Summary of native bat, reptile, amphibian and terrestrial invertebrate translocations in New Zealand

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Cover: Male Mercury Islands tusked weta, *Motuweta isolata*. Originally found on Atiu or Middle Island in the Mercury Islands, these were translocated onto six other nearby islands after being bred in captivity. *Photo: Ian Stringer.*

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ABSTRACT

Records of translocations are incomplete or non-existent for many taxa in New Zealand, yet such records are essential for understanding biogeography and providing context for ecological restoration. Here we summarise all known translocations of native bats, reptiles, amphibians and terrestrial invertebrates, based on written records and first-hand verbal accounts. This report lists details of 183 translocations: 2 with bats, 86 with reptiles, 10 with amphibians and 85 with invertebrates (including 44 molluscs, 39 insects, 1 centipede and 1 spider). We acknowledge the likelihood that there are additional translocations we are unaware of and recommend improvements for recording future translocation events and their outcomes in New Zealand by following the Standard Operating Procedure for translocations that is being developed by DOC wherever possible. We also recommend that consideration be given to the minimum number of individuals for release, to limit loss of genetic variation.

Keywords: translocation, transfer, supplementation, conservation, monitoring, tuatara, gecko, skink, Mollusca, Insecta, Chilopoda, Araneae

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1. Introduction

Native species have long been deliberately moved around New Zealand by humans. The first settlers, Māori, are thought to have moved food species such as the giant landsnails *Placostylus hongii* and *Placostylus bollonsi* (Pulmonata: Bulimulidae) and karaka trees (*Corynocarpus laevigatus*) (Climo 1973; Best 1976; Haywood & Brook 1981). Early translocations by Europeans were made by Quinton MacKinnon, who moved kākāpō (*Strigops habroptilus*, Aves: Psittacidae) to Centre Island, Lake Te Anau, and by Sir Walter Buller, who moved tuatara (*Sphenodon punctatus*, Reptilia: Rhynchocephalidae) and a variety of native birds to an island in Lake Papaitonga, near Levin (Hill & Hill 1987; Galbreath 1989). The first official translocations for conservation purposes were made from 1894 to 1908 by Richard Henry, after it became evident that many native birds were likely to go extinct on the mainland following the introduction of predatory mammals, especially stoats (*Mustela erminea*). Richard Henry moved at least 474 and possibly up to 700 birds (kākāpō, little spotted kiwi *Apteryx owenii* and brown kiwi *A. australis*) to Resolution Island and nearby islands in Fiordland, but this attempted rescue failed after stoats swam to the islands from the mainland (Hill & Hill 1987; Thomas 2002). Since then, numerous translocations have been documented in scientific papers, unpublished reports and government file notes; however, many others have gone unrecorded. Atkinson (1990) published the first compilation of translocations of indigenous New Zealand fauna and this was followed by summaries of translocations for some snails (Parrish et al. 1995), wētā (Watts et al. 2008a; Watts & Thornborrow 2008), frogs (Bell 2006; Germano & Bishop 2009), reptiles (Gaze 2001b; Towns et al. 2001; Germano & Bishop 2009) and birds (Girardet 2000). Gaze & Cash (2008) summarised all translocations in the Marlborough Sounds area and McHalick (1999) provided a compilation of the information held in the Department of Conservation (DOC) translocation database.

Here we summarise the information available to us about the translocations of bats, reptiles, amphibians and terrestrial invertebrates other than parasites[1] that have been carried out in New Zealand up to October 2008, to provide a central reference for future workers before more data are lost, particularly anecdotal information. Such data are essential for understanding the distribution of native species, as well as allowing us to understand the effects of anthropogenic actions on natural distributions of native taxa. They may also provide information for improving translocation methods. We conclude by making some recommendations on best practice for undertaking translocations.

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[1] We have not attempted to document translocations of parasites for the following reasons. Firstly, most translocations of New Zealand fauna have included their parasites because usually no attempts were made to remove them (K. McInnes, DOC, pers. comm.; C. Reed, Ministry of Agriculture and Forestry, pers. comm.). Secondly, we know of few cases where the parasites present on translocated fauna were documented—examples include ticks and mites that were translocated with some tuatara and lizards (e.g. Towns & Parrish 1998; McKenzie 2007; van Winkel 2008). Thus, we can only acknowledge that numerous potential translocations of parasites have or could have occurred.

Definitions

In the literature, various terms have been used to refer to translocations of animals for conservation purposes, resulting in some confusion (Hodder & Bullock 1997; JNCC 2003). We use the original definitions of the International Union for Conservation of Nature (IUCN) as outlined in the 1987 IUCN position statement, following Armstrong & Seddon (2007). Thus, a translocation is any movement of a living organism from one area to another; an introduction is the movement of an organism outside its historically known range; a reintroduction is an intentional movement of an organism into part of its native range from which it has disappeared or become extirpated in historical times; and re-stocking is movement of individuals to build up an existing population. Most translocations for conservation purposes are reintroductions or re-stockings. However, there is often uncertainty about the native ranges of most invertebrates and many herpetofauna in New Zealand, because their ranges became restricted after the arrival of humans and there is often no evidence of their former distributions. The usual aims for translocating such fauna have therefore been to release them into localities where they were likely to have been present in the past.

2. Methods

For the purposes of this summary, we consider a translocation to include all movements of organisms resulting in the release of an intended number of individuals at a site. Thus, for our purposes, a single translocation may involve multiple releases at one site over several months or years. This has occurred, for example, when multiple capture occasions were required to obtain sufficient individuals or when it was desirable to remove smaller numbers from the source population on several occasions to prevent harming the source population (e.g. Parrish 2005a; Stringer & Chappell 2008).

Most of the information on translocations in New Zealand was obtained from a literature search that included scientific papers, books, unpublished documents of government departments and agencies, and newsletters, such as the Newsletter of the Society for Research on Amphibians and Reptiles in New Zealand, the Oceania Newsletter of the Reintroduction Specialist Group of IUCN, and Rare Bits—the newsletter about threatened species work published by DOC. Some data were also obtained from interviewing people who were either involved with translocations or who remembered details about them. In some cases, particularly for invertebrates, the latter was the only available information source because there is no requirement to keep records for species that are not legally protected by the Wildlife Act 1953.

Tuatara were the first species to be legally protected in New Zealand (New Zealand Gazette 1895), followed by bats (Animals Protection and Game Act 1921–22; Oliver 1953). Some invertebrates, including *Placostylus* and *Powelliphanta* snails and some wētā, were given legal protection in 1980. All lizards except for four common species were afforded protection in 1981, and all native reptiles became protected in 1996 (Wildlife Act 1953). Legal protection also applies to all fauna and flora on legally protected land (now administered by DOC). DOC has been responsible for keeping records for these species since its formation in 1987. However, the majority of native invertebrates have never been protected by law and some invertebrates of interest were translocated by entomologists and conchologists, both amateur and professional, without documentation.

Much of the information reported here is anecdotal, so it is likely to be inaccurate or incomplete because details have been forgotten or people are now reluctant to provide them. Nevertheless, we have included it to ensure that it is not lost over time. It includes accounts from members of the public who have moved invertebrates or have known of others who have moved them.

Where information is lacking or unsubstantiated, we have included it only if it is likely that the translocation was intentional rather than unintentional. We have not included many instances where species are found outside their normal range and assumed to be a result of human activities, because we do not know if these were intentional translocations. For example, the wētā *Hemideina crassidens* occurs in Anderson's Bay, Dunedin, where it is well separated from Fiordland, the nearest location within its known natural range (Harris 2009). Transportation by humans seems most likely but we do not know whether this was intentional or not, and so we did not include it. The same applies to *Hemideina femorata*, which occurs in and around the village of Akaroa, where it is surrounded by *Hemideina ricta* and hybridises with it where the two species meet (Morgan-Richards & Townsend 1995). Again, *H. femorata* is likely to have been transported there by humans, but in this case it is thought to have been accidentally introduced with firewood (Townsend 1995).

Information on bird translocations (used for comparative purposes) was obtained from summary information in Atkinson (1990), McHalick (1999) and Girardet (2000), together with more recent information contained in the translocation databases held by DOC and IUCN (IUCN/RSG 2008).

3. Results

We are aware of the following numbers of translocations of New Zealand native terrestrial fauna excluding birds and parasitic invertebrates: 2 involving bats, 86 with reptiles, 10 with amphibians and 85 with invertebrates (Table 1). We have not included three unsubstantiated translocations that might have occurred prior to 1800, before Europeans arrived in New Zealand—possible releases of the flax snail *Placostylus hongii* to the Poor Knights Islands, Great Barrier Island (Aotea Island) and Fanal Island by the Māori people (Atkinson 1990). We have included three translocations of snails and one each of a gecko and spider that were moved short distances for experimental purposes. Three of these involved moving the snails *Placostylus ambagiosus michiei*, *P. a. paraspiritus* and *Placostylus hongii* up to 83 m between scattered food plants to investigate their site fidelity and to determine if they could return to their original locations (unpubl. data). The fourth involved jewelled geckos (*Naultinus gemmeus*) that were moved 78–160 m into the Every Scientific Reserve, Otago Peninsula, to test the effectiveness of an enclosure built to reduce mammalian predation and also to document the subsequent movements of the geckos (Shaw 1994). The fifth was a translocation of katipō spiders to test a method for future translocations (M. Bowie, Lincoln University, pers. comm.).

