

**Kaua`i nukupu`u**  
*(Hemignathus lucidus hanapepe)*  
**and**  
**Maui nukupu`u**  
*(Hemignathus lucidus affinis)*

**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: Kaua'i nukupu`u (*Hemignathus lucidus hanapepe*)  
and Maui nukupu`u (*Hemignathus lucidus affinis*)

### 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:.....	4
<b>2.0</b>	<b>REVIEW ANALYSIS.....</b>	<b>5</b>
2.1	Application of the 1996 Distinct Population Segment (DPS) policy.....	5
2.2	Recovery criteria.....	5
2.3	Updated Information and Current species Status.....	7
2.4	Synthesis.....	9
<b>3.0</b>	<b>RESULTS.....</b>	<b>11</b>
3.1	Recovery criteria.....	11
3.2	New Recovery Priority Number:.....	11
3.3	Listing and Reclassification Priority Number:.....	11
<b>4.0</b>	<b>RECOMMENDATIONS FOR FUTURE.....</b>	<b>12</b>
<b>5.0</b>	<b>REFERENCES.....</b>	<b>12</b>
	Signature Page.....	14

**5-YEAR REVIEW**  
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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:**

Information used to conduct this review was obtained from the following sources: the Revised Recovery Plan for Hawaiian Forest Birds (USFWS 2006), The Birds of North America (BNA) species account, No. 600 (Pratt *et al.* 2001), The Hawaiian Forest Bird Survey (Scott *et al.* 1986), The Hawai`i Rare Bird Search 1994-1996 (Reynolds and Snetsinger 2001), and the most recent Hawaiian forest bird surveys on the islands of Maui in 2006 and Kaua`i in 2005. Information from these sources was used to determine the species' historical distribution, recovery criteria, threats, most recent documented sightings, and extinction probability. The BNA species account (Pratt *et al.* 2001) and the peer-reviewed Revised Recovery Plan for Hawaiian Forest Birds (USFWS 2006) summarized all early scientific information gathered about the species, while the Hawaiian Forest bird Survey (Scott *et al.* 1986), the Hawai`i Rare Bird Search 1994-1996, which was conducted specifically to search for extremely rare and potentially extinct Hawaiian forest birds, and periodic forest bird surveys performed on a five-year rotating cycle on each of the main Hawaiian islands, provided the most recent information about the continued presence of the species in areas where it was known historically. The above sources constitute the most recent, complete, and scientifically reliable information available for the evaluation of the taxon's current status.

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office (PIFWO) of the U.S. Fish and Wildlife Service (USFWS) beginning in 2006. Information in this review was compiled by the lead biologist and Hawaiian Birds

Recovery Coordinator. The document was reviewed by the Assistant Field Supervisor for Endangered Species and Acting Deputy Field Supervisor before submittal to the Field Supervisor for approval.

### **1.3 Background**

#### **1.3.1 Federal Register (FR) Notice citation announcing initiation of this review:**

USFWS. 2006. Endangered and Threatened Wildlife and Plants; Initiation of 5-year Reviews of 70 Species in Idaho, Oregon, Washington, Hawaii, and Guam. Federal Register 71:18345-18348.

#### **1.3.2 Listing history**

##### Original Listing

**FR notice:** USFWS. 1970. Conservation of Endangered Species and Other Fish and Wildlife; Appendix D – United States List of Endangered Native Fish and Wildlife. 35 FR 16047.

**Date listed:** October 13, 1970

**Entity listed:** Species

**Classification:** Endangered

The Kaua'i nukupu`u and Maui nukupu`u are now considered subspecies (Pratt *et al.* 2001, USFWS 2006).

##### Revised Listing, if applicable

**FR notice:** N/A

**Date listed:** N/A

**Entity listed:** N/A

**Classification:** N/A

#### **1.3.3 Associated rulemakings:**

N/A

#### **1.3.4 Review History:**

Species status review [FY 2010 Recovery Data Call (August 2010)]: Unknown

#### **Recovery achieved:**

1 (0-25%) (FY 2007 Recovery Data Call – most recent year reported)

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

5

#### **1.3.6 Current Recovery Plan or Outline**

**Name of plan or outline:** Revised Recovery Plan for Hawaiian Forest Birds. Region 1, Portland, OR. 622 pp.

**Date issued:** September 22, 2006.

**Dates of previous revisions, if applicable:** July 1983 (Kauai Forest Birds Recovery Plan); May 1984 (Maui-Molokai Forest Birds Recovery Plan)

## **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*  
 *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 criteria?**

*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:**

A taxon may be downlisted from endangered to threatened when all four of the following criteria have been met.

1. The species occurs in two or more viable populations or a viable metapopulation that represent the ecological, morphological, behavioral, and genetic diversity of the species.

