



Global Re-introduction Perspectives: 2016

Case-studies from around the globe

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IUCN/SSC Re-introduction Specialist Group (RSG)



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Cover photo: Clockwise starting from top-left:
i. Bolson's tortoise, USA @ Turner Endangered Species Fund
ii. Wetapunga, New Zealand @ Richard Gibson
iii. Morelos minnow, Mexico @ Topiltzin Contreras-MacBeath
iv. *Silene cambessedesii*, Spain @ Emilio Laguna
v. Tasmanian Devil, Maria Island, Tasmania @Simon DeSalis
vi. Agile frog, Jersey @ States of Jersey Department of the Environment

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Establishing additional populations of the wetapunga on islands in the Hauraki Gulf, North Island, New Zealand

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Introduction

Until very recently, the wetapunga (*Deinacrida heteracantha*) (Anostostomatidae : Orthoptera) was represented by a single natural population on Te Hauturu-o-Toi, (Little Barrier Island) on the north-eastern coast of New Zealand's North Island (Gibbs, 2001). Once common in the forests of northern New Zealand, these endemic arboreal nocturnal insects, one of the largest in the world, have suffered a severe range reduction as a result of the introduction of mammalian predators (predominantly rodents), habitat destruction and modification. Consequently, the species is currently listed as 'At Risk:Relict' by the government's Department of Conservation (DOC) (Hitchmough, 2013; Trewick *et al.*, 2012). In 1998, DOC published a Threatened Weta Recovery Plan (Sherley, 1998), which included a number of goals and objectives for safeguarding the future of this and other threatened weta species. Two of the key priorities listed were to establish captive-breeding programs and then to use the progeny to found additional populations on other islands in the Hauraki Gulf that are free of introduced mammalian predators.



Adult female wetapunga © Jane Healy

Goals

- Goal 1: Establish self-sustaining island populations to improve the long-term security of the species.
- Goal 2: Further the ecological restoration of the receiving islands through the introduction of a large, heavy bodied insect.
- Goal 3: Increase knowledge of wetapunga

breeding and re-introduction methods to aid in species management and future releases.

- Goal 4: Identify additional suitable islands or 'safe' mainland sites for releases.
- Goal 5: Achieve advocacy for wetapunga conservation through inclusion of additional Hauraki Gulf islands in wetapunga recovery initiative.
- Goal 6: Post release research into dispersal, habitat use and abundance over time.

Success Indicators

- Indicator 1: Persistence of all established populations at pre-defined monitoring intervals.
- Indicator 2: Populations disperse beyond release sites to additional available habitat.
- Indicator 3: Relative costs and benefits of release techniques (older/larger instars & fewer numbers vs. younger/smaller instar & greater number) assessed.
- Indicator 4: Greater awareness of wetapunga and their ecological importance amongst visitors to the islands and breeding collections, and the wider New Zealand public.

Project Summary

Feasibility: Wetapunga surveys conducted by the DOC since 2005 on Hauturu revealed that numbers were recovering following Pacific rat (*Rattus exulans*) eradication in 2004 (Green *et al.*, 2011). However, numbers were not yet considered high enough to support repeated collection of large numbers for direct wild to wild translocation. Therefore DOC coordinated a program to remove small numbers into captivity with Butterfly Creek and Auckland Zoo. Captive weta husbandry techniques with the genus *Deinacrida* had been developed as early as the 1950s by Dr Aola Richards at the Department of Agriculture and more recently at Wellington Zoo (Barrett, 1991) and Butterfly Creek. Four islands in the Hauraki Gulf, namely Motuora, Tiritiri Matangi, and two in the Noises group, Motuhoropapa and Otata, were selected to receive wetapunga. All are free of introduced mammalian predators, lie within the historic range of wetapunga and experience a climate closely matching that of Te Hauturu-o-Toi. Each island has a range of potential bird, reptile and invertebrate predators, though all are natural inhabitants of Te Hauturu-o-Toi and wetapunga are consequently adapted to survive in their presence. Both Motuora and Tiritiri Matangi are protected island reserves and possess suitable habitat of remnant native broadleaf coastal forest and extensive areas of native replanting.

There is an abundance of food plants and refuges for these large bodied insects. The re-introduction of wetapunga is included in the restoration plans for both Motuora and Tiritiri Matangi. Motuhoropapa and Otata islands, though smaller, have significant mature broadleaf forest cover. The Neureuter family, who have owned the Noises islands for more than 80 years, are fully supportive of re-introduction proposals and actively contribute to enhancing their islands natural heritage through association with DOC and other conservation bodies. Current and future wetapunga collection, captive-breeding and release are supported by



Overview of the collection site on Hauturu-o-Toi

relevant Māori tribes (iwi) who have customary authority or historical interests in the islands. Both Auckland Zoo and Butterfly Creek have pledged a long-term commitment to the program. Expert technical advice and coordination of the wetapunga recovery program, along with considerable logistical support continues to be provided by several key personnel within DOC.

Implementation: Founder populations of wetapunga were collected from Te Hauturu-o-Toi in 2008 (3 adult males:3 adult females), 2009 (6:6) and 2012 (12:12) for establishment at the collections of Butterfly Creek and subsequently Auckland Zoo, respectively. Wild collected adult wetapunga were quickly paired in captivity, with each female given breeding access to each male to maximise genetic representation. Every female mated and all laid eggs, the first of which hatched 10 to 12 months after the first female was observed ovipositing. Wetapunga were reared individually at Butterfly Creek to produce around 350 hatchlings, of which 50 mid to late instars (6th - 11th) were released onto Motuora Island (25 x 6th - 7th instars) in September 2010 and Tiritiri Matangi (25 x 8th - 11th) in December 2011.

