Koloa maoli or Hawaiian Duck
(*Anas wyvilliana*)

5-Year Review
Summary and Evaluation

U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
Honolulu, Hawaii

5-YEAR REVIEW

Species reviewed: Koloa maoli or Hawaiian Duck (*Anas wyvilliana*)

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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, Gina Shultz, Deputy 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 (PIFWO) of the U.S. Fish and Wildlife Service (USFWS) beginning on March 8, 2007. The draft revised recovery plan for the koloa maoli or Hawaiian duck, sometimes referred to simply as "koloa," was the primary source of information for this five-year review (Draft Revised Recovery Plan for Hawaiian Waterbirds, Second Draft of Second Revision, USFWS 2005). However, updates on the status and biology of this species were also obtained from other sources, especially from researchers recently or currently working on this species. The evaluation of the status of the species was prepared by the lead PIFWO biologist and reviewed by the Vertebrate Recovery Coordinator. The document was then reviewed by the Recovery Program Leader and acting Assistant Field Supervisor for Endangered Species, and Deputy Field Supervisor, before submission to the Field Supervisor for approval.

1.3 Background:

1.3.1 FR Notice citation announcing initiation of this review:

U.S. Fish and Wildlife Service. 2007. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 71 species in Oregon, Hawaii, Commonwealth of the Northern Mariana Islands, and Territory of Guam. Federal Register 72(45):10547-10550.

1.3.2 Listing history

Original Listing
FR notice: USFWS. 1967. Office of the Secretary, Native Fish and Wildlife, Endangered Species. Federal Register 32(48):4001.
Date listed: March 11, 1967
Entity listed: Species
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: None

1.3.4 Review History:
Species status (FY 2008 Recovery Data Call [September 2008]):
Stable

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 or outline: Draft revised recovery plan for Hawaiian waterbirds, second draft of second revision
Date issued: May 2005
Dates of previous revisions, if applicable: Original approved 1978; First revision approved 1985; First draft of second revision released May 1999.

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?
__X__ ***Yes***
_____ ***No***

2.1.2 Is the species under review listed as a DPS?
____ ***Yes***
__X_ ***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***
__X_ ***No***

2.2 Recovery Criteria

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

_X_ ***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?

__X_ ***Yes***
____ ***No***

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

__X_ ***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 threats (Factors A, C, and E) affecting this species are discussed in section I.D. of the 2005 recovery plan (second draft of second revision, USFWS 2005). The main threat to the koloa currently is hybridization with feral mallards (*Anas platyrhynchos*) (Factor E). Loss and degradation of wetland habitat, including alteration of hydrology, and invasion of habitat by nonnative plants (Factor A) is also a significant threat to the koloa. In addition, predation and avian disease are a current threat to the recovery of the koloa (Factor C). Environmental contaminants (Factor E) are also considered a threat, particularly for birds utilizing wetlands associated with, for example, urban areas and ports (USFWS 2005). Hunting (Factor B, overutilization) is not considered a threat to the koloa at this time due to a total ban on waterfowl hunting initiated in 1939, which is still in effect today. Inadequacy of existing regulatory mechanisms (Factor D) is not considered a threat at this time (USFWS 2005).

The draft revised recovery plan for the koloa includes the following recovery criteria:

Downlisting criteria

(1) All core wetlands listed in the recovery plan on the islands of Kauai, Oahu, Maui, and Hawaii are protected and managed in accordance with the management practices outlined in the recovery plan.

(2) Of the supporting wetlands listed in the recovery plan on the islands of Kauai, Oahu, Maui, and Hawaii, at least 25 percent are protected and managed in accordance with the management practices outlined in the recovery plan.

(3) The statewide Hawaiian duck population shows a stable or increasing trend at a number greater than 2,000 birds for at least 5 consecutive years.

(4) There are multiple self-sustaining breeding populations, with populations present on Kauai, Oahu, Maui, and Hawaii; and

(5) The threat of hybridization with feral mallards is removed from all islands.

Delisting criteria

(1) All core wetlands listed in the recovery plan on the islands of Kauai, Oahu, Maui, and Hawaii are protected and managed in accordance with the management practices outlined in the recovery plan.

(2) Of the supporting wetlands listed in the recovery plan on the islands of Kauai, Oahu, Maui, and Hawaii, 75 percent are protected and managed in accordance with the management practices outlined in the recovery plan.

(3) The statewide Hawaiian duck population shows a stable or increasing trend at a number greater than 2,000 birds for at least 10 consecutive years.

(4) There are multiple self-sustaining breeding populations, with populations present on Kauai, Oahu, Maui, and Hawaii; and

(5) The threat of hybridization with feral mallards is removed from all islands.

