5-YEAR REVIEW

Short Form Summary

Species Reviewed: Maui Nukupuʻu (*Hemignathus affinis*)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2016. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status Reviews of 76 Species in Hawaii, Oregon, Washington, Montana, and Idaho. Federal Register 81(29):7571-7573.

Lead Region/Field Office: Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawaiʻi

Name of Reviewer(s):

Jay Nelson, Fish and Wildlife Biologist, PIFWO
Megan Laut, Animal Recovery Coordinator, PIFWO
Gregory Koob, Conservation & Restoration Team Manager, 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 January 8, 2018. The review was based on a review of current, available information since the last 5-year review for Maui nukupuʻu (USFWS 2010). The evaluation by Jay Nelson, Fish and Wildlife Biologist, was reviewed by the Animal Recovery Coordinator and the Conservation and Restoration Team Manager before review and approval by the Regional Office.

Background:

For information regarding the species' listing history and other facts, please refer to the USFWS Environmental Conservation Online 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 Kauaʻi nukupuʻu (*Hemignathus lucidus hanapepe*) and Maui nukupuʻu (*Hemignathus lucidus affinis*) published on August 27, 2010 (available at: *https://ecos.fws.gov/docs/five_year_review/doc3858.pdf*) for a complete review of the species' status, threats, and management efforts. The two taxa are now each considered to be full species (*H. hanapepe* and *H. affinis*) and are separate listed entities (USFWS 2016b). New information regarding the biological status of Maui nukupuʻu has come to light since listing to warrant a change in its Federal listing status.

The Maui nukupuʻu is a medium-sized, approximately 23 gram, 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 and follows its curvature rather than being straight as in the related ʻakiapōlāʻau (*Hemignathus munroi*) of Hawaiʻi island. Plumage of adult males is 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, p. 2-92).

Summary species status information:
Historical Observations

- In 1967, W. Banko rediscovered Maui nukupuʻu in the upper reaches of Kīpahulu Valley on the eastern slope of Haleakalā, east Maui (Banko 1968, pp. 65-66; USFWS 2006, p. 2-95). Since then, isolated sightings have been reported on the northern and eastern slopes of Haleakalā, but uncorroborated by behavioral information or follow-up sightings (USFWS 2006, p. 2-95). The validity of many of the nukupuʻu sightings during the 20th century has been questioned (Pratt and Pyle 2000, p. 38).
- Based on a single sighting of an immature bird during variable circular plot (VCP) surveys in 1980, Scott *et al.* (1986, pp. 37 and 131) estimated the population size of Maui nukupu'u at 28 $\pm$ 56 (95% CI). VCP surveys are conducted using 8-minute point counts at survey stations spaced 100 to 250 meters (m) (328 to 820 feet (ft)) apart. Survey stations are along transect lines spaced 1.6 to 3.2 km (1 to 2 miles) apart (Scott *et al.* 1986, pp. 34-40). Using VCP data, Scott *et al.* (2008, p. 7) estimated that 1357 8-minute point counts would be needed to determine with 95% confidence the absence of Maui nukupuʻu on Maui. However, in 2008, only 35 VCP counts were conducted. A 39-fold increase in VCP survey effort would be needed to determine the species extinction with 95% confidence.
- Although VCP has been the primary method used to survey birds in Hawaiʻi it is not appropriate for all species and provides poor estimates for extremely rare birds (Camp *et al.* 2009, p. 92). In recognition of this problem, the Rare Bird Search (RBS) was undertaken in 1994 to 1996 to update the status and distribution of 13 "missing" Hawaiian forest birds (Reynolds and Snetsinger 2001, pp. 134-137). The RBS was designed to improve efficiency in search for extremely rare species using the method of continuous observation during 20- to 30-minute timed searches in areas where target species were known to have occurred historically, in conjunction with audio playback of species vocalizations (when available). Surveys and searches have been unsuccessful in finding Maui nukupuʻu since the last confirmed sighting by RBS of an adult male with bright yellow plumage at 1,890 m (6,021 ft) in 1996 from Hanawī Natural Area Reserve (Hanawī NAR) (Reynolds and Snetsinger 2001, p. 140). Reynolds and Snetsinger 2001 (p. 137) define a "confirmed" sighting as "one sighting of a bird by two observers or at least two separate sightings in the same vicinity by different experienced observers."