Larger specimens in later instars were favoured for Tiritiri Matangi due to the higher avian predation potential compared to that expected on Motuora. Wetapunga need to be 5th instar or older before they can be accurately sexed and each release had roughly an even sex ratio. Each individual was placed into a short length of bamboo which was attached to host plant trees to provide a hide as protection from potential avian predators. All release trees were in close association with natural day time refuges for the wetapunga to move into post-release.

Individual rearing of wetapunga was established best practice for the species, as it ruled out issues such as cannibalism during moults and this was followed by Barrett in rearing the 2008 and 2009 collections. However, rearing enough specimens for releases had a significant impact on time and resources. Husbandry techniques were refined for higher yields at Auckland Zoo during 2013 through experimentation with communal rearing of nymphs to establish whether there would be similar survival rates. One hundred and twenty nymphs destined to be reared individually were housed in simple plastic perforated tubs and provided with a range of freshly cut native food plants, leaf litter, fish flake and a

refuge. They were then provided progressively larger plastic containers to accommodate their increasing size. Communal groups, mostly consisting of 10 or 20 nymphs, were reared in larger insect-mesh enclosures. A year later, no appreciable difference in survivorship between these methods was detected. Great breeding success was achieved from the 12 (6:6) adult founder stock with more than 1,500 first generation nymphs produced in 2014. Such results suggest that captive-breeding can reliably produce large numbers of first and second generation offspring for release, from modest numbers of founders.

In April and June 2014, more than 750 mid to late instar nymphs of roughly equal sex ratio were used to supplement the small populations already released on Motuora and Tiritiri Matangi by DOC and Butterfly Creek. Care was taken to keep early Butterfly Creek stock release sites separate from those established in 2014 so that subsequent generations and release cohorts are discernible from one another. Post-release surveys on Motuora and Tiritiri Matangi indicate that up to 20% of wetapunga remained 'faithful' to the bamboo they were released in and this is now proposed as a monitoring tool. Twenty pairs of first generation wetapunga were retained by Auckland Zoo to secure the second generation. These animals had produced more than 2,300 nymphs by June 2015. Communal rearing was adopted as the main husbandry method for these nymphs. In a departure from the earlier strategy of releasing a relatively small number of mid to late instar wetapunga, these second generation wetapunga are being released in larger numbers but at low to mid instar and directly into naturally occurring refuges on Motuhoropapa and Otata islands. Thus in June 2015, 944 wetapunga nymphs were released onto Motuhoropapa. Hundreds more are being reared for release later in the year as well as 100 larger animals for each of Motuora and Tiritiri Matangi. There will be further collections of small numbers of wetapunga from Te Hauturu-o-toi in the coming years to supplement the genetic diversity of the new populations.

Post-release monitoring: Adult wetapunga are predominantly monitored with baited tracking tunnels, though night time spotlight searches and refuge checking methods are also employed. Tunnels set on the ground over three consecutive nights with peanut butter as an attractant are effective at detecting presence of adults that are on the ground for mating and oviposition (Watts *et al.*, 2008). The monitoring program for re-introduced populations is arranged around wetapunga life



Bamboo releases on Tiritiri Matangi island

© Jane Healy

history, taking into account the time span required to reach maturity, including egg incubation. Wetapunga that reach adulthood will be detectable in baited tracking tunnels which will aid in determining survival of the founders and dispersal from the release sites (Watts *et al.*, 2008). Adult wetapunga survive for 12 - 18 months and the life cycle adult to adult takes approximately 2 - 3 years. Therefore tracking tunnels can be used to detect adults at this interval between generations. In June 2015 tracking tunnels indicated the presence of a first island-born generation at each of the first release sites on both Motuora and Tiritiri Matangi islands. This will be repeated in a further 3 years to detect the next generation. A self-sustaining population will be considered established when searches reveal wetapunga of mixed age class 10 years post-release. Monitoring on Tiritiri Matangi and Motuora, set up and coordinated by DOC, is undertaken primarily by personnel from each island's associated restoration society but also students, Butterfly Creek and Auckland Zoo staff and volunteers. Monitoring on Motuhoropapa and Otata will be undertaken primarily by Auckland Zoo staff.

Major difficulties faced

- Initial difficulties with determining the food preferences of 1st instar wetapunga during 2009 required intensive management at Butterfly Creek to overcome.
- Individual rearing was too labour intensive to produce high numbers for release.
- Unexpected and unprecedented breeding successes placed a significant strain on allocated resources at Auckland Zoo.

Major lessons learned

- Determination of the importance of protein and other key food preferences lead to greater survival of early instars.
- Group rearing methods are ultimately more cost effective than rearing wetapunga individually.
- With the proper guidance and a good working relationship, translocation permits can be written, submitted and processed in an acceptable time frame.
- Realistic budgeting of time for consultative elements of translocation proposals.

Success of project

Highly Successful	Successful	Partially Successful	Failure
		√	

Reasons for partial success:

- Recent monitoring on Tiritiri Matangi and Motuora has revealed the first indication of an island born generation close to the original release sites.
- Husbandry experimentation with communal rearing helped ensure large numbers of healthy and robust specimens can be reared with a degree of predictability.

- Large numbers of wetapunga can be reliably produced for population founding and supplementation.
- No shortage of suitable off shore island habitats available for re-introduction with the right level of protection.
- Full support and assistance from relevant islands restoration societies, iwi and DOC.
- Accessible technical expertise from DOC and legal and logistical support.
- Well-resourced through Auckland Zoo and Butterfly Creek with long-term commitment to the program.
- Significant and sustained multimedia coverage (TV, radio and press).
- Assistance from a large number of willing and able volunteers.

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