Photo; South Island robin (*Petroica australis*) on Motuara Island.

Conserving small island populations of endangered New Zealand birds: do inbreed donors act as a viable solution for long-term genetic rescue?

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Many of New Zealand's endemic birds have passed through severe population bottlenecks, as a result of introduced predators, habitat loss, and human intervention. Even if a population recovers, a bottleneck can lead to loss of genetic variation and a reduction in the fitness of the post-bottleneck population. Unfortunately, for many endangered birds in New Zealand, few non-bottlenecked populations survive to supply the donors needed to rescue bottlenecked populations. As a consequence, Heber et al. 2012 used a reciprocal translocation to rescue two bottlenecked populations of the South Island robin, *Petroica australis*, on Motuara and Allports Islands in 2008. The young that resulted from the cross between the two populations showed an increase in genetic diversity and a recovery of fitness traits, indicating that rescue with bottlenecked donors can be an alternative when non-bottlenecked populations are unavailable. However, a key element missing from all genetic rescue tests is what are the long-term effects (10+ years), how the cognitive processes are affected by the loss of genetic variation and whether these deleterious effects are reversed through genetic rescue. To address this question, I am to examine the effect of levels of genetic variation 10 years after the initial genetic rescue and genetic rescue on two key cognitive aspects in the South Island robin: song complexity, and problem-solving ability.

To achieve this goal I will first, collect DNA from blood samples from robins in the two populations subject to genetic rescue in 2008 by Heber et al. This will allow me to estimate levels of genetic variation using microsatellites, and toll-like receptors in bottlenecked individuals as well as hybrids between the two populations. I will then measure, (1) complexity of the dawn chorus songs; Song structure is strongly linked to cognitive capability in birds. Song in robins is composed of many learned features, some of which are likely constrained by genetic or environmental aspects of male quality. Therefore, birdsong can be an excellent indicator of male memory and cognitive ability, as it is expected to be compromised by the loss of genetic variation; (2) problem-solving will be measured as the ability of robins to complete a series of complex tasks using experimentally created food caches. Cognitive ability will be tested using three experiments that measure a set of cognitive processes including attentional control, inhibitory control, and memory.

Previous research relating to this project and the original genetic rescue experiment;

Heber, S., *Translocations and the 'genetic rescue' of bottlenecked populations*, in *Unpublished doctoral thesis*. 2012, University of Canterbury, Christchurch, New Zealand

Photo; Myself collecting a blood sample from a robin on Motuara Island

Photo; Albert (KM-DBW) the resident camp male on Motuara Island. He was generally considered the smartest bird on the island and passed all the cognitive experiments.

Photo; Amongst other things robin nests were also checked for breeding success. This photo is a female (PUDB-YM) from a resident pair (penguin pub pair) prior to me checking their nest.