Subsequent Survey Efforts and Extinction Assessments

- Since the last confirmed sighting of Maui nukupuʻu from Hanawī NAR extensive time has been spent by qualified observers in this same area searching for this species, poʻouli (*Melamprosops phaeosoma*), and Maui ʻākepa (*Loxops ochraceus*). Between September 1995 and October 1996, 700 ha (1,730 ac), Hanawī NAR, including the area of the last Maui nukupuʻu sighting, was searched during 318 person-days (Baker 2001, p. 147). During favorable weather conditions of good visibility and no wind or rain, teams would stop when "chewee" calls given by Maui parrotbill or kiwikiu (*Pseudonestor xanthophrys*), poʻouli, and Maui nukupuʻu were heard and would play either kiwikiu or ʻakiapōlāʻau (*Hemignathus munroi*) calls and

song to attract the bird for identification. Six poʻouli were found but no Maui ʻākepa or Maui nukupuʻu were detected (Baker 2001, p. 147). The Maui Forest Bird Recovery Project (MFBRP) conducted searches from 1997 to 1999 from Hanawī NAR to Koʻolau Gap (west of the last sighting of Maui nukupuʻu) for a total of 355 hours searching at three sites; this effort yielded no detections of Maui nukupuʻu (J. Vetter, U.S. Fish and Wildlife Service, pers. comm., 2018, p. 4). In total, from October 1995 through June 1999 the Hanawī NAR and nearby areas were searched for over 10,000 person-hours without confirming earlier detections of Maui nukupuʻu (Pratt and Pyle 2000, p. 37). MFBRP also searched Kīpahulu on northern Haleakalā from 1997 to 1999, for a total of 320 hours, but no Maui nukupuʻu were detected. However, these searches were hampered by bad weather and playback was not used (J. Vetter, U.S. Fish and Wildlife Service, pers. comm., 2018, p. 4). From 2006 to 2011, MFBRP biologists spent extensive time in the area of the last Maui nukupuʻu sighting while working on kiwikiu recovery. No Maui nukupu'u were detected. The MFBRP project coordinator maintains that if Maui nukupuʻu, Maui ʻākepa, or poʻouli were present they would have been detected (H. Mounce, Hawaiʻi Division of Forestry and Wildlife, pers. comm., 2018, p. 1).

- Forest bird surveys were conducted on East Maui in 2011-2012 (R. Camp, U.S. Geological Survey, pers. comm. 2015, p. 2) and 2017 (Smith 2018, p. 2). No Maui nukupu'u were detected.
- Elphick *et al.* (2010, p. 620) developed a method by which the predicted probability of a species extinction is determined based on time (years) since the species was last observed. Using 1996 for the last credible sighting of Maui nukupuʻu, and given the paucity of observations, the authors were unable to provide an estimated date for the species extinction. When applied to extremely rare species this approach for establishing extinction probability has the drawback that species extinction may be assigned incorrectly due to inadequate survey effort and/or insufficient time spent by qualified observers in the area where the species could still potentially exist..

Threats Evaluation

- A recent analytic tool proposes using information on threats to infer species extinction based on an evaluation of whether identified threats are sufficiently severe and prolonged to cause local extinction and extensive in geographic scope to eliminate all individuals (Keith *et al.* 2017, p. 320). At elevations below 1,500 m (4,921 ft) in Hawaiʻi, the key factor driving disease epizootics (temporarily prevalent and widespread in an animal population) of pox virus (*Avipoxvirus*) and avian malaria (*Plasmodium relictum*) is the seasonal and altitudinal distribution and density of the primary vector of these diseases, the mosquito *Culex quinquefasciatus* (Atkinson and Lapointe 2009a, pp. 237-238, 245-246). The disappearance of many Hawaiian honeycreeper species over the last century from areas below 1,500 m (4,921 ft) points to the effects of avian disease having been sufficiently severe and prolonged and extensive in geographic scope to cause wide-spread species range contraction and possible extinction. It is highly likely avian disease is the primary causal factor for the disappearance of several species of Hawaiian honeycreepers from forested areas below 1,500 m (4,921 ft) on the islands of Kauaʻi, Oʻahu, Molokaʻi, and Lānaʻi and the retreat by Hawaiian honeycreepers to forest above 1,500 m (4,921 ft) on higher islands of Maui and Hawaiʻi (Scott *et al.* 1986, p. 148; Banko and Banko 2009, pp.