This criterion has not been met; it is not known whether the species still exists.

2. Either a) quantitative surveys show that the number of individuals in each isolated population or in the metapopulation has been stable or increasing for 15 consecutive years, or b) demographic monitoring shows that each population or the metapopulation exhibits an average intrinsic growth rate ( $\lambda$ ) not less than 1.0 over a period of at least 15 consecutive years; and total population size is not expected to decline by more than 20 percent within the next 15 consecutive years for any reason.

This criterion has not been met; survey effort has not been adequate to determine with confidence whether the species still exists.

3. Sufficient recovery habitat is protected and managed to achieve Criteria 1 and 2.

This criterion has not been fully met; however, important habitat areas on the Island of Maui including Hanawaī Natural Area Reserve, Waikamoi Preserve, and Kīpahulu Valley of Haleakalā National Park are protected and managed. Other areas of habitat where the species might occur are unfenced and vulnerable to damage by feral ungulates. On the Island of Kaua`i this criterion has not been fully met; the remote Alaka`i Wilderness is protected and managed, however, most habitat where the species might occur is unfenced and vulnerable to damage by feral ungulates.

4. The mix of threats that were responsible for the decline of the species have been identified and controlled.

This criterion has not been fully met; most threats have been identified including disease, predation, and habitat damage by feral ungulates. However, each of these threats is only partly controlled. The threat from disease has been partly controlled by protecting forest habitat in some areas from feral pigs that create mosquito breeding sites, but mosquitoes are known to fly several kilometers in forested habitats and thus may still threaten forest birds even in pristine forest. Predator control and ungulate removal has been implemented in some areas where the species may still occur, but not in the entire suitable habitat area for the species.

The taxon may be delisted when the downlisting criteria described above have been satisfied for at least 30 consecutive years.

## **2.3 Updated Information and Current Species Status**

The nukupu`u is a medium-sized, approximately 23 gram (0.78 ounce), Hawaiian honeycreeper (family Fringillidae, subfamily Drepanidinae) with an extraordinarily thin, curved bill, slightly longer than the bird's head. The lower mandible is half the length of the upper mandible. Adult males are olive green with a yellow head, throat, and breast, whereas adult females and immatures have an olive-green head and yellow or yellowish gray under-parts (USFWS 2006).

### **2.3.1 Biology and Habitat**

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

No new information.

#### **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:**

No new information.

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

No new information.

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

No new information.

#### **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.):**

No new information.

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

Nukupu`u range probably included forested areas over a wide geographic range, however, introduced mosquitoes and avian diseases may have already limited species range to forests at higher elevations by the time the species was first described and studied by early observers (USFWS 2006). Native forested habitats on Maui and Kaua`i as result of agriculture, urbanization, and ungulate grazing are now limited to higher elevation montane regions above 3,000 feet elevation.

**2.3.1.7 Other:**

Not applicable.

**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 loss and degradation by agriculture, urbanization, cattle grazing, browsing by feral ungulate species, timber harvesting, and invasion of nonnative plant species into native-dominated plant communities have been some of the primary threats to this species (USFWS 2006). Feral pigs, and goats to a lesser degree, have had a long-term damaging effect upon native forests in the remaining nukupu`u range by consuming and damaging understory vegetation, creating openings on the forest floor for weeds, transporting weed seeds into the forest, and causing soil erosion and disruption of seedling regeneration of native plants.

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

Not known to be a limiting factor.

**2.3.2.3 Disease or predation:**

Predation by alien mammals such as black rats (*Rattus rattus*) and Polynesian rats (*Rattus exulans*) and diseases such as avian malaria (*Plasmodium relictum*) and avian pox (*Poxvirus avium*) carried by alien mosquitoes have also been primary threats to this species (USFWS 2006).

**2.3.2.4 Inadequacy of existing regulatory mechanisms:**

Current regulatory mechanisms are adequate: The nukupu`u was federally listed as endangered October 13, 1970 (USFWS 1970), and thus receives regulatory protection under the Endangered Species Act. Species listed under the Endangered Species Act are automatically added to the State of Hawai`i list of endangered species, and are thus also protected by State regulations. The Service recently added 24 species that belong to families covered by the Canadian and/or Mexican Conventions, but occur naturally in the United States only in Hawai`i, to the List of Migratory Birds. According

ly, these species, including the nukupu`u, receive additional protection under the Migratory Bird Treaty Act (USFWS 2010).