Overall, 63% of the information we obtained was from publications (60% for invertebrates, 65% for vertebrates) and the remainder was from personal communications. The majority of published accounts of translocations involved species that were protected by law when they were moved: such legal protection involved 76% of the invertebrate species and 99% of the vertebrate species translocated (excluding birds and parasites) for which the translocation date was known. Where translocation records were incomplete (54% overall; 41% of invertebrate records, 64% of vertebrate records), they most often lacked details about the numbers and/or composition of the animals translocated (e.g. numbers

TABLE 1. NUMBER OF TRANSLOCATION EVENTS OF NATIVE NEW ZEALAND TERRESTRIAL ANIMALS.
Note: the table does not include one lizard of unknown species translocated before 1960 or parasites translocated with their hosts.

	TRANSFER COMPLETION DATE												
	DATE UNKNOWN	BEFORE 1960	1960–1964	1965–1969	1970–1974	1975–1979	1980–1984	1985–1989	1990–1994	1995–1999	2000–2004	2005–2008	TOTAL
Molluscs	8	7	2	0	2	3	3	0	5	6	3	5	44
Arthropods	3	0	0	0	0	0	0	0	4	6	13	15	41
Frogs	0	1	0	0	0	0	0	1	1	0	2	5	10
Tuatara	0	4	0	0	0	0	0	0	0	4	4	5	17
Skinks	0	0	0	0	0	0	0	1	4	8	8	25	46
Geckos	0	0	0	0	0	0	0	0	1	4	5	12	22
Bats	0	0	0	0	0	0	0	0	1	0	0	1	2
Birds*	–	> 176	55	54	30	27	65	45	20	88	103	60	> 723

* Minimum numbers from Atkinson (1990), McHalick (1999) and Girardet (2000), supplemented by data from DOC and IUCN.

of males and females or adults and juveniles that were moved were not recorded) (40% invertebrates, 64% vertebrates). However, in some cases the precise year when the transfers took place was missing (21% invertebrates, 4% vertebrates), or the source population was unknown or not given (11% invertebrates, 2% vertebrates).

In 45.1% of all translocations, the outcome was unknown or the translocation was too recent for the outcome to be known, whereas in 7.4% of recent translocations the animals were seen after being released. Breeding was confirmed in 10.6% of translocations, and in 21.9% the animals either survived a long time or their populations expanded. In 15.0% of cases, translocations were known to have failed or no live individuals were found when last monitored.

On a proportional basis, there were almost twice as many vertebrate translocations with unknown outcomes as invertebrate translocations. This was largely due to salvage operations, where geckos and skinks were only moved short distances and therefore no monitoring was considered necessary (Table 2). Invertebrate translocations resulted in a higher percentage of long-term survival and population expansion compared with vertebrate translocations, but breeding was confirmed much more frequently after vertebrate translocations than after invertebrate translocations.

TABLE 2. KNOWN OUTCOMES FOR TRANSLOCATIONS OF NATIVE BATS, HERPETOFAUNA AND INVERTEBRATES IN NEW ZEALAND.

OUTCOME OF TRANSLOCATION	VERTEBRATE	INVERTEBRATE
Unknown	40.2%	21.2%
Recent, not seen since release	4.1%	12.9%
Recent, seen since release	12.4%	10.6%
Breeding confirmed	26.8%	5.9%
Population known to have survived for long period but in low numbers	0%	14.1%
Population has survived long-term and expanded	7.2%	21.2%
Either all dead or none found last time surveyed	12.4%	14.2%
Number of translocations	97	85

3.1 BATS

Two translocations of the endangered short-tailed bat (*Mystacina tuberculata*) are documented. One of these was from one island to another and the other was from the mainland to an island (Appendix 1). Both translocations were carried out for restoration purposes and to increase the species' range. Both were unsuccessful.

3.2 REPTILES

The first reptiles to be translocated were tuatara, which were released onto a small island in Lake Papaitonga by Sir Walter Buller in 1892–1893. This translocation was carried out to protect birds that had previously been translocated there from 'Māori depredations' (Buller 1893). There is an anecdotal report of lizards (unknown species) being translocated from Manawatawhi/Three Kings Islands to Mount Camel, Houhora, in the early 1960s (J. Marston, amateur naturalist, pers. comm.). However, the first documented translocation of lizards was carried out in 1988 (*Oligosoma whitakeri*; Towns 1994), and this was closely followed by the second, also in 1988 (*Oligosoma acrinasum*; Thomas & Whitaker 1995).

In total, there were 46 translocations of skinks involving 15 taxa, 22 translocations of geckos involving 13 taxa, and 17 translocations of tuatara. There was also one additional early translocation, for which the species of lizard was not given. The translocations of reptiles included 45 island to island, 28 mainland to mainland, nine mainland to island and two island to mainland translocations; the source locations for two tuatara translocations were unknown (Buller 1893; W. Dawbin, unpubl. data). The majority of translocations were undertaken for ecological restoration purposes only (20), for species conservation purposes only (29; criteria 2–5 in Appendix 1) or for both (31). Translocations carried out for species conservation purposes included 27 salvages associated with road or construction work and six supplementations. One translocation was made to deter the hunting of birds (Buller 1893) and the reasons for four others were not given. Details of only two of the translocations of native reptiles were from hearsay information (J. Marston; Appendix 1). We are aware that post-release monitoring was carried out or is planned for 56% of the translocations.

3.3 AMPHIBIANS

The first native frogs (Anura: Leiopelmatidae) were translocated to Kapiti Island from the Coromandel area in 1924/1925 for unknown reasons; this was unlikely to have been for protection from mammalian predators because two species of rat were present on Kapiti Island (Bell 1996, 2006). Overall, the ten translocations of native frogs that we know of involved all four species (Appendix 1). One translocation was from the mainland to an island, as mentioned above, five were between islands, three were between mainland sites and one was from an island to the mainland. Six of these translocations were undertaken to extend the range of a threatened species and three of these were also for ecological restoration purposes, two were salvage operations, and one was for disease risk mitigation (A. Haigh, DOC, pers. comm.). The frogs were monitored following release after all translocations except that to Kapiti Island.

3.4 INVERTEBRATES

3.4.1 Mollusca

The first published terrestrial invertebrate translocation in New Zealand was made in 1934 and involved the large land snail *Placostylus hongii* (Powell 1938). This was also the first documented translocation of a native invertebrate in New Zealand. The reason for this translocation was not stated, but it could not have been carried out to save the snails from predation because they were taken from Archway Island, Poor Knights Islands, which was rat-free, and released onto Motuhorapapa Island, Noises Islands, where rats were present. We know of 43 further translocations of molluscs that have occurred since then, involving 19–21 taxa. In total, 24 of these translocations were between mainland sites, five were from the mainland to an island, five were between islands and one was from an island to the mainland (Appendix 1). All translocations involved large species (> 20 mm shell or body length). The reasons for undertaking 18 of the translocations that were carried out informally by conchologists and the general public were unknown. Of the remaining 26 translocations, 11 were carried out for species conservation only (criteria 2–5, Appendix 1), 3 were for ecological restoration, 2 were for both species conservation and ecological restoration, 5 were experimental, 2 were both experimental and for species conservation, 2 were translocations by the general public for aesthetic reasons, and 1 was to provide food and calcium for another snail species.

3.4.2 Insecta

The wētā *Deinacrida rugosa* (Orthoptera: Anostostomatidae) was the first insect taxon to be translocated for conservation purposes in New Zealand (Appendix 1). This occurred in 1977, when 43 individuals were translocated from Mana Island to Maud Island (Te Hoiere) (Watts et al. 2008a). Since then, a further 38 translocations of insects have been made, of which 71% have been wētā. The translocations involved 22 between islands, seven between mainland sites, nine from the mainland to an island and 2 from an island to the mainland. Most translocations were carried out purely for ecological restoration (17), species conservation only (6) or a combination of ecological restoration and species conservation (12). One was carried out for both ecological restoration and general interest, and one was to provide food for tuatara; no reasons were given for the remaining two translocations. We have minimal anecdotal information for the translocations involving cave wētā, stick insects and preying mantis, whereas more detail was supplied for the other ten unpublished translocations by the people who did them (Appendix 1).

3.4.3 Chilopoda

One salvage translocation of the centipede *Cormocephalus rubriceps* (Scolopendromorpha) was undertaken in conjunction with a salvage translocation of a skink, *Oligosoma ornatum* (Appendix 1). These centipedes were translocated from one mainland site to another before road construction work began (S. Chapman, Boffa Miskell Ltd, pers. comm.).

3.4.4 Araneae

One spider, *Latrodectus katipo* (Theridiidae), was translocated from one mainland site to another for experimental reasons (M. Bowie, Lincoln University, pers. comm.) (Appendix 1).

4. Discussion

4.1 AN HISTORICAL PERSPECTIVE

In the past, the translocation of terrestrial native fauna in New Zealand for conservation purposes focused predominantly on birds, although increasing numbers of reptiles and invertebrates are now being translocated (Table 1). When Europeans arrived, birds were the most obvious native terrestrial animals in New Zealand, and were recognised and collected because of their unusual features. As a result, the reduction in the numbers of many native bird species that followed the introduction of predatory mammals was noticed, leading to the first translocations of birds to predator-free islands in the late 19th century. These translocations, which were the first practical attempts at conserving the fauna of New Zealand, were made by concerned individuals and the Government (King 1984; Hill & Hill 1987; Atkinson 1990). However, the entire terrestrial fauna of New Zealand is unusual (e.g. Diamond 1990), and bats, reptiles, frogs and many of the larger invertebrates were also adversely affected by the arrival of predatory mammals (King 2005). Initial efforts to conserve many of the species in these groups were made by interested individuals, and again often involved translocations to mammal-free islands.

