

5-YEAR REVIEW

Short Form Summary

Species Reviewed: Hawaii akepa (*Loxops coccineus coccineus*)

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 Brueggemann, 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 Hawaii akepa (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 Hawaii akepa (*Loxops coccineus coccineus*) published on August 27, 2010 (available at: http://ecos.fws.gov/docs/five_year_review/doc3853.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 Hawaii akepa.

The Hawaii akepa is a small, sexually dichromatic Hawaiian honeycreeper endemic to Hawaii Island. Adult males are bright orange, while females are greyish green with a yellow breast-band. The bill is conical and generally pale yellow in color (USFWS 2006). The Hawaii akepa occurs as disjunct populations in north and central windward Hawaii, Kau, Kona, and Hualalai 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 from 2010-2012 in areas with current and historical occurrence of Hawaii akepa (R. Camp, U.S. Geological Survey, pers. comm. 2015). The total population of Hawaii akepa is approximately 12,000 birds in 4 populations (Gorresen *et al.* 2009). Density is possibly increasing in Hakalau Forest National Wildlife Refuge (NWR) and possibly stable in Kau, but is likely decreasing in central windward Hawaii and nearly extirpated from Hualalai and central Kona (Gorresen *et al.* 2009). Freed and Cann (2013) criticized the use of linear models to assess trends in the status of Hawaiian forest birds through time. Camp *et al.* (2014) addressed these criticisms including sampling scheme used for forest bird surveys, whether model assumptions were met, and the effect of factors of short-term changes in population time series on population estimates. Hawaii akepa were detected at 1,260 meters (4,200 feet) elevation in the Hakalau Forest NWR during surveys for Hawaiian forest birds in 2012, within 1.6 kilometers (1 mile) of where they were last observed by USFWS biologists during the 1977 Hawaii Forest Bird Survey, suggesting possible range expansion into middle elevation native forests on the refuge (Kendall and Gordon 2012). In addition 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).

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 Hawaii akepa 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 Hawaii akepa 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 2010-2012 in areas with current and historical occurrence of Hawaii akepa.

Synthesis:

Recent surveys confirm that the Hawaii akepa population is stable overall and possibly increasing in Hakalau Forest NWR (see Table 1). However, Hawaii akepa is likely decreasing in central windward Hawaii and nearly extirpated from Hualalai and central Kona. Although the species is stable overall, its range is contracting, thus the Hawaii akepa 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 Hawaii akepa 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. 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 Hawaii akepa and other Hawaiian forest birds.

- Captive propagation for reintroduction and genetic storage – Recovery of Hawaii akepa may be achieved most effectively through in situ management techniques such as habitat management. However, captive propagation technology has been developed for the Hawaii akepa in case it is needed to help reestablish wild populations in the future.

Table 1. Trends in status of Hawaii akepa since listing.

| Date | Number wild individuals | Number released | Key Recovery Actions | Actions Accomplished |
|----------------------------------|--------------------------------|------------------------|--|---|
| 1970 (listing) | Rare | 0 | See below | |
| 1977 (Hawaii Forest Bird Survey) | 13,892 ± 1,825 (95% CI) | 0 | See below | |
| 1983 (first recovery plan) | Approximately 14,000 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 14,000 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 |
| 2007 | Approximately 14,000 birds | 12 | 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 12,000 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 |

| Date | Number wild individuals | Number released | Key Recovery Actions | Actions Accomplished |
|---------------------|----------------------------|-----------------|--|---|
| 2015(5-year review) | Approximately 12,000 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 Hawaii akepa 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 |
| 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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- Lia, W., O. E. Timm, C. Zhang, C. T. Atkinson, D. A. LaPointe, and M. D. Samuel. 2015. Will a warmer and wetter future cause extinction of native Hawaiian forest birds? Available on line at: <http://onlinelibrary.wiley.com/doi/10.1111/gcb.13005/pdf>.

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**U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of
Hawaii akepa (*Loxop coccineus coccineus*)**

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
- No Change in listing status

Appropriate Listing/Reclassification Priority Number, if applicable:

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

Maui M. Blueman

Date 2015-08-20