#### **2.3.2.5 Other natural or manmade factors affecting its continued existence:**

This species now occurs in such low numbers and in such restricted ranges, if it exists at all, that it is threatened by natural processes, such as inbreeding depression and demographic stochasticity, and by natural and man-made factors such as hurricanes, wildfires, and periodic vegetation die-back (USFWS 2006). Impacts of alien birds are not well understood, but include aggressive behavior towards native bird species, possible competition for food, nest sites, and roosting sites, and possibly supporting elevated predator population levels.

Climate change may also pose a threat to nukupu`u. However, current climate change models do not allow us to predict specifically what those effects, and their extent, would be for this species.

## **2.4 Synthesis**

Reevaluation of conclusions regarding extinction probability based on the 1994-1996 Hawai`i Rare Bird Search (Reynolds and Snetsinger 2001) and reexamination of data from the Hawaiian Forest Bird Survey (Scott *et al.* 1986) and surveys by John Sincock from 1968-1973 (USFWS 1983) indicates that the species' status is best described as "unknown" rather than "presumed extinct."

John Sincock conducted 466, ½ hour counts from 1968-1973 along stream and ridge transects within three areas of the Alaka`i Swamp: the "North Alaka`i," "South East Alaka`i," and "South West Alaka`i" which contained almost all habitat area (approx. 7,800 hectares) considered essential for endangered forest birds on Kaua`i, and where rare species most likely would continue to be found (USFWS 1983). Based on the effective detection distance for the species from transects surveyed, Sincock determined he surveyed 497.6 hectares, or less than one-fifteenth the total essential habitat area for forest birds on Kaua`i. Although extensive for its coverage of the nukupu`u's likely potential range, the 1968-1973 survey cannot be considered comprehensive in its coverage of the actual land area where the species at the time might still have existed. Sincock detected no nukupu`u during the 1968-1973 Alaka`i surveys (USFWS 1983).

The study area for the Hawaiian Forest Bird Survey (HFBS) in 1981 was located within the larger essential habitat area surveyed by Sincock, but consisted of six transects only and less than one-fourth (approx. 1,700 hectares) of the essential habitat area that was surveyed by Sincock (USFWS

1983; Scott *et al.* 1986, pp.16 and 39). During the HFBS no nukupu`u were detected on Kaua`i (Scott *et al.*, pp. 131-132).

The Hawai`i Rare Bird Search confirmed the existence of at least one nukupu`u on East Maui in 1995 and 1996; all sightings were of an adult male with bright yellow plumage from Hanawā at 1,890 m elevation (Reynolds and Snetsinger 2001). No nukupu`u were detected by The Hawai`i Rare Bird Search on Kaua`i (Reynolds and Snetsinger 2001). Skilled observers reported three (unconfirmed) sightings of at least one male and one female nukupu`u on Kaua`i in 1995 near the Koai`e Gauging Station (Conant *et al.* 1998, Reynolds and Snetsinger 2001); however, as discussed by Reynolds and Snetsinger (2001), reports of nukupu`u on Kaua`i require additional confirmation due to possible confusion of the taxon with Kaua`i amakihi (*Hemignathus kauaiensis*). Pratt and Pyle (2000) suggest that sightings of nukupu`u during the twentieth century (even by skilled observers) may be cases of mistaken identification. At the time of the 1994-1996 Hawai`i Rare Bird Search, Reynolds and Snetsinger (2001) considered the nukupu`u to be extant on East Maui and search results on Kaua`i to be inconclusive.

Scott *et al.* (1986) used the probability of detecting one bird from a randomly distributed population of  $n$  individuals to estimate species' extinction probability using the variable circular-plot point count methodology. Based on this data, for West Maui and Kaua`i (nukupu`u were unrecorded during the HFBS on West Maui and Kaua`i), Scott *et al.* (1986, pp. 69-71) determined the probability of detecting at least one nukupu`u during the HFBS to be 0.706 and 0.742, respectively, for a hypothesized population of 50 nukupu`u, and 0.217 and 0.238 for a population of 10 nukupu`u. In other words, for a population of 10 nukupu`u in these two areas, Scott *et al.* (1986) determined there was only approximately a 22% chance the surveys would have detected at least one of these individuals. This low probability of detection reflects the limited time spent and area covered and the much greater effort needed to effectively survey for extremely rare species such as nukupu`u using the variable circular-plot point count methodology (Scott *et al.* 1986).

Reynolds and Snetsinger (2001) instead developed an extinction probability for their survey data as a function of the number of independent visits made to search for the missing species, the number of sightings, and the probability of detection. Study areas for the Hawai`i Rare Bird Search (HRBS) on Kaua`i in 1994-1996 consisted of four major drainages within the Alaka`i Swamp, the Koai`e, Mōhihi-Waiakōali-Koali, Halehaha-Halepa`akia, and North Kawaikōi within the essential habitat area boundary defined by Sincock (USFWS 1983). Reynolds and Snetsinger's (2001) survey did not include some areas of suitable habitat along the perimeter and inside the essential habitat boundary described by Sincock and approximately 800 hectares of private lands (approx. 14% of the essential habitat area) along the southern boundary of the Alaka`i Swamp. Therefore, approximately 25% of the essential habitat area

for Kaua`i nukupu`u as defined by Sincock has not be surveyed since 1968-1973 (USFWS 1983). Lack of detections combined with analysis of detection probability suggest the population on Kaua`i is fewer than 10 birds (Reynolds and Snetsinger (2001).