At this time, none of the recovery criteria from the draft revised recovery plan (USFWS 2005) have been met. Several core wetlands listed in the draft revised recovery plan as needed for recovery are not yet protected. Second, few of the supporting wetlands listed in the draft revised recovery plan have been protected. Also, the koloa population currently is not self-sustaining. Hybridization is increasing, and the number of pure koloa may be declining, although numbers were estimated at 2,200 in 2002 (Engilis *et al*. 2002, USFWS 2005). Finally, although management remedies for hybridization currently are under study, the threat of hybridization has not been removed, and in fact has spread through the islands.

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:

Uyehara (2005) looked at the occupancy of koloa at wetlands on Hawaii Island and found that they are more likely to occupy wetlands greater than 600 meters from a house in areas of low building densities, and are more likely to occupy medium to large wetlands (greater than 1,000 square meters) in areas of high wetland densities. These results suggest that human disturbance nearby has a strong negative effect and that larger wetland areas are correlated with greater use by koloa. In addition, koloa are more likely to occupy wetlands lacking nonnative waterfowl and fish and wetlands with light livestock grazing.

Gee (2007) looked at refuge wetlands and taro loi use by koloa and Hawaiian waterbirds at Hanalei National Wildlife Refuge on Kauai and presented results on habitat characteristics and use patterns that could be used to improve habitat management for these species.

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:

Until recently, it was thought that more than 2,000 pure koloa remained on Hawaii, Kauai, and Niihau (Engilis *et al*. 2002). However, more recent information suggests that even these populations contain koloa-mallard hybrids (USFWS 2005; Uyehara *et al*. 2007).

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

Recent information on koloa genetics indicates that most hybrids are the result of female mallards mating with male koloa; individuals resulting from many generations of back-crossing are difficult to distinguish from pure koloa (A. Engilis, University of California, Davis, pers. comm. 2007). The information from this genetic study as well as the morphological research being simultaneously conducted is being used to develop a field key for distinguishing koloa from hybrids.

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.):

The distribution of the species is currently affected by the increasing number of koloa-mallard hybrids State-wide. Until recently, Kauai was believed to be free of hybrids, but is now known to have at least a small number of hybrids.

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

No new information.

2.3.1.7 Other:

The possibility of avian influenza or west Nile virus reaching Hawaii is a recent concern and has lead to efforts to increase control of the importation of birds into the State from the mainland. The impact these two diseases may have on Hawaiian waterbirds is not known at this time, but species-level effects could be harmful.

2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms) [see Synthesis in section 2.4 below]

2.3.2.1 Present or threatened destruction, modification or curtailment of its habitat or range:

No new information.

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

No new information.

2.3.2.3 Disease or predation:

No new information.

2.3.2.4 Inadequacy of existing regulatory mechanisms:

No new information.

2.3.2.5 Other natural or manmade factors affecting its continued existence:

No new information.

2.4 Synthesis

A significant amount of wetland habitat has been lost in Hawaii. The amount of coastal wetland habitat used by Hawaiian waterbirds addressed in the recovery plan was estimated to be 8,990 ha (22,215 ac) in 1780, reduced by 31 percent to 6,190 ha (15,296 ac) by 1990 (USFWS 2005). Management and protection remaining wetlands in Hawaii, particularly those determined to be core and supporting wetlands, are needed for recovery of the koloa. The state of the remaining wetland habitats in Hawaii is generally poor due to alteration of wetland plant communities and hydrology, unrestricted grazing, and effects of introduced predators, including mongooses (*Herpestes auropunctatus*), cats (*Felis catus*), cattle egrets (*Bubulcus ibis*), bullfrogs (*Rana catesbeiana*), and various fish species. Habitat protection and restoration, including predator control, must be continued and improved. Many of the wetlands that could be, or are, used by koloa are currently unprotected or unmanaged. Koloa also use more than coastal wetlands; montane streams are important nesting habitat for koloa on Kauai and probably on Hawaii Island (USFWS 2005). Introduced ungulates have significantly degraded habitat along Kauai's montane streams.

The alteration of wetland habitat in Hawaii has reduced the usefulness of wetland areas for all endangered waterbirds (USFWS 2005). For example, when predator control of cats and mongooses was implemented at Aimakapa Pond on Hawaii Island (1993-1994), 18 to 22 stilts and 6 to 18 coots were fledged (Morin 1998). Since management actions including predator control were discontinued in 1995, no stilts have been recruited, and only approximately 2 coots are recruited annually (K. Uyehara, pers. comm. 2008). Feral cats were found to be a major

predator of koloa and other waterbirds at Hanalei National Wildlife Refuge, Kauai (Gee 2007).

