Monitoring population size of endangered Hawaiian duck and prevalence of Mallard/Hawaiian duck hybrids on Hanalei and Hulēʻia NWRs, Kauaʻi, Hawaiʻi

The Hawaiian duck or Koloa maoli (*Anas wyvilliana*) is endemic to Hawaiʻi and one of three extant waterfowl species occurring on the Hawaiian Islands (Olson and James 1982, Engilis et al. 2002). Relatively common during the early 1900s, the Koloa has since experienced a significant state-wide population decline because of factors that include wetland loss, over harvest by hunters, and introduced mammalian predators. More recently, the genetic integrity of the species has been threatened by hybridization with feral Mallards (Engilis et al. 2002). Consequently, Koloa was listed as a Federally-endangered species in 1967 and has the highest recovery priority for the four listed wetland birds that occur on the main Hawaiian Islands (USFWS 2005). Kauaʻi is the only island that likely supports a viable population of pure Koloa and Hanalei and Hulēʻia NWRs are at this time the number one and two most important sites for Koloa in the state.

There is currently no credible estimate of Koloa population size at any spatial scale (Engilis et al. 2002). Although state biannual counts may provide an index for wetlands, counts do not include streams where 50-80% of Koloa are believed to reside on Kauaʻi (Schwartz and Schwartz 1953, Swedberg 1967). These state biannual count data have peaked at 524 for the all-island survey and 459 for Kauaʻi in January 2004 (Hawaiʻi DLNR unpublished data 1986-2006). However, recent banding activities over a two month period on Hanalei NWR have banded nearly 300 individuals and resighting activities indicate that greater than 75% of birds on the refuge are not currently banded (C. Malachowski unpubl. data). Together, these data indicate the count data is biased seriously low. Additionally, limited radio telemetry data from Hanalei NWR (C. Malachowski unpubl. data) indicates there are strong daily movements of Koloa onto Hanalei NWR in the evening and movement off the refuge in the morning. Thus, mid day counts on the refuge are not adequately characterizing the roll of Hanalei NWR in meeting the daily habitat needs for Koloa in the Hanalei region.

Beginning in December of 2010, we used grant money from Region 1 Refuges, Ecological Services, and Migratory Birds and Oregon State University, and inkind contributions from Kauaʻi NWRC to initiate a capture, banding and survey protocol that can achieve multiple monitoring and research objectives listed in the Draft Hanalei and Hulēʻia NWR CCP and Hawaiian Waterbird Recovery Plan. The protocol for our survey also allows us to move forward with key conservation and research activities that will support implementation and assessment of the refuges CCP and inform refuge staff about the value of habitat management programs on both refuges. Our specific objectives include:

Objectives:

1. Investigate the value of using banded birds and a mark-resight analysis approach to estimate the population size of Koloa using Hanalei and Hulēʻia NWRs.

2. Determine the prevalence of Mallard/Koloa hybrids on Hanalei and Hulēʻia NWRs.

3. Develop operational survey to annually detect and remove hybrids from Hanalei and Hulēʻia NWRs; explore application of these methods to James Campbell NWR on Oʻahu.

4. Collect data to help refine the Mallard/Koloa hybrid key to improve implementation of hybrid removal activities at both Kauaʻi refuges and James Campbell NWR on Oʻahu.

5. Conduct field surveys at Hanalei and Hulēʻia to survey for extent and seasonality of intra-island movements.

Since December of 2010, we have captured, banded, and collected morphometric data on nearly 300 individual Koloa and have removed seven hybrid males from the population. We seek funds to maintain our monitoring effort through FY2011 and into FY2012. We need an extensive effort initially to sort through logistics (e.g., what time of the year are birds vulnerable to being trapped). Using that information, we will design an operational survey that could be supported within the Kauaʻi NWRC annual budget.

Our survey directly addresses four priorities listed in the I&M Project RFP: (1) it benefits the science information needs of multiple refuges. Our monitoring and assessments are largely focused on Hanalei at this time, but with additional funds we propose to expand to Hulēʻia and conduct limited sampling and explore application of these methods to James Campbell NWR on Oʻahu. (2) Our survey has already begun, thus we are past "shovel ready" – we're shoveling! (3) Our project has applicability beyond refuge boundaries. Regionally, it will help us understand how places like Hanalei NWR fit into the surrounding habitat matrix of Kauaʻi. With extensive banding we also hope to increase the odds of detecting inter-island movements. Recent telemetry work confirmed movement of a bird from Kauaʻi to Niʻihau. We also need to quantify the frequency of movement between Kauaʻi and Oʻahu. Oʻahu is a large source of Mallard/koloa hybrids that might increase threats to the Kauaʻi population if inter-island movements are common. Finally, 4) our project addresses resource management priorities of the Refuges, other FWS programs (T&E species, Migratory Birds, Habitat Conservation), and conservation partners (Pacific Coast Joint Venture, Hawaiʻi DLNR).

Our proposed survey addresses all objectives of Goal 4 in the draft Hanalei and Hulēʻia NWRs CCP (**Goal 4: Gather scientific information [surveys, research, and assessments] to support adaptive management decisions under objectives for Goals 1-3.** The specific objectives covered by our survey include: **Objective 4.1 Conduct high priority inventory and monitoring (survey) activities; Objective 4.2 Conduct high priority research projects; Objective 4.3 Conduct scientific assessments.** Specific tasks under these objectives that would be addressed include: 1. Evaluate methods to control hybridization threats to Koloa maoli; support completion of hybrid identification keys; 2. Develop survey methods to reliably estimate Koloa maoli population size; and 3. Investigate endangered waterbird daily and seasonal movements.

Additionally, our capture efforts to mark birds are providing an opportunity to field test the recently developed morphological key used to identify hybrids in the population and implement a conservation action for the Koloa by removing the threat of hybridization with feral Mallards. Removal of hybrids is the highest priority objective in the Draft Hawaiian Waterbird Recovery Plan for Koloa (Engilis et al. 2002, USFWS 2005). Part of our funding request includes funds to increase the sample of birds submitted to genetic testing with the goal of refining and improving the hybrid key.

Budget for Koloa Abundance and Hybrid Prevalence
Timeframe: 12-15 months from Award

Item	Est. Cost
Personnel	
Duck Trapper	$ 12,811
Travel	
One round trip plane ticket mainland to Kauai and one Kauai to Oahu	$ 1,000
Supplies	
Bait for traps	$ 4,400
Banding supplies	$ 2,000
Trap construction and maintance	$ 500
Contractual Services & Supplies	
Process genetic samples	$ 2,500
Other direct Costs	
Vehicle maintenance and gas	$ 500
TOTAL DIRECT COSTS	$ 23,711
INDIRECT COSTS (26% of Direct Costs)	$ 6,165
TOTAL	**$ 29,876**