

Maungatautari Ecological Island Trust
- Revised Research Agenda 2009
DRAFT

Primary purpose of the MEIT Science and Research Committee:

“To identify fundamental science issues of importance to the management of indigenous biodiversity within the Maungatautari Ecological Island reserve and other New Zealand refuges where all or most mammalian pest species have been removed, and to initiate research to address these issues.”

Research agenda:

1. Biological resource inventory, monitoring and prediction (terrestrial and freshwater)

- a) **Develop a more complete knowledge of** the composition, abundance and distribution of flora and fauna currently present on Maungatautari, including:
 - i. the presence, abundance and locations of keystone/focal/iconic species (eg. northern rata, large podocarps).
 - ii. the presence, abundance and locations of rare/threatened species (eg. bats, *Dactylanthus taylorii*).
- b) **Continue to** review evidence of floral and faunal composition and abundance formerly present on Maungatautari in the pre-human (i.e. **1100 to 1200 AD**), pre-European (i.e. 1840 AD), and pre-possum (i.e. circa 1960) eras.
- c) Monitor the changes in composition and abundance of communities of birds, bats, reptiles and frogs, invertebrates, and vegetation after the **removal of pest mammals and as plant and animal species are reintroduced**, and compare with similar areas not receiving such management and **other areas where similar management is taking place**.
- d) Determine changes in ecosystem health and other properties (eg. productivity, carbon sequestration, nutrient storage and cycling, soil, chemical, physical and biological properties) after the **removal of pest mammals and as plant and animal species are reintroduced**, and compare with similar areas not receiving such management and **other areas where similar management is taking place**.
- e) Determine changes in population size and demographic characteristics (e.g. birth and mortality rates) of **all reintroduced** and selected notable species (e.g. kiwi, kokako, bats, tuatara, giant weta, giant land snails, rare plant species).
- f) Determine changes in population size and demographic characteristics of selected non-target species that are potential threats (e.g. wasps, snails, weeds, eastern rosellas, and magpies).
- g) **Note and** assess any changes to the ecological roles of plant and animal species (e.g. large invertebrates, lizards, kiwi as predators of koura).

- h) Determine changes in the composition and abundance of mobile native species at different distances outside Maungatautari to identify potential flowover effects into the surrounding landscape.
- i) Investigate methods to overcome downstream impediments to fish passage to facilitate the recolonisation of indigenous fish communities in Maungatautari streams.
- j) Monitor and, where possible, predict the biotic composition of Maungatautari to enable management to achieve the desired balance of species.

2. Physical resource inventory and monitoring

- a) Determine geological and hydrological features present on Maungatautari and evaluate their relevance to restoration and management activities.
- b) Determine changes in stream water quality and biology after the removal of pest mammals, and compare with similar areas not receiving such management other areas where similar management is taking place.

3. Cultural resource inventory and monitoring

- a) Identify the presence and abundance of taonga/kai/rongoa species.
- b) Monitor changes in abundance of taong/kai/rongoa species after the removal of pest mammals and as plant and animal species are reintroduced, and compare with similar areas not receiving such management and other areas where similar management is taking place.

4. Restoration and reintroductions

- a) Evaluate the need for restoration of plant and animal species currently absent from the forest interior, e.g. rata, king fern, etc.
- b) Identify opportunities and appropriate sources of plant and animal species for reintroduction.
- c) Determine what biodiversity and ecological opportunities would be provided to Maungatautari by increasing the area of contiguous lowland forest and/or developing a forested lowland corridor from Maungatautari to the banks of the Waikato River.
- d) Review plant and animal species that are candidates for reintroduction at Maungatautari (e.g. those formerly present or analogues).
- e) Give consideration to the desirable order of species reintroductions that should be followed to avoid undesirable competitive or predatory interactions of one species on another, and monitor all reintroductions for such interactions.
- f) Determine possible effects of soil temperature on tuatara breeding in the Tautari enclosure, and recommend if remedial measures are needed.

- g) Assess the likely effects of climate change on the ecology of the mountain, and recommend any changes to management.

5. Pest mammal eradication and weed management

- a) Document successful, partially successful and unsuccessful techniques used in the large-scale eradication of pest mammals from Maungatautari, and compare to other areas where similar pest mammal eradication has been attempted.
- b) Document all reinvasion events, and attempt to determine the cause of reinvasion and understand reinvasion behaviour for each pest mammal species in order to increase the likelihood of recapture.
- c) Evaluate the response requirements for reinvasion in order to optimise the effectiveness and efficiency of recapture.
- d) Give consideration to the biological and management implications if one or more pest mammal species cannot be eradicated, specifically giving regard to:
 - i. The population dynamics of the remaining pest mammal species;
 - ii. The impact on existing flora and fauna;
 - iii. The impact on future species reintroductions.
- e) Identify weed species present within the fenced area, their distribution, abundance and impact on indigenous plants and animals, and assess the weed eradication potential for each species.
- f) Review state-of-the-art weed management options.
- g) Predict responses from weeds when browsers are removed.

6. Pest-proof fence technology

- a) Determine, and periodically review, the cost effectiveness, in terms of both economic and conservation/biodiversity outcomes, of pest-proof fence and pest eradication technology at Maungatautari and throughout New Zealand, compared to other long-term pest control strategies.
- b) Determine, and periodically review, the long-term effectiveness of the fence as a barrier to all pest mammals, giving consideration to:
 - i. the durability of materials;
 - ii. the cost of maintenance;
 - iii. the ability of project staff to maintain the fence in fully-effective condition.
- c) Determine, and periodically review, the impact of the fence and fence structures on the movement patterns of non-flighted indigenous fauna (e.g. impact on natural migration, terrestrial and aquatic) and flighted fauna (e.g. physical contact with the fence).

7. Community and economic sustainability

- a) Review existing information or undertake new research on how to maintain community support for biodiversity initiatives from all segments of the community (e.g. landowners, iwi, general public) and develop recommendations for the MEIT.
- b) Determine, and periodically review, economic and social impacts of Maungatautari on neighbouring communities (e.g. real estate value change, community composition changes).
- c) Review information or undertake new research on expectations and preferred activities and visitor facilities desired by visitors to sanctuaries such as Maungatautari offering indigenous biodiversity experiences. Develop recommendations for the MEIT.
- d) Review the financial management and fund-generating strategies of other pest-proof fencing projects throughout New Zealand and evaluate the relative financial sustainability of each project.
- e) Investigate new methods and opportunities to make Maungatautari a financially sustainable enterprise.
- f) Define, and regularly review, the attempts of Maungatautari and other pest-free reserves to achieve a balance between improvement of ecosystem health, provision of enhanced visitor experiences, and generation of sustainable levels of income.

MEIT Science and Research Committee

Membership of the MEIT Science and Research Committee is made up of selected science professionals from recognised research organisations and government agencies, including Landcare Research, Department of Conservation, the University of Waikato, NIWA, and Waipa District Council, plus co-opted experts.