52-53; Atkinson and Lapointe 2009a, pp. 237-238). Historical sightings of Maui nukupuʻu all are above 1,500 m (4,921 ft) (USFWS 2006, p. 2-94) and there is large area of native forest habitat at elevations above this where other species of Hawaiian honeycreepers still persist. This suggests avian disease is not sufficiently persistent or extensive in geographic scope to be the sole or primary causal factor for the disappearance of Maui nukupuʻu.

- It is widely established that small populations of animals are inherently more vulnerable to extinction because of random demographic fluctuations and stochastic environmental events (Mangel and Tier 1994, p. 607; Gilpin and Soulé 1986, pp. 24-34). Formerly widespread populations that become small and isolated often exhibit reduced levels of genetic variability, which diminishes the species' capacity to adapt and respond to environmental changes, thereby lessening the probability of long-term persistence (e.g., Barrett and Kohn 1991, p. 4; Keller and Waller 2002, p. 240; Newman and Pilson 1997, p. 361). As populations are lost or decrease in size, genetic variability is reduced resulting in increased vulnerability to disease and restricted potential evolutionary capacity to respond to novel stressors (Spielman *et al.* 2004, p. 15261; Whiteman *et al.* 2006, p. 797). With an estimated population in 1980 of only 28 birds (Scott *et al.* 1986, p. 131), effects of small population size are likely to have negatively impacted Maui nukupuʻu, reducing its potential for long-term persistence.
- Climate change and temperature increase presents an additional threat specific to Hawaiian forest birds by causing an increase in the elevation below which regular transmission of avian malaria occurs. In Hawaiʻi, the threshold temperature for transmission of avian malaria is estimated to be 13 degrees Celsius (55 degrees Fahrenheit), whereas peak *Plasmodium relictum* prevalence in wild mosquitoes occurs in mid-elevation forest where the mean ambient summer temperature is 17 degrees Celsius (64 degrees Fahrenheit) (Atkinson and Lapointe 2009b, p. 58-59). Benning *et al.* (2002, p. 14248) used Geographic Information System simulation to show that an increase in temperature of 2 degrees Celsius (3.6 degrees Fahrenheit), which is within the range predicted by different climate models, in 100 years will result in a 57 percent reduction in the forest area with low risk of malarial infection for Hanawi NAR on Maui. Prevalence of malaria infection in forest birds increased significantly on Kauaʻi between the periods of 1994 to 1997 and 2007 to 2013 at elevations between 1,100 and 1,350 m (3,609 and 4,429 ft) in conjunction with increased air temperatures, declining precipitation, and changes in stream flow that improved conditions for mosquito breeding (Atkinson *et al.* 2014, p. 2427). A similar increase in malaria infection in forest birds would be expected on Maui for the same elevation range, given that surface air temperatures are increasing across all of the Hawaiian Islands (Giambelluca *et al.* 2008, p. 1). Hawaiian honeycreepers are highly vulnerable to avian malaria; for example, the ʻiʻiwi (*Vestiaria coccinea*) suffers high mortality with infection (Atkinson *et al.* 1995, p. S59) and sharp population declines have been observed (92 percent decline on Kauaʻi and 34 percent decline for the northeastern region of East Maui over 25 years) (Paxton *et al.* 2013, p. 5). The Maui nukupu'u is expected to have been similarly vulnerable to malaria. Liao *et al.* (2015, p. 3486) assessed how global climate change will affect future malaria risk for native Hawaiian bird populations and predicted even high elevation forest bird habitat

(above 1,500 m) (4,921 ft) will remain relatively mosquito free only to the mid-21st Century.

New management actions:

- Surveys / inventories, as described above.