Increasing numbers of translocations of native birds were made from the 1960s onwards, as interest in their conservation increased. Atkinson (1990) recorded only two translocations of invertebrates on New Zealand islands since 1800 (one of the giant wētā *Deinacrida rugosa* and one of the snail *Placostylus hongii*) and two of lizards (Fiordland skink and Whitakers skink), compared with 106 indigenous bird species to islands involving more than 176 releases. Since 1960, there have been a total of 81 translocations of reptiles, 9 of native frogs and at least 67 of invertebrates that we are aware of (Table 1). This followed a growing awareness of the importance of such taxa that accompanied an increasing wider interest in conservation (Young 2004).

The overall pattern of translocations for conservation purposes in New Zealand, whereby herpetofauna and invertebrates lagged behind the effort invested in birds, has followed the general pattern elsewhere in the world (Pyle et al. 1981). Worldwide, the conservation of invertebrates can be traced back to 1835, but has developed primarily since the 1970s. Thus, it followed well behind conservation of birds and mammals (Lyles & May 1987; Mikkola 1989; Bonnet et al. 2002; Seddon et al. 2005). Butterflies are the exception to this, as they have had a relatively long involvement with conservation including translocation, especially in Britain and North America. This has partly been due to specialist interest groups such as the Xerces Society (USA) and Butterfly Conservation (UK) (Oates & Warren 1990; New et al. 1995). Translocations of herpetofauna have a similar history to those of invertebrates in that most have occurred since the 1970s (Dodd & Seigal 1991; Germano & Bishop 2009). However, worldwide, translocation projects involving invertebrates have suffered from taxonomic bias (9% of projects v. 77% of species) whereas those involving amphibians and reptiles have been approximately in proportion to the number of species (17% and 5% of projects v. 14% and 10% of species) (Seddon et al. 2005). If we take 21 500 as an estimate of the number of indigenous terrestrial species in New Zealand—103 birds, 60 reptiles, 4 frogs and 20 000 arthropods and land snails (Watt 1976; Barker 1999; Gibbs 2006; Miskelly et al. 2008)—to compare the relative proportions of species with the proportions translocated since 1960, then invertebrates are under-represented (10.1% of translocations v. 99.3% of species), whereas frogs, reptiles and bats are over-represented (1.4%, 12.9% and 0.3% of translocations v. 0.02%, 0.28% and 0.002% of species, respectively). These proportions of translocations were slightly lower than reported worldwide for invertebrates and reptiles over the same period (13.8% and 14.9%, respectively) and were much lower for amphibians and mammals (5.1% and 36.7%, respectively), although the latter have much lower proportional numbers of species in New Zealand compared with world averages (Seddon et al. 2005). However, the situation in New Zealand has changed since 1990 and the relative proportion of translocations for all groups other than birds has increased (17.5% for invertebrates, 1.9% for frogs, 15.5% for reptiles and 0.3% for bats).

4.2 OUTCOMES OF TRANSLOCATIONS

One of the most contentious issues relating to moving animals is deciding when a translocation has been successful. Success has been defined in a variety of ways, but the ultimate objective of any translocation is to establish a self-sustaining population (Griffith et al. 1989; Dodd & Seigal 1991). However, confirming this may take a long time, especially in the case of long-lived species and species with low fecundity, as is the case with the New Zealand herpetofauna (e.g. Cree 1994; Towns & Parrish 1999; Nelson et al. 2002; Gibbs 2006).

Germano & Bishop (2009) used evidence of a substantial recruitment to the adult population (resulting from reproduction at the translocation site) obtained by monitoring for at least a period equal to the developmental time of the species as the criterion for a successful herpetofauna translocation. They reported that of three New Zealand indigenous frog translocations, one was a success, one was a failure and one was of unknown outcome, whereas of five New Zealand skink and one tuatara translocation, four were successful and two, including the tuatara translocation, were of unknown outcome. Certainly the outcomes we were aware of were unknown for 43% of all reptile translocations in New Zealand. This was largely due to salvage translocations, where lizards were moved short distances and were not monitored. Five percent of unknown outcomes related to releases that were too recent for any assessment to be made (Appendix 1).

Assessing the success of most invertebrate translocations in New Zealand is made easier because their life spans are generally shorter than 3 years, with the exception of some of the large landsnails (Stringer & Grant 2007). Thus, numbers increased considerably after 21% of translocations and the species survived for many generations but in low numbers after another 16% of translocations. However, it can be difficult to be sure if any invertebrates remain alive after a translocation if none are found because of their small size and often cryptic behaviour, particularly if they also disperse after being released. In such cases, it may be many years before invertebrates reappear after being released. For example, the first *Mimopeus opaculus* beetles were seen 4–6 years after their release on Korapuki Islands (C. Green, DOC, pers. comm.). We therefore acknowledge that at least some of the 12% of cases we have assessed as failed may eventually prove to be successful.

Whatever the definition of success, its determination requires post-translocation monitoring to determine whether the species survived and what the population status is. Where such monitoring has been carried out, it has varied from casual observations of presence or absence (mostly with invertebrates) to carefully designed procedures. Recent developments in monitoring New Zealand reptiles and invertebrates include the use of artificial cover objects for katipō spiders, footprint tracking tunnels for giant wētā, skinks and frogs, 'Gee-minnow' fish traps for lizards, and closed foam sheets around tree trunks for geckos (e.g. Lettink & Patrick 2006; Subair 2006; Frost 2008; van Winkel 2008; Watts et al. 2008b; Barr 2009; Jamieson, H. 2009; Bell in press). In one case, artificial refuges were used for collecting and then transporting individuals of a tree wētā to the release site and for subsequently monitoring them in both the source population and release site (Green 2005). However, in many cases no monitoring has been undertaken at all to our knowledge (Appendix 1), despite the universal call for it (e.g. Hodder & Bullock 1997; IUCN/SSC RSG 1998; Atkinson 1990; Fischer & Lindenmayer 2000; JNCC 2003).

4.3 OTHER CONSIDERATIONS WHEN TRANSLOCATING SPECIES

4.3.1 Genetics

Genetic considerations are now a primary concern when translocating any New Zealand bat, frog or reptile due to the geographic variation that is now known to occur amongst these vertebrates (R. Hitchmough, DOC, pers. comm.). We are aware of only one recent study (Miller et al. 2009) where the maintenance of genetic material in translocated populations of New Zealand skinks was specifically studied. There is, however, much genetic information about other New Zealand terrestrial vertebrate groups that suggests that many species show fine genetic variation over their geographical ranges; e.g. bats (Winnington 1999; Lloyd 2003), geckos (Pringle 1998; Jones 2000), skinks (Greaves et al. 2007; Miller et al. 2009), tuatara (MacAvoy et al. 2004; Hay & Lambert 2007; Hay et al. 2009), and frogs (Gemmell et al. 2003; Green 1994).

Potential genetic spatial variation is also now taken into consideration for translocations of protected invertebrate species or when the translocation involves land administered by DOC, by using location as a surrogate in the absence of genetic information. This is because invertebrates can be expected to show more complex levels of genetic spatial structure. For example, Chappell

(2008) found distinct genetic differences between populations of the ground wētā *Hemiandrus pallitarsus* (Anostostomatidae) separated by about 7 km. However, nothing is known about the population genetics of most invertebrates that have been translocated in New Zealand. A small genetic difference linked to geographic location in the snail *Powelliphanta augusta* was taken into account when this snail was translocated (Trewick et al. 2008; K. Walker, DOC, pers. comm.; S. Trewick, Massey University, pers. comm.), and there is evidence from both genetics and chromosomal race studies of the spatial variation amongst tree wētā and some giant wētā. The latter variation has been related to present and past geographical isolation (Morgan-Richards & Gibbs 2001; Morgan-Richards et al. 2001; Trewick & Morgan-Richards 2004). Marked genetic structure in relation to geographic range has also been reported for a variety of other New Zealand invertebrates, including two species of *Paryphanta* snail (Spencer et al. 2006), a peripatus (Gleeson et al. 1998), various species of wētā (King et al. 2003; Chappell 2008) and cockroaches (Chinn & Gemmell 2004). Even native insects that fly can show marked genetic differences over their range. Examples include a mayfly (Smith et al. 2006) and a cicada (Hill et al. 2009).

4.3.2 Pre-release surveys

Prior to any translocation, with the exception of restocking for genetic purposes, it is essential that the absence of the species from the release site is confirmed to preserve genetic identity. This is especially important if the only animals available for translocation are located a large distance from the proposed release site.

The survey methodology must account for the difficulties in detecting individuals when they occur at low densities. Careful pre-release surveys may show that a species thought to be absent is in fact present and a translocation is unnecessary. For example, it became apparent that an intended release of Hochstetter's frogs (*Leiopelma hochstetteri*) into Maungatautari Scenic Reserve was unnecessary after the completion of a predator-proof fence and eradication of introduced mammals because this species was found there incidentally during an invertebrate survey (Baber et al. 2005).

