

# Using artificial refuges to translocate and establish Auckland tree weta *Hemideina thoracica* on Korapuki Island, New Zealand

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## SUMMARY

Two hundred wooden refuges were provided for the Auckland tree weta *Hemideina thoracica*. Within six months over half were used, 52 weta were transferred to Korapuki Island by plugging then translocating these refuges. After five years, there were over 500 individual tree wetas present on Korapuki.

## BACKGROUND

The Auckland tree weta *Hemideina thoracica* (Orthoptera: Anostomatidae) is a common species widely distributed over the upper half of the North Island and its offshore islands, New Zealand. Their eggs hatch in spring and weta take 13 – 15 months to mature going through eight to ten instars, with adults reaching about 50 - 60 mm body length. Although omnivorous, tree weta generally feed on fresh foliage in the canopy of forest trees and shrubs, with occasional fruit, flowers and other invertebrates augmenting their diet. Typically tree weta hide during the day by squeezing themselves into refuges such as a narrow tunnel or gallery in trunks or branches preferably well off the ground. As they moult tree weta need to find increasingly larger refuges until they mature. After dusk the flightless weta carefully back out of their refuge and quickly move up into foliage to escape the attention of nocturnal predators such as owls and lizards. Tree weta can be an important component in the diet of some birds, especially morepork *Ninox novaeseelandiae*, the only surviving native New Zealand owl.

Korapuki Island (18 ha) is within the Mercury Island group off the north eastern coast of New Zealand and has been the focus for a variety of restoration activities. Early settlers introduced the Pacific rat or kiore *Rattus exulans* to a number of islands in the group, including Korapuki. There was also considerable habitat modification through fire and cultivation before most of the islands reverted back to native forest. Predation by the rat together with

habitat modification led to the loss of a variety of birds, lizards and large bodied invertebrates from Korapuki, including the Auckland tree weta. Restoration activities began with the eradication of rats in 1987. Subsequently a variety of native skink species were reintroduced through translocation from neighbouring islands that had escaped invasion by the Pacific rat. In addition the island has been used to test new methods of invertebrate monitoring and translocation techniques, particularly using artificial weta refuges designed to facilitate both these techniques. Thus the project aimed to re-establish the Auckland tree weta on Korapuki Island using artificial refuges.

## ACTION

**Survey and monitoring on the source island:** Neighbouring Double Island was chosen as the source island for the Auckland tree weta translocation to Korapuki Island. Two hundred artificial refuges made from untreated timber measuring 165 x 50 x 30 mm, were attached to weta host trees. Each wooden refuge featured a single hole measuring 21 mm diameter by 100 mm deep, with the opening on the lower end pointing toward the ground. The large hole was designed to attract sub-adult or adult weta and was long enough to accommodate two or three adults squeezed in. Refuges were attached to the shady side of the tree as tree weta are particularly averse to light. Each refuge was inspected by using the beam of a penlight torch directed up the hole to see if there were any resident weta. Inspection and instar

determination did not require any physical contact with the weta, thus disturbance was kept to a minimum. Within six months over half the refuges were occupied with one or more weta. Many additional weta were seen in natural refuges in trees, thus there appeared to be sufficient to allow transfer of some weta to Korapuki Island with little harm to the source population.

**Tree weta translocation:** In May 1997, 52 tree weta (36 females and 16 males) in 39 wooden refuges were selected. The hole was plugged with a cork and each refuge carefully removed from the tree and placed in a wooden box for transport by boat to Korapuki Island. All weta were adult and it was anticipated that females would have been mated already so there was a bias towards these as they would produce eggs and lay when transferred to Korapuki. On the same day the refuges were tied to pre-selected host trees at the release site and the corks removed. Thus at no time were weta actually handled and the method therefore facilitated an absolute minimum of stress on the weta.

**Tree weta monitoring:** Regular monitoring was undertaken on Korapuki to assess the success of the translocation. Also, on Double Island the 39 refuges taken were replaced with new ones so post-transfer monitoring could determine any negative impacts.

## CONSEQUENCES

**Tree weta monitoring:** To assist with monitoring 161 additional wooden refuges were nailed to trees around the release site on Korapuki. During the first week after translocation 75% of the weta remained in the artificial refuges with some moving to new neighbouring refuges. Most of the 25% that left did so on the first night. By spring in November 1997, six months after the transfer, 68% of the founder adults remained within the artificial refuge network.

On Double Island the occupancy rate by November 1997 had increased to 65% so there had clearly been no or minimal adverse impact on the population through the removal of the 52 individuals used in the translocation.

It was found that the wooden refuges with 21 mm diameter holes did not attract the smaller weta instars therefore a second design was used to monitor juveniles on Korapuki Island. This design consisted of short (100 mm) lengths of bamboo with the top end being the node thus a closed seal. Two sizes of aperture were used, 10 mm for small weta and 13 mm for medium sized weta. A total of 350 refuges were attached in pairs, one of each size per pair, to trees throughout the release site.

In March 1998 there were still 16 (31%) of the adult weta in the wooden refuge network. In addition the first juveniles were seen with 10, second to fourth instars recorded in the bamboo refuge network. Thus breeding was proven to be underway on Korapuki.

**Tree weta establishment:** Twice yearly monitoring over subsequent years has recorded a steady increase in the tree weta population in both the wooden and bamboo refuges. Generally the bamboo refuges were occupied by juvenile weta and the larger diameter apertures in the wooden blocks contained adults. Increasing number of male – female pairs were recorded in later years. Five years after the translocation there had been a 10-fold increase from the original 52 weta to over 500 individuals. Natural sites were occupied and weta had spread well beyond the release site. The network of artificial refuges was maintained for five years but in subsequent years, as they deteriorated and began to disintegrate they were removed. The weta were therefore increasingly forced to take up residence in natural refuges.

**Conclusions:** The transfer of Auckland tree weta to Korapuki was a success with a thriving colony now established on the island. Artificial refuges were successfully used to both facilitate the transfer and monitor the subsequent weta establishment and population increase. There was no detrimental impact on the weta population on Double Island from where the founding population of 52 weta was removed.