As Reynolds and Snetsinger (2001) describe, there are instances where rare Hawaiian birds have been rediscovered after they were presumed extinct or have been found in larger populations than expected. The large areas on East Maui (approximately 50,000 hectares; USFWS 1984, USFWS 2006) and Kaua`i (7,800 hectares) with suitable habitat, and many sites that are remote and only rarely visited by qualified observers, increase the potential that a small population of nukupu`u still exists in Hawai`i. In addition, the rough terrain on Kaua`i and Maui and frequent wet weather make surveys difficult, and numerous steep valleys create many small pockets of habitat where the species could potentially persist.

### 3.0 RESULTS

#### 3.1 Recommended Classification:

Downlist to Threatened

Uplist to Endangered

Delist

*Extinction*

*Recovery*

*Original data for classification in error*

No change is needed

#### 3.2 New Recovery Priority Number:

**Brief Rationale:**

#### 3.3 Listing and Reclassification Priority Number:

**Reclassification (from Threatened to Endangered) Priority Number:** \_\_\_\_\_

**Reclassification (from Endangered to Threatened) Priority Number:** \_\_\_\_\_

**Delisting (regardless of current classification) Priority Number:** \_\_\_\_\_

**Brief Rationale:**

### 4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

Given the low survey effort for this species and the difficulty of detecting forest birds in remote mountainous habitats in Hawai`i, we recommend the species' biological status be "unknown" instead of "presumed extinct." This determination is based on reexamination of data from the 1994-1996 Hawai`i Rare Bird Search (Reynolds and

Snetsinger 2001), Hawaiian Forest Bird Survey data (Scott *et al.* 1986), and searches for this and other rare species by John Sincock from 1968-1973 (USFWS 1983). The species was confirmed to still exist as recently as 1995, and additional targeted searches are needed to confirm either that the nukupu`u still exists or that it has disappeared and is likely to be extinct.

As described in the Revised Recovery Plan for Hawaiian Forest Birds (USFWS 2006), one of the most important recovery actions for the nukupu`u is to intensively and systematically search areas of forest habitat where the species occurred historically. Statewide surveys of Hawaiian forest bird populations are conducted along widely spaced transects (Scott *et al.* 2006, pp. 16, 30, 32, 37, and 39) that do not cover all areas where extremely rare Hawaiian forest birds are most likely to persist. Additionally, these surveys do not spend the lengths of time needed to maximize the probability that extremely rare and/or likely extinct Hawaiian forest birds will be detected or rediscovered. Therefore, we recommend that an intensive search for nukupu`u be conducted on Maui and Kaua`i using similar methodologies as those employed during the 1994-1996 Hawai`i Rare Bird Search (Reynolds and Snetsinger 2001). In addition, we recommend that autonomous recording units, or ARUs (Fitzpatrick 2002), be deployed in suitable habitats for this species. These field recording units record vocalizations of forest birds. The tapes are then analyzed using computer programs to determine if the target species is present in the area. Use of this technology would greatly increase the amount of search time for this species.

## 5.0. REFERENCES

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**Signature Page**  
**U.S. FISH AND WILDLIFE SERVICE**  
**5-YEAR REVIEW of**  
**Kaua`i nukupu`u (*Hemignathus lucidus hanapepe*) and**  
**Maui nukupu`u (*Hemignathus lucidus affinis*)**

**Current Classification:** \_\_\_\_\_ E \_\_\_\_\_

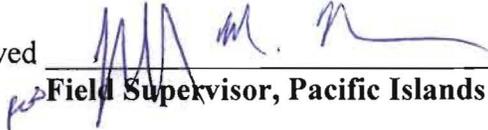
**Recommendation resulting from the 5-Year Review:**

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

**Appropriate Listing/Reclassification Priority Number, if applicable:** \_\_\_\_\_

**Review Conducted By:**

Jay T. Nelson, Fish and Wildlife Biologist  
Marilet A. Zablan, Assistant Field Supervisor for Endangered Species  
Jeff Newman, Acting Deputy Field Supervisor

Approved  \_\_\_\_\_ Date **AUG 27 2010**  
 **Field Supervisor, Pacific Islands Fish and Wildlife Office**