If translocations follow a pest eradication operation, sufficient time must be allowed to elapse to allow species that were present at undetectable levels to reach detectable numbers. This is especially important for cryptic species and species with low fecundities and long developmental periods (Towns & Ferreira 2001). We exemplify this with the following seven examples involving lizards. In each case, species that were believed to be absent were found 6–12 years after predatory mammals were eradicated from islands. The species were copper skink (*Oligosoma aeneum*) on Whatupuke Island (Whitaker & Parrish 1999), brown skink (*Oligosoma zealandicum*) on Mana Island (A. Tennyson, Te Papa Tongarewa, pers. comm.), speckled skink (*Oligosoma infrapunctatum*) on Mokoia Island (K. Owen, DOC, pers. comm.) and on Chetwode Islands in 1998 (Studholme et al. 1998), common gecko (*Hoplodactylus maculatus*) on Tiritiri Matangi Island in 2006 (M. Baling, Auckland University, pers. comm.), forest gecko (*Hoplodactylus granulatus*) on Motuara Island (Studholme et al. 1998) and the Pacific gecko (*Hoplodactylus pacificus*) on Lady Alice Island. In the latter example, the Pacific gecko was rediscovered at two sites well away from the release site 6 years after release (Parrish 2003).

Even large animals can be missed. For example, a tuatara was found on a small island (Mauitaha Island) many years after the species was thought not to exist there (Tennyson & Pierce 1995). Similarly, a previously undetected and unidentified large land snail was found on Red Mercury Island (Whakau) in 2008, 16 years after kiore (*Rattus exulans*) were eradicated (C. Watts, Landcare Research Ltd, pers. comm.). Large native land snails can also have low fecundities and long developmental periods and, like lizards, can be hard to detect at low densities (e.g. Stringer et al. 2003; Stringer & Grant 2007).

The time lag before species become apparent will depend on the characteristics of individual species and their habitats, so we cannot prescribe a minimum period before they are likely to become detectable. However, we suggest that 6 years would be an appropriate minimum.

5. Recommendations

5.1 MONITORING

Given the variation in the quality of monitoring (from occasional casual searches to regular, formal, structured monitoring regimes involving large investments of time and energy), it is difficult to know how successful many of the reported translocations were, notwithstanding the difficulties of defining a successful translocation. Monitoring for an appropriate time after release is required to determine whether a species has become established (e.g. Dodd & Seigal 1991; Towns & Ferreira 2001). A well-designed post-release monitoring programme can also provide additional information on how the animal behaves after being released and how it responds to the new environment. Both can be valuable when designing further releases. The monitoring programme should also include genetic assessments, in case supplementations are required to optimise the genetic diversity of new populations (see section 5.2). We emphasise the importance of including a research component in all translocations, as recommended by Sarrazin & Barbault (1996), IUCN/SSC RSG (1998) and Seddon et al. (2007). In time, less intensive monitoring may be necessary for a particular species, once sufficient is known about how to translocate it and how it responds after release. While the decision that this point has been reached will always be debatable, it is better to make this decision after a consideration of all the evidence rather than have it arbitrarily imposed when resources become restricted and monitoring is no longer affordable.

5.2 GENETICS

To limit loss of genetic variation, we recommend that consideration be given to the minimum number of individuals for release, as stated by Jamieson, I.G. (2009), in a review dealing with New Zealand birds. However, the relevant information is lacking for most invertebrates and this is urgently needed. We note that obtaining genetic samples from rare or threatened invertebrates without killing them may sometimes be possible. For example, small samples can be taken from the foot of snails (D. Gleeson, Landcare Research Ltd, pers. comm.) and research has commenced on the genetics of past and future translocations of some species of wētā using small sections of antennae (T. Buckley, Landcare Research Ltd, pers. comm.; R. Hale, Lincoln University, pers. comm.).

5.3 A STANDARD OPERATING PROCEDURE

We recommend following the Standard Operating Procedure for translocations that is being developed by DOC wherever possible, even though, legally, it applies only to protected species or species inhabiting land administered by DOC (P. Cromarty, DOC, pers. comm.). The Standard Operating Procedure is comprehensive and includes assessing the effects of a translocation on both the source population and the release area, disease screening and hybridisation risk, and considering the probable natural biogeographic range of a species. The process involves submitting a proposal for approval to a senior manager who makes a decision following advice from his/her technical staff. The Standard Operating Procedure also calls for the proposer to provide details on translocation methods and subsequent monitoring programmes. However, in New Zealand, many translocations of non-protected species are made by the general public and by community conservation groups, and these translocations are not formally recorded or reported.

We recommend that a simplified translocation protocol be developed for such situations where there is strong reluctance to follow the Standard Operating Procedure because of the effort required in obtaining the information. We recommend that the simplified protocol would involve recording the following: the species if known, the numbers translocated and details such as sex or age class if known, the dates of the translocations, the source and destination (preferably GPS grid references), the persons responsible for the translocations, and a brief explanation of why the translocations were made. Recording such information about translocations is a usual requirement elsewhere (e.g. JCCBI 1986; IUCN/SSC RSG 1998; JNCC 2003). The protocol could encourage the collection of genetic samples and, in the case of invertebrates, voucher specimens. We recommend that a similar simplified system is developed for unexpected salvage operations when they are required at short notice. Furthermore, we recommend that a centralised system be established for maintaining records of all translocated taxa, such as is done in Britain (IUCN/SSC RSG 1998). Data held in this system, including the results of any monitoring, will represent essential biogeographic information available for future use, such as when planning restoration projects. We strongly urge relevant public institutions and private sector groups to cooperate in developing centralised record keeping. The need is urgent because of the increasing numbers of translocations being made and the accompanying risks of losing information.

Lastly, we agree with the recommendations of other authors that translocations should be published, or at least written up in some accessible form, so that others can learn from the results (e.g. JCCBI 1986; IUCN/SSC RSG 1998).

6. Conclusions

While we have endeavoured to provide a comprehensive summary of all known bat, herpetofauna and invertebrate translocations in New Zealand, more information is likely to emerge in the future, especially anecdotal accounts of unrecorded translocations by members of the public. During the course of this review, we became aware of a huge amount of additional information on translocations of native New Zealand freshwater fish—often carried out during the course of land developments—and of native avifauna. Clearly, comprehensive compilations of these translocations are needed. We emphasise that the numbers of bird translocations we present here are incomplete and these are included only to serve as a coarse comparison with other taxa.

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Appendix 1

TRANSFERS OF NATIVE NEW ZEALAND BATS, REPTILES, FROGS AND INVERTEBRATES

Dates = transfer completion dates.

Composition: A = adult (or for snails, individuals with fully developed shells), J = juvenile, M = male, F = female.

Reason for transfer: 0 = not known, 1 = ecological restoration, 2 = increasing numbers and range of species, 3 = salvage, 4 = other protection (e.g. disease risk reduction), 5 = supplementation, 6 = protection of other species, 7 = research, 8 = general interest (e.g. aesthetic), 9 = food for other species.

Outcome: 0 = unknown, 1= recent, 2 = recent but seen since release, 3 = breeding confirmed, 4 = survived long-term in low numbers, 5 = population expanded and survived long-term, 6 = status uncertain—survived long-term in low numbers but surveyed > 10 years ago, 7 = all dead or none found during last surveys.

COMMON NAME	SPECIES	YEAR(S) RELEASED	NO. RELEASED	COMPOSITION	SOURCE	RELEASE SITE	REASON	OUT-COME	REFERENCES
Bats: Mammalia: Chiroptera: Microchiroptera									
Short tailed bat	*Mystacina tuberculata*	Sept 1994	50	A	Codfish I. (Whenuahou)	Ulva I., Stewart I./Rakiura	1, 2	7	B. Lloyd, pers comm.; C. O'Donnell, pers. comm.
Short tailed bat	*Mystacina tuberculata*	Feb 2005, Feb 2006	23	J	Tararua Range	Kapiti I., Wellington	1, 2	7	L. Adams and B. Lloyd, pers. comm.
Geckos: Reptilia: Lacertilia: Gekkonidae									
Auckland green gecko	*Naultinus elegans elegans*	2003	10	Unknown	Greenhithe, State Highway 18, Auckland	Kereru Grove Reserve, Auckland	3	0	S. Chapman, pers. comm.
Auckland green gecko	*Naultinus elegans elegans*	2005–2006	22	6+ M, 6+ F	Orewa-Puhoi	Tawharenui Regional Park	3	0	S. Chapman, pers. comm.
Canterbury gecko	*Hoplodactylus* sp. "Canterbury"	2006	101	Unknown	Kaituna Quarry, Banks Peninsula	Birdlings Flat, Canterbury	3	2	Lettink 2006, 2007
Common gecko	*Hoplodactylus maculatus*	2007	2	Unknown	East Cape	East I. (Whangaokeno I.), East Cape	1	0	A. Basset, pers. comm.
Duvaucel's gecko	*Hoplodactylus duvaucelii*	Feb 1998, Nov 1998	21, 19	Unknown	North Brother I., Cook Strait	Mana I., Wellington	1, 2	0	Jones et al. 2001
Duvaucel's gecko	*Hoplodactylus duvaucelii*	2001	40	Unknown	North Brother I., Cook Strait	Mana I., Wellington	1, 2	3	Reed et al. 1998; Jones et al. 2001; A. Whitaker, pers. comm.
Duvaucel's gecko	*Hoplodactylus duvaucelii*	2006	20	10 AM, 10 AF	Korapuki I., Mercury Is.	Motuora I., Hauraki Gulf	1, 2	3	van Winkel 2008; M. Baling, pers. comm.
Duvaucel's gecko	*Hoplodactylus duvaucelii*	2006	19	9 AM, 1 JM, 9 AF	Korapuki I., Mercury Is.	Tiritiri Matangi I., Hauraki Gulf	1, 2	3	van Winkel 2008; M. Baling, pers. comm.
Forest gecko	*Hoplodactylus granulatus*	2003	44	Unknown	Greenhithe, State Highway 18, Auckland	Kereru Grove Reserve, Auckland	3	0	S. Chapman, pers. comm.
Forest gecko	*Hoplodactylus granulatus*	2006	33	Unknown	Wellington via captivity	Matiu/Somes I., Wellington	1	2	Morrison 2006; A. Morrison, pers. comm.
Forest gecko	*Hoplodactylus granulatus*	2005–2006	70	10+ M, 25+ F	Orewa-Puhoi	Tawharenui Regional Park, North Auckland	3	0	S. Chapman, pers. comm.
Jewelled gecko	*Naultinus gemmeus*	Sept 1994	16	7 AF, 4 AM, 5 J	Every Scientific Reserve, Otago Peninsula	Every Scientific Reserve, Otago Peninsula	7	1	Shaw 1994
Marlborough green gecko	*Naultinus manukanus*	1997–1998	14	5 M, 6 F, 3 J	Arapawa I., Marlborough Sounds	Motuara I., Marlborough Sounds	1	0	Gaze 1999; Cash & Gaze 2000; Gaze & Cash 2008
Marlborough green gecko	*Naultinus manukanus*	2003	44	27 A, 17 J	Stephens I. (Takapourewa), Cook Strait & via captivity	Whakaterepapanui I., Rangitoto Is.	1	2	Rutledge et al. 2003; Gaze & Cash 2008
Matapia gecko	*Hoplodactylus* sp. "Matapia"	Apr 1997	41	16 M, 20 F, 3 JM, 2 JF	Matapia I., Northland	Motuopao I., Northland	1, 2	6	Parrish & Anderson 1999
Matapia gecko	*Hoplodactylus* sp. "Matapia"	Sept 2008 –	15	Unknown	Cape Reinga, State Highway 1 realignment, Northland	Cape Reinga area, Northland	3	0	S. Chapman, pers. comm.

