It was subsequently reviewed and approved by the Programmatic Deputy Field Supervisor.

Background:

For information regarding the species listing history and other facts, please refer to the Fish and Wildlife Service's Environmental Conservation On-line System (ECOS) database for threatened and endangered species at: *http://ecos.fws.gov/tess_public*.

Review Analysis:

Please refer to the previous 5-year review for akiapolaau (*Hemignathus munroi*) published on August 27, 2010 (available at: *http://ecos.fws.gov/docs/five_year_review/doc3851.pdf*) for a complete review of the species' status, threats, and management efforts. No significant new information regarding the species' biological status has come to light since listing to warrant a change in the Federal listing status of akiapolaau.

The akiapolaau is medium-sized, stocky, short-tailed Hawaiian honeycreeper endemic to Hawaii Island. Its most remarkable feature is the extraordinary bill, which has a long, sickle-shaped upper mandible and a short, straight lower mandible that is only half as long as the upper. Males are larger and heavier than females and have a slightly longer bill. Adult males have a bright yellow head and underparts, a greenish back and wings, and black lores. Adult females differ in color, with a yellowish-white chin, throat, and

upper breast that contrasts with a pale yellowish-gray lower breast and belly (USFWS 2006). The akiapolaau occurs as disjunct populations in the windward Hawaii, Kau, Mauna Kea, and Kona regions on Hawaii.

New status information:

- Surveys for Hawaiian forest birds using the variable circular-plot method as previously conducted by Scott *et al.* (1986) were conducted in forest areas on Hawaii Island from 2010-2015 in areas with current and historical occurrence of akiapolaau (R. Camp, U.S. Geological Survey, pers. comm. 2015). The total population of akiapolaau is approximately 1,900 birds in 2 populations (Gorresen *et al.* 2009). Density is increasing in Hakalau Forest National Wildlife Refuge (NWR) and stable in upper Kau, but is likely decreasing in central windward Hawaii. The species is extirpated from subalpine Mauna Kea and probably Kona districts (Gorresen *et al.* 2009). Akiapolaau were detected at 4,200 feet elevation in the Hakalau Forest NWR during surveys for Hawaiian forest birds in 2012, which is 1,000 feet lower in elevation than previous sightings in the 1970s, suggesting possible range expansion into middle elevation native forests on the NWR (Kendall and Gordon 2012). Analysis of population trends suggest the species is benefiting from over two decades of habitat restoration in the Hakalau Forest NWR (Camp *et al.* 2010). Akiapolaau is regularly seen foraging in planted koa groves at upper elevations of the Hakalau Forest NWR several kilometers above old growth forest areas (Hakalau Forest NWR 2013). In addition, the highest akiapolaau densities reported are in upper elevation koa (*Acacia koa*) forest plantations (Pejchar *et al.* 2005).

New threats:

- Climate change destruction or degradation of habitat – Hawaiian honeycreepers are known to be highly susceptible to introduced avian disease, particularly avian malaria (*Plasmodium relictum*) (Atkinson *et al.* 1995; Atkinson *et al.* 2000; Yorinks and Atkinson 2000; Banko and Banko 2009). According to some climate change projections, temperature increases could present an additional threat specific to Hawaiian forest birds by causing an increase in the elevation below which regular transmission of avian malaria occurs, potentially reducing the remaining suitable habitat for these species. In Hawaii, the threshold temperature for transmission of avian malaria has been estimated to be 13 degrees Celsius (55 degrees Fahrenheit), whereas peak *P. relictum* prevalence in wild mosquitoes occurs in mid-elevation forest where the mean ambient summer temperature is 17 degrees Celsius (64 degrees Fahrenheit) (Benning *et al.* 2002). Benning *et al.* (2002) used GIS simulation to show that an increase in temperature of 2 degrees Celsius (3.6 degrees Fahrenheit), which is within the range predicted by some climate models (*e.g.*, IPCC 2013; ICAP 2010), would result in 100 years in a nearly 100 percent decrease in the land area for akiapolaau where malaria transmission currently is only periodic. Lia *et al.* (2015) assessed how global climate change will affect future malaria risk for native Hawaiian bird populations and expect high elevation areas to remain mosquito free only to mid-century due to combined factors of increased rainfall and increasing temperatures. If climate change were to reduce the remaining suitable habitat for

akiapolaau as predicted, it would likely contribute to the extinction of this species over time.

New management actions:

- Surveys / inventories – Forest bird surveys were conducted on Hawaii from 2010-2015 in areas within current and historical occurrence of akiapolaau.