Synthesis:

For this review, we applied a standard of demonstrated species absence at the 95% confidence level to recommend a change in species population status from "unknown" to "presumed extinct." This standard means we assumed a species is potentially extant until survey or other information shows the species is absent with 95% confidence from suitable habitat it was known to have occupied historically during the roughly last half century. At the time of the sighting in 1980, the population of Maui nukupuʻu was estimated to be 28 birds. This small population was vulnerable to the many negative effects of small population size that accelerate decline of small populations. Although a single sighting of Maui nukupuʻu was reported in 1996 from Hanawī NAR (Reynolds and Snetsinger 2001, p. 140), over 10,000 person search hours in Hanawī NAR and nearby areas including Kīpahulu Valley from October 1995 through June 1999 failed to confirm this sighting or to detect other individuals (Pratt and Pyle 2000, p. 37). Elphick *et al.* (2010, p. 620) used 1896 for the last credible sighting of Maui nukupuʻu but given the paucity of observations the authors were unable to estimate the year of the species' extinction. We believe the population status of the Maui nukupuʻu should be considered "presumed extinct" rather than "unknown." This recommendation is based on: 1) the lack of detections during extensive searches conducted throughout the species range, in particular Hanawī NAR where Maui nukupuʻu was last reported in 1996; and 2) the extremely small population at the end of the 20th Century and its vulnerability to the negative effects of small population size. Although neither an estimate of species extinction date nor a quantitative confidence bound were available for this species (Elphick *et al.* 2010), we conclude based on the failure to detect Maui nukupuʻu despite extensive search by qualified observers of over 10,000 person hours in the area of the species' last reported sighting (Pratt and Pyle 2000, p. 37), and many hours of subsequent field presence by qualified observers in Hanawī NAR and other high elevation native forest on east Maui (H. Mounce, Hawaiʻi Division of Forestry and Wildlife, pers. comm., 2018, p. 1), that there is strong confidence (equivalent to at least 95 percent) that the species is extinct.

Recommendations for Future Actions:

- *Captive propagation for reintroduction and genetic storage* – There are instances where rare Hawaiian birds have been rediscovered after they were presumed extinct or have been found in larger populations than expected (Reynolds and Snetsinger 2001, p. 142). Should Maui nukupuʻu be rediscovered we recommend the Rare Bird Discovery Protocol in the Revised Recovery Plan for Hawaiian Forest Birds (USFWS 2006, pp. 3-17 – 3-21) be followed with regard to decisions for whether to attempt to establish a captive population for propagation and reintroduction or to manage rediscovered population(s) *in situ*.

Table 1. Trends in status of Maui nukupuʻu since listing.

Date	Number wild individuals	Number released	Key Recovery Actions	Actions Accomplished
1970 (listing)	Very rare	0	See below	
1980 (Hawaiʻi Forest Bird Survey)	28 ± 56 (95% CI)	0	See below	
1984 (first recovery plan)	28 ± 56 (95% CI)	0	Improve habitat conditions; decrease threat of avian disease; systematically search area of suitable forest habitat	Improve habitat conditions – Yes Decrease threat of avian disease – No Systematically search area of suitable forest habitat – Yes
2006 (revised recovery plan)	Unknown	0	Improve habitat conditions; decrease threat of avian disease; systematically search area of suitable forest habitat	Improve habitat conditions – Yes Decrease threat of avian disease – No Systematically search area of suitable forest habitat – Yes
2010 (5-year review)	Unknown	0	Improve habitat conditions; decrease threat of avian disease; systematically search area of suitable forest habitat	Improve habitat conditions – Yes Decrease threat of avian disease – No Systematically search area of suitable forest habitat – Yes

Date	Number wild individuals	Number released	Key Recovery Actions	Actions Accomplished
2018 (5-year review)	Presumed Extinct	0	Improve habitat conditions; decrease threat of avian disease; systematically search area of suitable forest habitat	Improve habitat conditions – Yes Decrease threat of avian disease – No Systematically search area of suitable forest habitat – Yes

References:

Atkinson, C. T., and D. A. LaPointe. 2009a. Ecology and pathogenicity of avian malaria and pox. Pages 234-252 *in* T. K. Pratt, C. T. Atkinson, P. C. Banko, J. D. Jacobi, and B. L. Woodworth (eds.). Conservation biology of Hawaiian forest birds: implications for island avifauna. Yale University Press, New Haven and London.