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Appendix 1—continued

COMMON NAME	SPECIES	YEAR(S) RELEASED	NO. RELEASED	COMPOSITION	SOURCE	RELEASE SITE	REASON	OUT-COME	REFERENCES
New species	*Hoplodactylus* sp.	Sept 2008 –	2	Unknown	Cape Reinga, State Highway 1 realignment, Northland	Cape Reinga area, Northland	3	0	S. Chapman, pers. comm.
North Cape gecko	*Hoplodactylus* sp. "North Cape"	Sept 2008 –	25	Unknown	Cape Reinga, State Highway 1 realignment, Northland	Cape Reinga area, Northland	3	0	S. Chapman, pers. comm.
Pacific gecko	*Hoplodactylus pacificus*	1997–1998	30	15 M, 15 F	Pupuha I., Hen and Chickens Is., Northland	Lady Alice I., Hen and Chickens Is., Northland	1	3	Parrish 2000, 2005a
Wellington green gecko	*Naultinus elegans punctatus*	1997–2001	22	8 M, 4 F, 10 unknown	Wellington, some via captivity	Mana I., Wellington	1	2	Reed et al. 1998; A. Whitaker pers. comm.
Wellington green gecko	*Naultinus elegans punctatus*	2007	9	Unknown	Wellington	Matiu/Somes I., Wellington	1	0	A. Morrison, pers. comm.
Yellow lipped gecko	*Naultinus* sp.	Sept 2008 –	8	Unknown	Cape Reinga, State Highway 1 realignment, Northland	Cape Reinga area, Northland	3	0	S. Chapman, pers. comm.
Skinks: Reptilia: Lacertilia: Scincidae									
Brown skink	*Oligosoma zelandicum*	19 May 2001	30	7 M, 7 F, 12 J, 4 unknown	Maud I. (Te Hoiere), Marlborough Sounds via captivity	Awaiti I., Marlborough Sounds	1	0	Gaze 2001a; Gaze & Cash 2008
Common skink	*Oligosoma polychronum*	2005–2006	62	Unknown	The Neck, Stewart I./Rakiura	Ulva I., Stewart I./Rakiura	1	2	Goodman et al. 2006
Copper skink	*Oligosoma aeneum*	2003	1	Unknown	Greenhithe State Highway 18, Auckland	Kereru Grove Reserve, Auckland	3	0	S. Chapman, pers. comm.
Copper skink	*Oligosoma aeneum*	2005	24	Unknown	Smith's Bush, Northcote, Auckland	Smith's Bush, Northcote, Auckland	3	2	S. Chapman, pers. comm.
Copper skink	*Oligosoma aeneum*	2006	107	Unknown	Norton Road, Hamilton via captivity	Whewell's Bush Reserve, Hamilton	3	0	S. Chapman, pers. comm.
Copper skink	*Oligosoma aeneum*	2006–2007	8	Unknown	Otanerua Road subdivision, Hatfields Beach	Otanerua Road subdivision, Hatfields Beach	3	0	S. Chapman, pers. comm.
Copper skink	*Oligosoma aeneum*	2007	2	Unknown	Jonkers Road, Waitakere	Jonkers Road, Waitakere	3	0	S. Chapman, pers. comm.
Copper skink	*Oligosoma aeneum*	2007	2	Unknown	Stanmore Bay, Whangaparaoa Peninsula	Stanmore Bay, Whangaparaoa Peninsula	3	1	S. Chapman, pers. comm.
Copper skink	*Oligosoma aeneum*	2007	2	Unknown	Withers Road, Kaurilands, Auckland	Withers Road, Kaurilands, Auckland	3	0	S. Chapman, pers. comm.
Copper skink	*Oligosoma aeneum*	2007–2008	1	Unknown	Scott Road, Whangaparaoa Peninsula	Scott Road, Whangaparaoa Peninsula	3	0	S. Chapman, pers. comm.
Copper skink	*Oligosoma aeneum*	2007–2008	72	Unknown	Army Bay, Whangaparaoa Peninsula	Shakespear Regional Park, Whangaparaoa Peninsula	3	0	S. Chapman, pers. comm.
Copper skink	*Oligosoma aeneum*	2007–2008	25	Unknown	Awaroa, Henderson	Vitasovich Esplanade Reserve, Henderson	3	0	S. Chapman, pers. comm.
Copper skink	*Oligosoma aeneum*	2007–2008	25	Unknown	Great North Road, Henderson	Vitasovich Esplanade Reserve, Henderson	3	0	S. Chapman, pers. comm.

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Appendix 1—continued

COMMON NAME	SPECIES	YEAR(S) RELEASED	NO. RELEASED	COMPOSITION	SOURCE	RELEASE SITE	REASON	OUT-COME	REFERENCES
Fiordland skink	*Oligosoma acrinasum*	1988	40	Unknown	Wairaki I., Fiordland	Hawea I., Fiordland	1	3	Thomas & Whitaker 1995; Thomas 2002
Marbled skink	*Oligosoma oliveri*	Nov 1992, Mar 1993	25	14 A, 11 J sex unknown	Green I., Mercury Is.	Korapuki I., Mercury Is.	1, 2	3	Towns & Ferreira 2001; D. Towns, pers. comm.
McGregor's skink	*Oligosoma macgregori*	Mar 1997, Dec 1997	39	16 M, 19 F, 4 large J	Sail Rock, Hen and Chickens Is., Northland	Lady Alice I., Hen and Chickens Is., Northland	1, 2	3	Parrish 2003, 2005a
McGregor's skink	*Oligosoma macgregori*	Mar & Dec 2000	30	15 M, 12 F, 3 unknown	Sail Rock, Hen and Chickens Is., Northland	Whatupuke I., Hen and Chickens Is., Northland	1, 2	3	Riddell & Parrish 2001; Parrish 2004b
Moko skink	*Oligosoma moco*	2004–2005	13	Unknown	Whangaparaoa Peninsula	Whangaparaoa Peninsula	3	0	S. Chapman, pers. comm.
Ornate skink	*Oligosoma ornatum*	2004–2005	71	Unknown	Whangaparaoa Peninsula	Whangaparaoa Peninsula	3	0	S. Chapman, pers. comm.
Ornate skink	*Oligosoma ornatum*	2005	1	Unknown	Smith's Bush, Northcote, Auckland	Smith's Bush, Northcote, Auckland	3	0	S. Chapman, pers. comm.
Ornate skink	*Oligosoma ornatum*	Nov 2006	31 or 37?	8 M, 11 F, 6 J, + unknown	Wellington via captivity	Matiu/Somes I., Wellington	1, 5	0	A. Morrison, pers. comm.
Ornate skink	*Oligosoma ornatum*	2006/2007	13	Unknown	Arkles Bay, Whangaparaoa Peninsula	Arkles Bay, Whangaparaoa Peninsula	3	0	S. Chapman, pers. comm.
Ornate skink	*Oligosoma ornatum*	2007–2008	3	Unknown	Motutara Road, Muriwai	Motutara Road, Muriwai	3	0	S. Chapman, pers. comm.
Ornate skink	*Oligosoma ornatum*	Feb 2008	62	Unknown	Rodney District Council's wastewater plant, Waiwera	Shakespear Regional Park, Whangaparaoa Peninsula	3	0	Maitland 2009
Ornate skink	*Oligosoma ornatum*	Nov 2008	30	10 M, 20 F	Whatupuke I., Hen and Chickens Is., Northland	Limestone I. (Matakohe), Whangarei Harbour	1	0	Parrish 2008; R. Parrish, unpubl. data
Ornate skink	*Oligosoma ornatum*	Sept 2008 – Oct 2008	7	Unknown	Cape Reinga, State Highway 1 realignment, Northland	Cape Reinga area, Northland	3	0	S. Chapman, pers. comm.
Robust skink	*Oligosoma alani*	1992–1993	14	5 M, 7 F, 2 J	Green I., Mercury Is.	Korapuki I., Mercury Is.	1, 2	5	Towns & Ferreira 2001; D. Towns, pers. comm.
Robust skink	*Oligosoma alani*	1994–1995	30	Unknown	Atiu or Middle I., Mercury Is.	Red Mercury I. (Whakau), Mercury Is.	1, 2	3	Towns 1999
Robust skink	*Oligosoma alani*	1995	30	Unknown	Atiu or Middle I., Mercury Is.	Kawhitu or Stanley I., Mercury Is.	1, 2	5	Towns 1999; D. Towns, pers. comm.
Robust skink	*Oligosoma alani*	Apr 1997	30	27 A, 3 J	Matapia I., Northland	Motuopao I., Northland	1, 2	3	Parrish & Anderson 1999
Shore skink	*Oligosoma smithi*	Dec 2006	40	26 AF, 14 AM	Tawharenui Regional Park, North Auckland	Motuora I., Hauraki Gulf	1	3	M. Baling, pers. comm.
Shore skink	*Oligosoma smithi*	Dec 2006	40	21 AF, 12 AM, 7 J	Tawharenui Regional Park, North Auckland	Tiritiri Matangi I., Hauraki Gulf	1	3	M. Baling, pers. comm.
Shore skink	*Oligosoma smithi*	2005–2007	250–300	Unknown	East Cape	East I. (Whangaokeno I.), East Cape	1	3	A. Basset, pers. comm.

