Translocation of wild Laysan Teal *Anas laysanensis* from Laysan Island to Midway Atoll: project update

MICHELLE H. REYNOLDS[1,2], JAMES H. BREEDEN JR.[1], AND JOHN L. KLAVITTER[3]

[1]US Geological Survey, Pacific Island Ecosystems Research Centre
Kilauea Field Station PO Box 44, Hawaii National Park, HI 96718, USA.
[2]Email: michelle_reynolds@usgs.gov
[3]US Fish and Wildlife Service, Midway Atoll National Wildlife Refuge,
1082 Makepono St., Honolulu, HI 96819, USA.

Abstract

The Laysan Teal *Anas laysanensis* is endemic to the Hawaiian Islands, where it has been restricted to Laysan Island over the last 150 years. Individuals of this endangered species have recently been translocated to the two largest islands that comprise Midway Atoll National Wildlife Refuge, to reduce the risk of the Laysan Teal becoming extinct. Post-release monitoring with the aid of radio-telemetry was conducted to determine the success of the reintroduction attempt during October 2004–2007. The population was found to have increased after three breeding seasons, from forty-two founders sourced directly from Laysan, to a population of ≥ 192 post-fledglings juveniles and adults.

Many island ecosystems have undergone catastrophic species losses, largely due to the effects of introduced species. Fortunately, an "insurance policy" is being implemented for one member of the world's rapidly disappearing island birds. Hawaii has lost at least seven of its 10 known endemic waterfowl species since humans colonised the islands, and the remaining three species are endangered: Nene *Nesochen sandvicensis*, Koloa Maoli *Anas wyvilliana*, and Laysan Teal *Anas laysanensis*. The Laysan Teal, also known as the Laysan Duck (AOU 1998), was once widespread across the Hawaiian Islands, but now has one of the most isolated and restricted ranges of any duck species. Laysan Island (hereafter Laysan), part of the Hawaiian Islands National Wildlife Refuge, and Papahānaumokuākea Marine National Monument, supported the last remaining population.

The Laysan Teal is classified as critically endangered by the IUNC and was among the first species placed on the US

Endangered Species List because of its vulnerability and the sensitive ecosystem of Laysan (USFWS 2004). Evidence suggests that the Laysan Teal's range contraction to only 4 sq. km was in part due to the introduction of non-native rats (*Rattus* spp.) coincident with human colonisation of the Hawaiian Islands (Burney *et al.* 2001). Since rats never became established on Laysan, it provided a critical refuge for the birds. Small isolated island populations have high extinction risks, and the Laysan Teal is vulnerable to hurricanes, tsunamis, diseases, introduction of mammalian predators, sea level rise, and droughts (USFWS 2004).

Since the Laysan Teal does not disperse from Laysan, "translocation" – the human-aided movement of a species from one location to another – was used as a reintroduction tool (Griffith *et al.* 1989). In October 2004, 20 juvenile and pre-breeding ducks therefore were taken on a 600 km voyage from Laysan to Midway Atoll National Wildlife Refuge (NWR; hereafter Midway Atoll) (USGS 2005). In October 2005, an additional 22 mostly juvenile ducks joined them at Midway Atoll. Midway Atoll is part of the presumed previous range for Laysan Teal, and was recommended by biologists and managers planning the species' recovery as the best site for establishing an "insurance" population (Reynolds & Kozar 2000; USFWS 2004). Midway Atoll was also chosen because of the successful eradication of rats from the Refuge by 1997, and because of logistic feasibility, including year-round staffing by Refuge staff. Habitat was enhanced by creating freshwater wetlands and planting native vegetation at release sites prior to translocation. Ongoing native plant restoration, weed control, and wetland monitoring is undertaken by US Fish and Wildlife Service staff and volunteers.

The recovery strategy for the Laysan Teal includes maintaining the source population on Laysan and establishing additional populations on other islands at levels sufficient to increase the resistance of the species to catastrophic events, and to demographic and environmental uncertainties. The draft revised recovery plan (USFWS 2004) identified the use of translocation to re-establish 3–4 additional populations on other islands as a priority to reduce extinction risk. Here we provide a brief summary of the research and recovery efforts to date on Midway Atoll.

Study site and methods

Laysan is a 415 ha island, situated 1,463 km northwest of Honolulu (25° 46´N, 171° 44´W; Fig. 1), and is accessible only by boat, typically as a five-day voyage. The island is unique in having a large hyper-saline lake. Laysan is dominated by native vegetation and, despite guano mining and a rabbit infestation in the early 1900s (Ely & Clapp, 1973), now has one of the most intact ecosystems of the archipelago. Midway Atoll land area covers ~594 ha, is comprised of Sand Island (452 ha), Eastern Island (136 ha) and Spit Island (6 ha), and is located 1,930 km from Honolulu (28° 12´N and 177° 22´W), from which it is accessible by air (Fig. 1). During 2004–2006, all translocated Laysan Teal were monitored using radio-telemetry. Transmitters were attached between the scapulas with a nylon

