

## To disturb or not disturb - A study of Stewart Island kiwi

(*Apteryx australis lawryi*)

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The 2017-2027 Kiwi Recovery Plan calls for a 2% increase per annum in all kiwi species, however, previous studies on Stewart Island kiwi/Rakiura tokoeka are not adequate to enable management decisions towards this goal. Historical monitoring by the Department of Conservation (DOC) has been undertaken at five-year intervals at two locations (Mason Bay and Port Adventure) on Stewart Island using a combination of kiwi detection dogs, short-term radio telemetry and territory mapping. These reports have been used to extrapolate the Rakiura tokoeka population trajectory over wider Rakiura through changes in territory number and size and the number and age structure of the birds detected. Since 1993, a marked decline in the number of territories and minimum number of adults was reported at the Mason Bay site. However, the most recent survey in 2018 suggests the decline has halted or even reversed slightly. Surveys from Port Adventure in 2011 and 2017 suggest 'variable productivity', with an adult dominated population in the earlier survey, and a higher proportion of young birds in the latter.

Although these long-term surveys provide valuable insight into two local populations, it is difficult to use them for inference of the wider Rakiura population for several reasons. Firstly, the sites do not represent all habitats available on the island, and different habitats may show significant variation in survivorship and density. Secondly, there is a scarcity of knowledge about the life history of this species that precludes predictions of what may be expected in terms of productivity and survival of the various life stages. Significantly, we don't know what is responsible for the observed decline in Rakiura tokoeka at Mason Bay, and whether it is reflected elsewhere on the Island.

To gain more information and guide potential management of Rakiura tokoeka, we: 1) Investigated whether surveys from other locations on Rakiura reflected the results from Port Adventure and Mason Bay by establishing two new monitoring sites, Kaipipi and Ulva Island. In February 2019, we replicated DOC's historical methods of catching, attaching VHF transmitters and tracking Rakiura tokoeka to produce territory maps analogous to those historically produced for Mason Bay and Port Adventure and so compare the survey results from four local populations. 2) Monitored the transmitted adults and their chicks at Kaipipi and Ulva Island over the 2019-2020 breeding season to investigate breeding behaviour and chick survival, and thus potential threats to the population. 3) Explored and compared the use of invasive (catching, attaching VHF transmitters & tracking) and non-invasive (camera trapping & acoustic recorders) monitoring methods for kiwi.

The majority of our fieldwork has now been completed. In total, from our two monitoring sites Kaipipi and Ulva Island we transmitted the largest group of Rakiura tokoeka that have ever been monitored simultaneously, 49 adults/subadults and 9 chicks. We collected an abundance of novel information about their breeding and activity, as well as how territory size and number and the minimum number of adults at our two new sites compares to surveys by DOC. From our chick survival monitoring during the 2019-2020 breeding season we found the mortality rate of chicks was low. From 9 transmitted chicks there were 2 mortalities. The first deceased chick on Ulva Is. was approximately 6 weeks old and the causes of death were starvation and weka predation. The second deceased chick/juvenile at Kaipipi was approximately 6.5 months old and the cause of death could not be determined. An analysis of feral cat scats collected by DOC and our project between 2016 and 2020 found that 3.8% of 158 cat scats contained kiwi remains. Whether the kiwi were scavenged or predated cannot be determined. However, cats were not found responsible for any kiwi mortalities during our monitoring, despite being seen on trail cameras making repeat visits to nest burrows. Importantly, the age structure of the population we caught at each site reflected the successful recruitment of chicks from previous years; 3.25 and 2.25 chicks per year at Kaipipi and on Ulva Is. (within our study areas) respectively since 2017. Additionally, over three years we conducted 18 acoustic recorder and trail camera surveys of Rakiura tokoeka at the four sites where VHF telemetry & tracking had also been used (Port Adventure, Mason Bay, Kaipipi and Ulva Is.) in order to compare methods.

In this final phase of the project, data is being analysed and results compiled. Some of our pending outcomes include; method effectiveness comparisons, information on the breeding and activity of Rakiura tokoeka and conclusions from our site comparisons with DOC to build a more comprehensive picture of the management status and potential threats to the Rakiura tokoeka population.

Stay tuned at <https://www.facebook.com/StewartIslandkiwi>

Thank you to the BirdsNZ team for their support of our project!



*Photos: (Left) A chick transmitter and chick feather, (Right) Transmitter check for a chick on Ulva Island*