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Appendix 1—continued

COMMON NAME	SPECIES	YEAR(S) RELEASED	NO. RELEASED	COMPOSITION	SOURCE	RELEASE SITE	REASON	OUT-COME	REFERENCES
Shore skink	*Oligosoma smithi*	2007	29	Unknown	Mimiwhangata, Northland	Limestone I. (Matakohe), Whangarei Harbour	1	0	C. and P. Mitchell, pers. comm.
Speckled skink	*Oligosoma infrapunctatum*	2004	40	Unknown	Stephens I. (Takapourewa), Cook Strait	Mana I., Wellington	1	3	Adams 2004; Aikman et al. 2004; Gaze & Cash 2008; A. Whitaker, pers. comm.
Speckled skink	*Oligosoma infrapunctatum*	2004	40	Unknown	Stephens I. (Takapourewa), Cook Strait	Maud I. (Te Hoiere), Marlborough Sounds	1	3	Gaze & Cash 2008; W. Cash, pers. comm.
Spotted skink	*Oligosoma lineoocellatum*	Feb 1998, Nov 1999	50	Unknown	Matiu/Somes I., Wellington	Mana I., Wellington	1	3	Griffiths 1999; Adams 2004; A. Whitaker, pers. comm.
Suter's skink	*Oligosoma suteri*	Mar 1992	30	10 M, 20 F	Green I., Mercury Is. via captivity	Korapuki I., Mercury Is.	1	5	Towns & Ferreira 2001; D. Towns, pers. comm.
Suter's skink	*Oligosoma suteri*	Mar 2001	83	J	Green I., Mercury Is. via captivity	Korapuki I., Mercury Is.	1	5	Towns & Ferreira 2001; D. Towns, pers. comm.
Town's skink	*Oligosoma townsi*	Jan 2002	30	15 M, 14 F, 1 J	"Middle Stack", Hen and Chickens Is., Northland	Whatupuke I., Hen and Chickens Is., Northland	1, 2	3	Riddell & Parrish 2001; Parrish 2004b
Town's skink	*Oligosoma townsi*	2002	30	Unknown	"Middle Stack", Hen and Chickens Is., Northland	Coppermine I., Hen and Chickens Is., Northland	1, 2	2	Parrish 2002, 2007
Town's skink	*Oligosoma townsi*	Jan 2005	31	14 M, 17 F	Muriwhenua I., Hen and Chickens Is., Northland	Lady Alice I., Hen and Chickens Is., Northland	1, 2	2	Parrish 2005a,b, 2007
Town's skink	*Oligosoma townsi*	Mar 1997, Dec 1997	30	15 M, 15 F	Muriwhenua I., Hen and Chickens Is., Northland	Lady Alice I., Hen and Chickens Is., Northland	1, 2	6	Parrish 2003, 2005b
Whitaker's skink	*Oligosoma whitakeri*	Feb 1988 – Mar 1990	28	8 M, 5 F, 15 J	Atiu or Middle I., Mercury Is.	Korapuki I., Mercury Is.	1, 2	5	Towns 1994; Towns & Ferreira 2001; D. Towns, pers. comm.
Whitaker's skink	*Oligosoma whitakeri*	1994–1995	14	Unknown	Atiu or Middle I., Mercury Is.	Red Mercury I., (Whakau), Mercury Is.	1, 2	2	Towns 1999; D Towns, pers. comm.
Whitaker's skink	*Oligosoma whitakeri*	1995	30	Unknown	Atiu or Middle I., Mercury Is.	Kawhitu or Stanley I., Mercury Is.	1, 2	0	Towns 1999; D Towns, pers. comm.
Unknown lizard species: Reptilia									
Unknown species	Unknown	Early 1960s	Unknown	Large number	Manawatawhi/Three Kings Is., Northland	Mt Camel, Houhora, Northland	0	0	J. Marston, pers. comm.
Tuatara: Reptilia: Rhynchocephalia									
Tuatara (Cook Strait)	*Sphenodon punctatus*	2003	422	89 A, 333 J	Stephens I. (Takapourewa), Cook Strait & via captivity	Whakaterepapanui I., Rangitoto Is. Cook Strait	1, 2	2	Gaze 2005b; Rutledge et al. 2003; M. Aviss, pers. comm.
Tuatara (Cook Strait)	*Sphenodon punctatus*	2005, 2007	130	Unknown	Stephens I. (Takapourewa), Cook Strait	Karori Sanctury, Wellington	1, 2	2	McKenzie 2007
Tuatara (Brothers Is.)	*Sphenodon punctatus*	1995	68	J	North Brother I., Cook Strait via captivity	Titi I., Cook Strait	1, 2	3	Nelson et al. 2002; Gaze & Cash 2008

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Appendix 1—continued

COMMON NAME	SPECIES	YEAR(S) RELEASED	NO. RELEASED	COMPOSITION	SOURCE	RELEASE SITE	REASON	OUT-COME	REFERENCES
Tuatara (Brothers Is.)	*Sphenodon punctatus*	1998	50	20 A, 30 J	North Brother I., Cook Strait	Matiu/Somes I., Wellington	1, 2	3	Griffen 1998; Merrifield 2001; Gaze & Cash 2008
Tuatara (Brothers Is.)	*Sphenodon punctatus*	Nov 2007	55	J	North Brother I., Cook Strait via captivity	Long I., Marlborough Sounds	2	2	Gaze & Cash 2008; M. Aviss, pers. comm.
Tuatara (northern)	*Sphenodon punctatus*	Oct 1996	32	A	Moutaki I., Bay of Plenty	Moutohora I., Bay of Plenty	1, 2	3	Ussher 1997; Owen 1998, 1999
Tuatara (northern)	*Sphenodon punctatus*	Nov 1996 – June 1998	11	1 M, 4 F, + unknown	Red Mercury I. (Whakau), Mercury Is. via captivity	Red Mercury I. (Whakau), Mercury Is.	1, 2, 5	0	Ussher 1997, 1999; Towns et al. 2001; R. Chappell, pers. comm.
Tuatara (northern)	*Sphenodon punctatus*	Nov 2001, June 2003	18	1M, 2 F, 15 unknown	Cuvier I. (Repanga I.), Coromandel via captivity	Cuvier I. (Repanga I.), Coromandel	1, 2, 5	0	Roxburgh & Marshall 2003; R. Chappell, pers. comm.
Tuatara (northern)	*Sphenodon punctatus*	Oct 2003	60	30 F, 30 M	Atiu or Middle I., Mercury Is.	Tiritiri Matangi I., Hauraki Gulf	1, 2	0	Jack et al. 2004; R. Chappell, pers. comm.
Tuatara (northern)	*Sphenodon punctatus*	May 2003 – Dec 2004	15	2 M, 4 F, 9 unknown	Kawhitu or Stanley I., Mercury Is. via captivity	Kawhitu or Stanley I., Mercury Is.	1, 2, 5	0	Brandon et al. 2003; Roxburgh & Marshall 2003; R. Chappell, pers. comm.
Tuatara (northern)	*Sphenodon punctatus*	2006	140	J	Hauturu I., Hauraki Gulf via captivity	Hauturu I., Hauraki Gulf	5	0	S. McInnes, pers. comm.
Tuatara (northern)	*Sphenodon punctatus*	Oct 2007	30	15 F, 15 M	Karewa I., Bay of Plenty	Mayor (Tuhua) I., Bay of Plenty	1, 2	2	J. Heaphy, pers. comm.
Tuatara (northern)	*Sphenodon punctatus*	Oct 2008	2	Unknown	Cuvier I. (Repanga I.) via captivity	Cuvier I. (Repanga I.)	1, 2, 5	1	R. Chappell, pers. comm.
Tuatara	*Sphenodon punctatus*	1892–1893	3	Unknown	Unknown	Island in Lake Papaitonga, Levin	6	7	Buller 1893
Tuatara	*Sphenodon punctatus*	c. 1920	Unknown	Unknown	Island in Bay of Plenty	Mokopuna I., Wellington	0	7	Hislop 1920; Thomson 1920
Tuatara	*Sphenodon punctatus*	c. 1949	> 2	Unknown	Unknown	Kapiti I., Wellington	0	7	W. Dawbin, unpubl. notes
Tuatara	*Sphenodon punctatus*	c. 1963	Unknown	Unknown	Trios Is., Cook Strait	Moleta area, D'Urville I., Cook Strait	0	0	J. Marston, pers. comm.
Frogs: Amphibia: Anura									
Archey's frog	*Leiopelma archeyi*	2006	70	Unknown	Whareorino Forest, Waikato	Nth Pureora Forest, Waikato	4	0	A. Haigh, pers. comm.
Hamilton's frog	*Leiopelma hamiltoni*	1992	12	Unknown	Stephens I. (Takapourewa), Cook Strait	Stephens I. (Takapourewa), Cook Strait	2	2	Brown 1994; Tocher & Brown 2004; Germano 2006; Gaze & Cash 2008
Hamilton's frog	*Leiopelma hamiltoni*	2004–2006	71	Unknown	Stephens I. (Takapourewa), Cook Strait	Nukuwaiata I. Chetwode Is., 1, Cook Strait	2	3	Bishop 2005; Tocher et al. 2006; Gaze & Cash 2008; M. Aviss, pers. comm.
Hochstetter's frog	*Leiopelma hochstetteri*	2004	28	Unknown	Brynderwyn Hills, Northland	Brynderwyn Hills, Northland	3	6	Parrish 2004a,b