Synthesis:
Recent surveys confirm that the akiapolaau population is increasing in Hakalau Forest NWR (see Table 1). However, akiapolaau is likely decreasing in central windward Hawaii and is extirpated from subalpine Mauna Kea and probably Kona districts. Although the species is stable overall, its range is contracting, thus the akiapolaau still meets the definition of endangered. In addition, all threats are not being sufficiently managed throughout all of the populations (Table 2).

Recommendations for Future Actions:

- Surveys / inventories – Continued monitoring of akiapolaau is important to determine species response to management actions and effects of climate change.
- Threats – disease control research – Of particular concern to the continued survival of many Hawaiian forest birds (particularly Hawaiian honeycreepers) is avian disease. Existing tools and approaches have proved largely ineffective in addressing this problem given mosquito dispersal distance and the abundance of mosquito breeding sites in most wet native forest habitats (LaPointe *et al.* 2009). Opportunities are emerging however based on new genetic tools as part of the fields of synthetic biology and genomic technology that have the potential to assist Hawaiian forest birds in developing genetic resistance to avian disease (LaPointe *et al.* 2009). In addition, recent progress has been made with the development of genetically modified mosquitoes for disease control. Several of these techniques have achieved proof-of-principle in laboratory studies, while other transgenic insect techniques, including self-sustaining technologies to achieve long-term transmission control are anticipated to advance to field testing in the near future. We encourage continued research in the fields of genomic technologies and genetically modified mosquitoes for disease control and their field application as a conservation strategy for Hawaiian forest birds.
- Habitat and natural process management and restoration –
    - We recommend continued habitat management in areas where the species currently exists (USFWS 2006).
    - Hawaiian forest birds susceptible to avian disease may become extinct following a drastic reduction in disease free habitat, but ultimately forest might expand into higher elevations maintaining disease free refugia for some species. Akiapolaau forage primarily on koa and utilize koa plantations for foraging (Pejchar et al. 2005). Acquisition and management of transmission-free high-elevation habitat is crucial to the preservation and restoration of native Hawaiian forest birds (Lapointe *et al.* 2009). As a long-term contingency against a warming scenario, we recommend securing deforested and pasture lands on Hawaii at high elevations adjacent to protected refugia

and managing these areas for forest growth to provide suitable habitat for akiapolaau and other Hawaiian forest birds.

- Captive propagation protocol development – Recovery of akiapolaau may be achieved most effectively through *in situ* management techniques such as habitat management. However, captive propagation technology may need to be developed for akiapolaau in case it is needed to help reestablish wild populations in the future.

Table 1. Trends in status of akiapolaau since listing.

Date	**Number wild individuals**	**Number released**	**Key Recovery Actions**	**Actions Accomplished**
1967 (listing)	Rare	0	See below	
1977 (Hawaii Forest Bird Survey)	1,496 $\pm$ 318 (95% CI)	0	See below	
1983 (first recovery plan)	Approximately 1,500 birds	0	Improve habitat conditions; decrease threat of avian disease; monitor populations;	Improve habitat conditions – Yes Decrease threat of avian disease – Yes Monitor populations – Yes
2006 (revised recovery plan)	Approximately 1,500 birds	0	Improve habitat conditions; decrease threat of avian disease; monitor populations;	Improve habitat conditions – Yes Decrease threat of avian disease – Yes Monitor populations – Yes
2010 (5-year review)	Approximately 1,500 birds	0	Improve habitat conditions; decrease threat of avian disease; monitor populations;	Improve habitat conditions – Yes Decrease threat of avian disease – Yes Monitor populations – Yes
2015(5-year review)	Approximately 1,900 birds	0	Improve habitat conditions; decrease threat of avian disease; monitor populations;	Improve habitat conditions – Yes Decrease threat of avian disease – Yes Monitor populations – Yes

Table 2. Threats to akiapolaau and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – degradation of habitat and herbivory	A, C, E	Ongoing	Partially, some habitat areas fenced
Invasive introduced plants	A, E	Ongoing	Partially, some habitat areas managed
Low numbers	E	Ongoing	Partially, captive propagation and release and forest protection/reforestation
Climate change	A, E	Increasing	Partially, forest protection at middle elevations and reforestation in some high elevation areas

References:

See previous 5-year review for a full list of references (USFWS 2010).

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U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of
Akiapolaau (*Hemignathus munroi*)

Pre-1996 DPS listing still considered a listable entity? N/A

Recommendation resulting from the 5-year review:

_____	Delisting
_____	Reclassify from Endangered to Threatened status
_____	Reclassify from Threatened to Endangered status
X	No Change in listing status

Appropriate Listing/Reclassification Priority Number, if applicable:_____

for **Programmatic Deputy Field Supervisor, Pacific Islands Fish and Wildlife Office**

Maile M Bluegman Date 2015-08-18