The relatively large koloa population on Kauai has maintained itself until recently, due mainly to the lack of an established mongoose population, as well as a low incidence of hybridization with mallards. Captive-bred birds have never been released Kauai (USFWS 2005), and if hybridization is kept in check, koloa will likely continue to do well on Kauai with continued habitat management and predator control. However, if hybridization is not addressed, the number of pure koloa on Kauai will decline.

West Nile virus and avian influenza may pose a risk to koloa if they reach Hawaii. In 2002, the Hawaii Department of Agriculture placed an embargo on shipping any birds in to the islands, which may help reduce the possibility of these diseases arriving here, but continued vigilance is required. In addition, Hawaii is currently monitoring birds statewide by surveillance and collecting dead birds for early detection of avian influenza. Botulism is a prevalent disease and has reappeared annually resulting in many deaths of native and migratory waterbirds in Hawaii. Developing a plan to track the locations of outbreaks may reveal information that could help in ameliorating the conditions that lead to outbreaks (USFWS 2005).

Currently, the main recovery action needed to provide for the survival and recovery of this species is reducing and eliminating the threat of hybridization. Efforts are currently underway to finish a field key to distinguish koloa from koloa-mallard hybrids. Public outreach is the next important step and preliminary planning efforts have begun. Public understanding of the serious hybridization threat posed to koloa by mallards is key; support is needed for humane methods of management actions including mallard and hybrid removal.

Koloa are still present in large numbers on Kauai; however, koloa-mallard hybrids are increasing on Kauai and most of the other populations consist largely of hybrids. The number of pure koloa has declined and the stabilization and recovery goals for this species have not been met. Therefore, the koloa meets the definition of endangered as it remains in danger of extinction throughout its range.

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:

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:

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

- Finalize research on methodology to distinguish koloa from koloa-mallard hybrids and develop and test a field key.
- Develop a communication plan and implement outreach and public education efforts to generate interest in saving the koloa.
- Develop and implement a State-wide feral mallard and hybrid removal plan.
- Protect core and supporting wetlands.
- Remove nonnative invasive plants and improve altered wetland hydrology as appropriate.
- Continue predator control and implement improved methods as they become available.
- Continue annual State-wide waterbird counts. These data are currently not analyzed for other than basic status of the species. Directed analysis of the waterbird count data could identify correlations, including use of specific wetlands, time of year, and state of wetlands, that could improve our ability to manage for endangered waterbirds.

5.0 REFERENCES

Engilis, A., Jr., K.J. Uyehara, and J.G. Giffin. 2002. Hawaiian Duck (*Anas wyvilliana*). *In* Poole, A. and F. Gill (eds.), The Birds of North American, No. 694: Philadelphia, The Birds of North America, Inc.

Gee, H.K. 2007. Habitat characteristics of refuge wetlands and taro loi used by endangered waterbirds at Hanalei National Wildlife Refuge, Hawaii. Master's thesis, South Dakota State University, Brookings, SD. 154 pages.

Morin, M.P. 1998. Endangered waterbird and wetland status, Kaloko-Honokohau National Historical Park, Hawaii Island. Technical Report 119. Cooperative National Park Resources Studies Unit. University of Hawaii at Manoa. Honolulu, HI. 62 pages.

[USFWS] U.S. Fish and Wildlife Service. 2005. Draft revised recovery plan for Hawaiian waterbirds, second draft of second revision. U.S. Fish and Wildlife Service, Portland, OR. 155 pages.

Uyehara, K.J. 2005. Wetland features that influence occupancy by endangered Hawaiian duck on the island of Hawaii. Master's thesis, Bard College, New York, NY. 45 pages.

Uyehara, K.J., A.E. Engilis, Jr., and M. Reynolds. 2007. Hawaiian Duck's future threatened by feral mallards. Fact sheet published by USGS. 4 pages. <http://pubs.usgs.gov/fs/2007/3047>

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of Koloa maoli or Hawaiian duck *(Anas wyvilliana)*

Current Classification: ___E_____

Recommendation resulting from the 5-Year Review:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
__X_ No change needed

Appropriate Listing/Reclassification Priority Number, if applicable:_____

Review Conducted By:
Ann P. Marshall, Fish and Wildlife Biologist
Holly B. Freifeld, Vertebrate Recovery Coordinator
Marilet A. Zablan, Recovery Program Leader and acting Assistant Field Supervisor for Endangered Species
Gina Shultz, Deputy Field Supervisor

Approved: _____ Date 31 July 2009
Acting Field Supervisor, Pacific Islands Fish and Wildlife Office