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COMMON NAME	SPECIES	YEAR(S) RELEASED	NO. RELEASED	COMPOSITION	SOURCE	RELEASE SITE	REASON	OUT-COME	REFERENCES
Hochstetter's frog	*Leiopelma hochstetteri*	2005	25	Unknown	Brynderwyn Hills, Northland	Brynderwyn Hills, Northland	3	6	Parrish 2005c; Parrish & Beauchamp 2005
Leiopelma frog	*Leiopelma hochstetteri* or *L. archeyi*	Dec 1924, Mar 1925	15	Unknown	Coromandel	Kapiti I., Wellington	0	6	Bell 1996
Maud Island frog	*Leiopelma pakeka*	1984/1985	100	Unknown	Maud I. (Te Hoiere), Marlborough Sounds	Maud I. (Te Hoiere), Marlborough Sounds	2	3	Bell et al. 2004; Dewhurst & Bell 2004; Gaze & Cash 2008
Maud Island frog	*Leiopelma pakeka*	2001	300	Unknown	Maud I. (Te Hoiere), Marlborough Sounds	Motuara I., Marlborough Sounds	2	3	Gaze 1999; Cash & Gaze 2000; Tocher & Pledger 2005; Gaze & Cash 2008
Maud Island frog	*Leiopelma pakeka*	2005	101	Unknown	Maud I. (Te Hoiere), Marlborough Sounds	Long I., Marlborough Sounds	1, 2	3	Gaze 2005a; Gaze & Cash 2008
Maud Island frog	*Leiopelma pakeka*	2005/2006	60	Unknown	Maud I. (Te Hoiere), Marlborough Sounds via captivity	Karori Sanctury, Wellington	1, 2	3	Gaze & Cash 2008; A. Whitaker, pers. comm.
Snails and slugs: Mollusca: Gastropoda: Pulmonata									
Snail	*Amborhytida tarangaensis* (Rhytitidae)	Sept 2006	43	14 A, 29 J	Taranga (Hen) I., Hen and Chickens Is., Northland	Lady Alice I., Hen and Chickens Is., Northland	1, 2	2	Parrish & Stringer 2007
Kauri snail	*Paryphanta busbyi* (Rhytitidae)	Unknown	Unknown	Unknown	Unknown	Huia Valley, Waitakere	0	5	Parrish et al. 1995
Kauri snail	*Paryphanta busbyi* (Rhytitidae)	Unknown	Unknown	Unknown	Unknown	Little Huia, Waitakere	0	5	Montefiore 1996
Kauri snail	*Paryphanta busbyi* (Rhytitidae)	Unknown	Unknown	Unknown	Unknown	Woodcocks, Warkworth	0	0	Parrish et al. 1995
Kauri snail	*Paryphanta busbyi* (Rhytitidae)	Possibly first few decades of 1900s	Unknown	Unknown	Unknown	Awhitu Peninsula, Manukau Harbour	0	0	Parrish et al. 1995
Kauri snail	*Paryphanta busbyi* (Rhytitidae)	Between 1950 and 1970	Unknown	Unknown	Unknown	Kemp Road, Awhiti Peninsula, Manukau Harbour	0	0	M. Douglas, pers. comm.
Kauri snail	*Paryphanta busbyi* (Rhytitidae)	c. 1969–1974	Unknown	Unknown	Dargaville	Soldiers Road, Kaimai Ranges	3	4	O'Connell 1999; Gilchrist 2000
Powelliphanta snail	*Powelliphanta augustus* (Rhytitidae)	Dec 2006	40	40 snails	Mined area, Mt Augustus (part via captivity)	Unmined area, Mt Augustus	1, 3	1	Solid Energy NZ Ltd, unpubl. data
Powelliphanta snail	*Powelliphanta augustus* (Rhytitidae)	20 Jan 2007–30 Mar 2007	4210	3178 snails, 1032 eggs	Mined area, Mt Augustus (part via captivity)	Unmined area, Mt Augustus	3	1	Solid Energy NZ Ltd, unpubl. data
Powelliphanta snail	*Powelliphanta augustus* (Rhytitidae)	June 2007, Sept 2007	1250	1085 snails, 165 eggs	Mined area, Mt Augustus (part via captivity)	Summit Mt Rochfort	3	1	Solid Energy NZ Ltd, unpubl. data
Powelliphanta snail	*Powelliphanta augustus* (Rhytitidae)	Sept 2007	1618	1219 snails, 399 eggs	Mined area, Mt Augustus (part via captivity)	Basin below Mt Rochfort	3	1	Solid Energy NZ Ltd, unpubl. data
Powelliphanta snail	*Powelliphanta annectens* (Rhytitidae)	Unknown	Unknown	Unknown	Unknown	Hokitika Airport Reserve	0	5	Walker 2003

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COMMON NAME	SPECIES	YEAR(S) RELEASED	NO. RELEASED	COMPOSITION	SOURCE	RELEASE SITE	REASON	OUT-COME	REFERENCES
Powelliphanta snail	*Powelliphanta gilliesi subfusca* (Rhytitidae)	Unknown	Unknown	Unknown	Unknown	Drumduan, Cable Bay, northeast Nelson	0	5	Walker 2003
Powelliphanta snail	*Powelliphanta gilliesi subfusca* (Rhytitidae)	1959 or 1960	3 or 4	Unknown	Hicks Point, Northwest Nelson	Taupata Creek near Puponga	7	4	F. Climo, pers. comm.
Powelliphanta snail	*Powelliphanta hochstetteri* (Rhytitidae)	Unknown	Unknown	Unknown	Northern South Island—otherwise unknown	Kaikou River, Mangakahia, Northland	0	4	Ogle 1982
Powelliphanta snail	*Powelliphanta hochstetteri hochstetteri* (Rhytitidae)	Unknown	Unknown	Unknown	Canann, Abel Tasman National Park	Mt Robert, Nelson Lakes National Park	0	5	Walker 2003
Powelliphanta snail	*Powelliphanta hochstetteri hochstetteri* (Rhytitidae)	1978	4	Unknown	Canann, Abel Tasman National Park	Atarau, Grey Valley	0	5	Walker 2003
Powelliphanta snail	*Powelliphanta lignaria lusca* (Rhytitidae)	1938?	Unknown	Unknown	Corbyvale, Taffytown Camp and Lake Hanlon	Lower Karamea Valley, Northwest Nelson	8	0	J. Marston, pers. comm.
Powelliphanta snail	*Powelliphanta* sp. (Rhytitidae)	c. 1940	Unknown	Unknown	Virgin, Kakapo and Roaring Lion Creeks, Paryphanta Saddle	Uleri, Karamea Valley	0	0	J. Marston, pers. comm.
Powelliphanta snail	*Powelliphanta* sp. (Rhytitidae)	Unknown	Unknown	Unknown	Unknown	Birchfield School, West Coast	0	4	J. McLennan, pers. comm.
Powelliphanta snail	*Powelliphanta traversi traversi* form *latizona* (Rhytitidae)	1944	40	Unknown	Unknown	Khandallah Park, Wellington	0	4	Powell 1946
Powelliphanta snail	*Powelliphanta traversi traversi* form *latizona* (Rhytitidae)	1944	250	Unknown	Greenaways Bush, Levin	Botanical Gardens, Wellington	0	0	J. Marston, pers. comm.
Powelliphanta snail	*Powelliphanta traversi traversi* form *latizona* (Rhytitidae)	1944	Hundreds	Unknown	Arapaepae Ridge, Tararua Ranges	Levin	8	0	J. Marston, pers. comm.
Flax snail	*Placostylus ambagiosus annectens* (Bulimulidae)	Nov 1990	59	44 A, 13 J	Te Huka Bay, Northland	Te Huka Stream fenced enclosure, Northland	1	5	Sherley 1990a
Flax snail	*Placostylus ambagiosus annectens* (Bulimulidae)	Nov 1990	28	Unknown	Matirarau Bay, Northland	Te Huka Stream fenced enclosure, Northland	1	5	Sherley 1990a
Flax snail	*Placostylus ambagiosus keenorum* (Bulimulidae)	Oct 1985	62	10 A, 52 J	Captive-reared, from Spirits Bay, Northland	Motu Puruhi I., Simmonds Is., Northland	2	7	Parrish 1990
Flax snail	*Placostylus ambagiosus keenorum* (Bulimulidae)	Nov 1976	Unknown	Eggs	Captive-reared, from Spirits Bay, Northland	Waiuku, South Auckland	0	7	M. Douglas, pers. comm.
Flax snail	*Placostylus ambagiosus keenorum* (Bulimulidae)	Oct–Jan 1976	9	9 J	Captive-reared, from Spirits Bay, Northland	Kariotahi Beach, South Auckland	0	6	M. Douglas, pers. comm.
Flax snail	*Placostylus ambagiosus michiei* (Bulimulidae)	6 Nov 1998	28	27 A, 1 J	Surville Cliffs, Northland	Surville Cliffs, Northland	7	2	I. Stringer, upubl. data
Flax snail	*Placostylus ambagiosus pandora* (Bulimulidae)	July 1984	16+	5 A, 12+ J	Captive-reared, from Pandora, Northland	Motutakupu I., Cavalli Is., Northland	2	4	Parrish 1988, 1989