Atkinson, C. T., and D. A. LaPointe. 2009b. Introduced avian diseases, climate change, and the future of Hawaiian honeycreepers. Journal of Avian Medicine and Surgery 23:53-63.

Atkinson, C. T., R. B. Utzurrum, D. A. LaPointe, R. J. Camp, L. H. Crampton, J. T. Foster, and T. W. Giambelluca. 2014. Changing climate and the altitudinal range of avian malaria in the Hawaiian Islands: an ongoing conservation crisis on the island of Kauai. Global Change Biology 20:2426-2436.

Atkinson, C. T., K. L. Woods, R. J. Dusek, L. S. Sileo, and W. M. Iko. 1995. Wildlife disease and conservation in Hawaii: pathogenicity of avian malaria (*Plasmodium relictum*) in experimentally infected iiwi (*Vestiaria coccinea*). Parasitology 1995; 111:S59-69.

Baker, P. E. 2001. Status and distribution of the poouli in the Hanawi Natural Area Reserve between December 1995 and June 1997. Studies in Avian Biology 22:144-150.

Banko, W. E. 1968. Rediscovery of Maui nukupuʻu, *Hemignathus lucidus affinis*, and sighting of Maui Parrotbill, *Pseudonestor xanthophrys*, Kipahulu Valley, Maui, Hawaii. Condor 70:265-266.

Banko, W. E., and P. C. Banko. 2009. Historic Decline and Extinction. Pages 27-58 *in* T, K. Pratt, C. T. Atkinson, P. C. Banko, J. D. Jacobi, and B. L. Woodworth (eds.). Conservation biology of Hawaiian forest birds: implications for island avifauna. Yale University Press, New Haven and London.

Barrett, S. C. H., and J. Kohn. 1991. Genetics and evolutionary consequences of small population size in plants: implications for conservation. Pages 3-30 *in* Genetics and Conservation of Rare Plants (D. A. Falk and K. E. Holsinger (eds.). Oxford University Press, New York and Oxford.

Benning, T. L., D. LaPointe, C. T. Atkinson, and P. M. Vitousek. 2002. Interactions of climate change with biological invasions and land use in the Hawaiian Islands: modeling the fate of endemic birds using a geographic information system. PNAS 99:14246-14249.

Camp, R. J., Reynolds, M. H., Woodworth, B. L., Gorresen, P. M, and T. K. Pratt. 2009. Monitoring Hawaiian forest birds. Pages 83-107 *in* T, K. Pratt, C. T. Atkinson, P. C. Banko, J. D. Jacobi, and B. L. Woodworth (eds.). Conservation biology of Hawaiian forest birds: implications for island avifauna. Yale University Press, New Haven and London.

Elphick, C. S., D. L. Roberts, and J. M. Reed. 2010. Estimated dates of recent extinctions for North American and Hawaiian birds. Biological Conservation 143:617-624.

Giambelluca, T.W., Diaz, H.F., and M.S.A. Luke. 2008. Secular temperature changes in Hawaii. Geophysical Research Letters 35(L12702):1-5. http://www.agu.org/journals/ABS/2008/2008GL034377.shtml.

Glipin, M. E, and M. E. Soule. 1986. Minimium viable populations: processes of species extinction. Pages 19-34 *in* M. E. Soulé (ed.). Conservation Biology: the science of scarcity and diversity. Sinauer Associates.

Keith, D. A., S. H. M. Butchart, H. M. Regan, I. Harrison, H. R. Akçakaya, A. R. Solow, M. A. Burgman. 2017. Inferring extinctions I: a structured method using information on threats. Biological Conservation 2154:320-327.

Keller, L. F., and D. M. Waller. 2002. Inbreeding effects in wild populations. Trends in Ecology and Evolution 17:230-241.

Liao, 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.

Mangel, M., and C. Tier. 1994. Four facts every conservation biologists should know about persistence. Ecology 75:607-614.