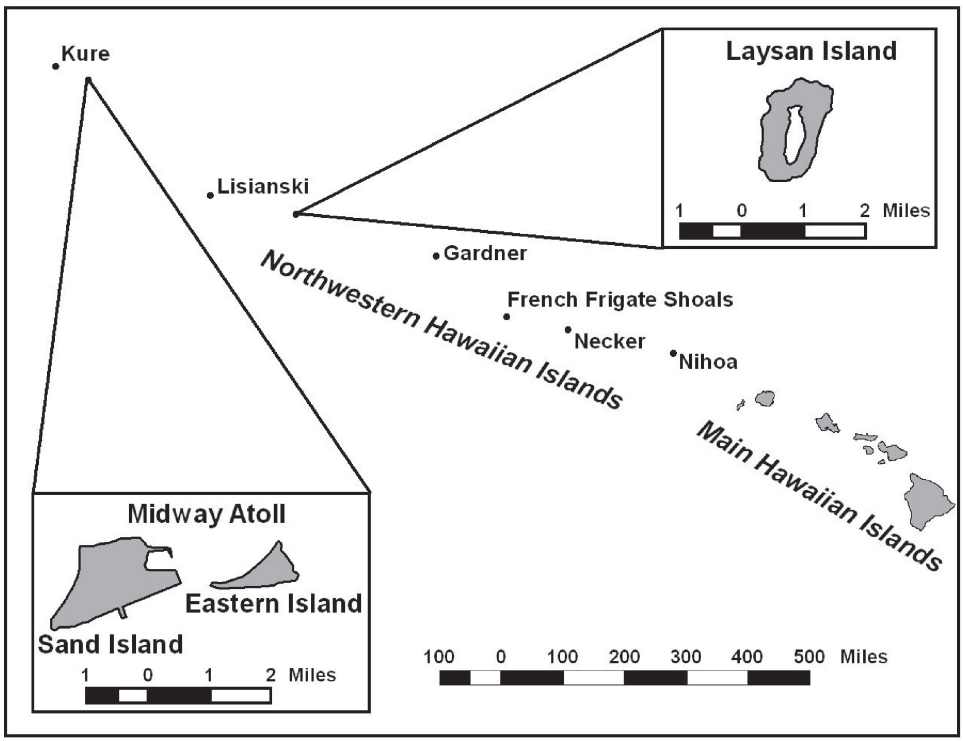

Figure 1. Map of Hawaiian Islands with enlargement of Laysan Island and Midway Atoll.

Table 1. Annual maximum population sizes for Laysan Teal at the Midway Atoll National Wildlife Refuge. Post-fledglings include adults and independent flying juveniles.

Year	No. of founder-birds, translocated from Laysan Island	Maximum no. of potentially breeding adult females	Maximum post-fledgling population size on Midway Atoll
2003	0	0	0
2004	20	0	20
2005	22	6	51
2006	0	18	104
2007	0	49	~192*

* Preliminary count: sum of the maximum number of adults surviving from 2006 and the total number of juveniles marked by October 2007.

harness equipped with a weaker link of break-away thread. All fledglings were caught and ringed with a numbered aluminium band (USGS) on the tibiotarsus of one leg and a plastic colour-band with alpha or numeric symbols on the other leg (Haggie Engraving™). Birds were fitted with 4.5–9.5 g radio-transmitters weighing less than 3% of their body mass (see also Reynolds *et al.* 2007). Laysan Teal were recaptured on multiple occasions to replace transmitters during the post-release monitoring period. Radio-telemetry locations were recorded for each bird on average 1–2 times per week.

During 2007, 18–20 adult birds were radio tracked approximately bi-weekly, and all adults were individually colour-ringed. Juveniles were captured opportunistically, and efforts are underway to ring the 2007 post-fledgling juvenile cohort.

Results and Discussion

All of the ducks survived translocation, and survival of the 42 founding birds thereafter was approximately 90% during their first years post-release. Four of six translocated females bred successfully during their first post-release year, and the first generation of fledglings was produced in 2005 (Reynolds & Klavitter 2006). On Laysan, one-year-old ducks typically do not breed successfully, so the productive first year at Midway Atoll was unexpected.

The adult population size is currently between 80–92 birds, and the 2007 breeding season (~April–October) on Midway Atoll is on-going, with gravid hens, active broods, and a nest under surveillance. As of October 2007, ~100 juveniles have been ringed from this breeding season. To date, the reintroduction programme appears to be successful, with recruitment exceeding adult mortality during the first three breeding seasons (USGS data; Table 1). Furthermore, the species' range has more than doubled with this reintroduction (total species range = ~9 total sq. km). The post translocation monitoring revealed that the Laysan Teal is capable of using novel habitats, and of flight between the islands of Midway Atoll (1–5 km). Ducks on Midway Atoll used a wide variety of non-native vegetation types for nesting and foraging that are not available on Laysan. The outlook for the conservation of Laysan Teal is optimistic given their foraging and nesting plasticity. Discussions are underway about genetic supplementation to the founder population at Midway Atoll, and the establishment of a third population on another mammalian predator-free island. A pilot study is planned for 2008, to develop effective survey methods to estimate the Laysan Teal's population abundance without the aid of radio-telemetry on Midway Atoll. It will also soon be possible for the public to visit Midway Atoll and to see Laysan Teal in the wild, with a visitor services programme scheduled to commence in 2008 (B. Christenson, USFWS Midway Atoll Refuge Manager, pers. comm.; www.fws.gov/midway/VSP/MidwayVSPindex.html).

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