

Hihi: Understanding hatching failure

The hihi *Notiomystis cincta* is among the rarest birds in the world. Levels of hatching failure, at over 30%, are three times higher than non-threatened species, and affect not only the viability of established populations but also the establishment of new populations via the hihi reintroduction programme. Although hatching failure is often assumed to be driven by fertilisation failure, our preliminary work in hihi has indicated that a large number of hatching failures are due to very early embryo mortality. In this project, we aim to understand the drivers of hihi hatching failure to help their ongoing conservation. This work will provide vital insight into the mechanisms and drivers of early-stage reproductive failure in a threatened endemic New Zealand songbird, contributing to our understanding of its breeding biology and population demography, as well as informing future translocation and reintroduction efforts.

We are currently monitoring nest success and collecting all failed eggs across the hihi population located on Tiritiri Mātangi. We will then microscopically examine unhatched eggs for signs of development, assess the developmental stage of embryos, and conduct molecular analysis to determine inbreeding levels of failed embryos. We will also collect data from the Tiritiri Mātangi weather station, enabling us to investigate patterns of fertility and embryo survival relative to prevailing weather conditions across the breeding season. The proposed work will allow us to address the following questions:

1. Is fertilisation failure/embryo mortality associated with parental or individual (embryonic) inbreeding levels in hihi?
2. Is early embryo mortality in hihi sex-biased?
3. Do hihi egg fertility and embryo survival rates vary with climatic variables including temperature and rainfall?



Photos © Emma Gray. Left hand side: nest with three of four hihi eggs presumably infertile, indicated by a yellowish colour. Right hand side: successfully hatched chicks, with two unhatched eggs apparent.