Newman, D., and D. Pilson. 1997. Increased probability of extinction due to decreased genetic effective population size: experimental populations of *Clarkia pulchella*. Evolution 51:354-362.

Paxton, E. H., Gorresen, P. M., and R. J. Camp. 2013. Abundance, distribution, and

population trends of the iconic Hawaiian Honeycreeper, the iiwi (*Vestiaria coccinea*) throughout the Hawaiian Islands. U.S. Geological Survey Open-File Report 2013-1150.

Pratt, T. K., and R. L. Pyle. 2000. Nukupuu in the Twentieth Century: endangered species or phantom presence? Elepaio 60:35-41.

Reynolds, M. H., and T. J. Snetsinger. 2001. The Hawaii rare bird search 1994-1996. Studies in Avian Biology 22:133-143.

Scott, J. M., S. Mountainspring, F. L. Ramsey, and C. B. Kepler. 1986. Forest bird communities of the Hawaiian Islands: their dynamics, ecology, and conservation. Studies in Avian Biology 9:1-431.

Scott, J. M, F. L. Ramsey, M. Lammertink, K. V. Rosenberg, R. Rohrbaugh, J. A. Wiens, and J. M. Reed. 2008. When is an "extinct" species really extinct? Gauging the search efforts for Hawaiian forest birds and the Ivory-billed Woodpecker. Avian Conservation and Ecology – Écologie et conservation des oiseaux 3(2):3, 17 pages. Available on line at: http://www.ace-eco.org/vol3/iss2/art3/.

Smith, D. G. 2018. Division of Forestry and Wildlife comments on draft 5-year status evaluations for five Hawaiian forest birds. State of Hawaii, Department of Land and Natural Resources, Division of Forestry and Wildlife. 2 pages.

Spielman, D., B. W. Brook, and R. Frankham. 2004. Most species are not driven to extinction before genetic factors impact them. PNAS 101:15261–15264.

[USFWS] U.S. Fish and Wildlife Service. 2006. Revised recovery plan for Hawaiian forest birds. Region 1, Portland, Oregon. 622 pages.

[USFWS] U.S. Fish and Wildlife Service. 2010. Kauai nukupuu (*Hemignathus lucidus hanapepe*) and Maui nukupuʻu (*Hemignathus lucidus affinis*) 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii. 14 pages.

[USFWS] U.S. Fish and Wildlife Service. 2016a. Endangered and Threatened Wildlife and Plants; Initiation of 5-year Status Reviews of 76 Species in Hawaii, Oregon, Washington, Montana, and Idaho. Federal Register 81:751-753.

[USFWS] U.S. Fish and Wildlife Service. 2016b. Endangered and threatened wildlife: Technical corrections for eight wildlife species on the List of Endangered and Threatened Wildlife. Federal Register 81:8004-8007. February 17, 2016.

Whiteman, N. K., K. D. Matson, J. L. Bollmer, and P. G. Parker. 2006. Disease ecology in the Galapagos hawk (*Buteo galapagoensis*): host genetic diversity, parasite load and natural antibodies. Proceedings of the Royal Society B 273:797-804.

Personal communications:

Camp, Rick. 2015. U.S. Geological Survey. E-mail communication with Jay Nelson, Pacific Islands Fish and Wildlife Office, dated May 6, 2015. Subject: Recent forest bird surveys – islands and area(s) surveyed.

Vetter, John. 2018. U.S. Fish and Wildlife Service. E-mail communication with Jay Nelson, Pacific Islands Fish and Wildlife Office, dated January 4, 2018. Subject: Request for Maui Nui forest bird info.

Mounce, Hannah. 2018. Hawaii Division of Forestry and Wildlife. E-mail commication with Jay Nelson, Pacific Islands Fish and Wildlife Office, dated January 4, 2018. Subject: Request for Maui Nui forest bird info.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of
Maui Nukupu'u (*Hemignathus affinis*)

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

Recommendation resulting from the 5-year review:

__X__ 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:_____

Acting **Assistant Regional Director, Ecological Services, Pacific Regional Office**

Rachel Mercil

Date 7/30/2018