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COMMON NAME	SPECIES	YEAR(S) RELEASED	NO. RELEASED	COMPOSITION	SOURCE	RELEASE SITE	REASON	OUT-COME	REFERENCES
Flax snail	*Placostylus ambagiosus paraspiritus* (Bulimulidae)	1990	32	25 A, 7 J	Pā site, Cape Maria van Diemen, Northland	South translocation site, Cape Maria van Diemen, Northland	2	4	Sherley 1990b; I. Stringer, unpubl. data
Flax snail	*Placostylus ambagiosus paraspiritus* (Bulimulidae)	1990	31	25 A, 6 J	Pā site, Cape Maria van Diemen, Northland	North translocation site, Cape Maria van Diemen, Northland	2	5	Sherley 1990b; I. Stringer, unpubl. data
Flax snail	*Placostylus ambagiosus paraspiritus* (Bulimulidae)	Oct 1997, July 1998	13, 11	5A, 8 J; 6 A, 5 J	Pā site, Cape Maria van Diemen, Northland	Pā site, Cape Maria van Diemen, Northland	7	2	I. Stringer, unpubl. data
Flax snail	*Placostylus ambagiosus paraspiritus* (Bulimulidae)	1999	7	3 A, 4 J	Captive-reared from pā site, Cape Maria van Diemen, Northland	Enclosure, Te Paki DOC field centre, Northland	2, 7	7	Stringer & Grant 2003
Flax snail	*Placostylus ambagiosus watti* or *P. a. michiei* (Bulimulidae)	June 1984	42+	9 A, 33+ J	Captive-reared, from North Cape, Northland	Nukutaunga I., Cavalli Is., Northland	2	7	Parrish 1988, 1989
Flax snail	*Placostylus ambagiosus whareana* (Bulimulidae)	July 1984	32+	13 A, 19+ J	Captive-reared, from Whareana, Northland	Horonui I., Cavalli Is., Northland	2	7	Parrish 1988; A. Booth, pers. comm.
Flax snail	*Placostylus ambagiosus whareana* (Bulimulidae)	Nov 1990	37	7+ A, 3+ J	Whareana Bay, Northland	Whareana Bay fenced enclosure, Northland	2, 5	4	Sherley 1990a; A. Booth pers. comm.
Flax snail	*Placostylus ambagiosus whareana* (Bulimulidae)	2 Nov 1997, 31 Oct 1999	9, 4	11 A, 2 J	Bush containing fenced enclosure, Whareana Bay	Bush containing fenced enclosure, Whareana Bay	7	2	I. Stringer, unpubl. data
Flax snail	*Placostylus bollonsi* (Bulimulidae)	Early 1960s	Unknown	Unknown	Manawatawhi/Three Kings Is., Northland	Butler Point or Hihi Road areas opposite Mangonui Harbour wharf, Northland	0	6	J. Marston, pers. comm.
Flax snail	*Placostylus bollonsi arbutus* (Bulimulidae)	Nov 2003	20	20 A	Great I., Manawatawhi/ Three Kings Is., Northland	South West I., Manawatawhi/ Three Kings Is., Northland	9	3	Brook & Whaley 2008
Flax snail	*Placostylus hongii* (Bulimulidae)	Feb 1934	100	Unknown	Archway I., Poor Knights Is., Northland	Motuhoropapa I., The Noises, Hauraki Gulf	0	4	Powell 1938; F. Brook, pers. comm.
Flax snail	*Placostylus hongii* (Bulimulidae)	27–28 Jan 1998	55	49 A, 6 J	Tawhiti Rahi I., Poor Knights Is., Northland	Tawhiti Rahi I., Poor Knights Is., Northland	7	2	I. Stringer, unpubl. data
Flax snail	*Placostylus hongii* (Bulimulidae)	Aug 2002	11	4 A, 7 J	Captive-reared from Aorangi I., Poor Knights Is., Northland	Limestone I. (Matakohe), Whangarei Harbour	2, 7	7	Stringer & Parrish 2008
Leaf-vein slug	*Pseudaneitea maculata* (Athoracophoridae)	Apr–Nov 2004	75	25 slugs, 50 eggs	Orton Bradley Park, Banks Peninsula	Otamahua/Quail I., Lyttelton Harbour/Whakaraupo	1	3	Bowie 2007
Insects: Arthropoda: Insecta									
Mantids: Mantidae									
Preying mantis	Unknown	Unknown	Unknown	Unknown	Whangarei area	Limestone I. (Matakohe), Whangarei Harbour	1	0	G. Brackenbury, pers. comm.

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COMMON NAME	SPECIES	YEAR(S) RELEASED	NO. RELEASED	COMPOSITION	SOURCE	RELEASE SITE	REASON	OUT-COME	REFERENCES
Stick insects: Phasmatodea									
Stick insect	Unknown	Unknown	Unknown	Unknown	Whangarei area	Limestone I. (Matakohe), Whangarei Harbour	1	0	G. Brackenbury, pers. comm.
Weevils: Coleoptera: Curculionidae									
Weevil	*Anagotus fairburnii*	1991	20	A	Wairaka I., Fiordland	Breaksea I., Fiordland	1, 2	0	Thomas 1996, 2002
Weevil	*Anagotus fairburnii*	2001	82	A	Maud I. (Te Hoiere), Marlborough Sounds	Titi I., Cook Strait	1	0	Gaze & Cash 2008
Weevil	*Anagotus fairburnii*	Mar 2004, Mar 2006	150	A	Maud I. (Te Hoiere), Marlborough Sounds	Mana I., Wellington	1	0	Gaze & Cash 2008; L. Adams, pers. comm.
Weevil	*Anagotus turbotti*	Sept 2006	30	18 AF, 12 AM	Muriwhenua I., Hen and Chickens Is., Northland	Lady Alice I., Hen and Chickens Is., Northland	1, 2	0	Parrish 2007; Parrish & Stringer 2007
Weevil	*Hadramphus stilbocarpae*	1991	40	20 AF, 20 AM	Unnamed I. ("OG3"—informal name) near Breaksea I., Fiordland	Breaksea I., Fiordland	1, 2	5	Thomas 1996, 2002
Spear grass weevil	*Lyperobius huttoni*	2006	30	A	South Wellington Coast	Mana I, Wellington	1, 2	0	L. Adams, pers. comm.
Ground beetles: Coleoptera: Carabidae									
Ground beetle	*Mecodema oregoides*	Apr 2004	50	A	Orton Bradley Park, Banks Peninsula	Otamahua/Quail I., Lyttelton Harbour /Whakaraupo	1	2	M. Bowie, pers. comm.
Darkling beetles: Coleoptera: Tenebrionidae									
Darkling beetle	*Mimopeus opaculus*	Apr 1997	56	A	Te Kakaho I., Chetwode Is., Cook Strait	Nukuwaiata I., Chetwode Is., Cook Strait	1	4	M. Aviss, pers. comm.
Darkling beetle	*Mimopeus opaculus*	Mar 2000, Oct & Nov 2002	100	A	Atiu or Middle I., Mercury Is. via captivity	Korapuki I., Mercury Is.	1	3	C. Green, pers. comm.
Darkling beetle	*Mimopeus opaculus*	Sept 2006	41	A	Muriwhenua I., Hen and Chickens Is., Northland	Lady Alice I., Hen and Chickens Is., Northland	1	1	Parrish 2007; Parrish & Stringer 2007
Wētā: Orthoptera: Anostostomatidae									
Mahoenui giant wētā	*Deinacrida mahoenui*	Unknown	Unknown	108 F, 65 M	Mahoenui Giant Weta Scientific Reserve and adjacent farm, Waikato	Tikikaru—private land, Waikato	3	4	Watts & Thornburrow 2008
Mahoenui giant wētā	*Deinacrida mahoenui*	Dec 1980 – Oct 1992	374	Unknown	Mahoenui Giant Weta Scientific Reserve and adjacent farm, Waikato	Cowan's—private land, Waikato	2	7	Watts & Thornburrow 2008
Mahoenui giant wētā	*Deinacrida mahoenui*	Dec 1993	295	Unknown	Mahoenui Giant Weta Scientific Reserve and adjacent farm, Waikato	Mahurangi Island Scenic Reserve, Coromandel	1, 2, 3	5	Watts & Thornburrow 2008
Mahoenui giant wētā	*Deinacrida mahoenui*	Apr 1998	54	Unknown	Mahoenui Giant Weta Scientific Reserve and adjacent farm, Waikato	Motutapere I. Scenic Reserve, Coromandel	2	7	Watts & Thornburrow 2008

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COMMON NAME	SPECIES	YEAR(S) RELEASED	NO. RELEASED	COMPOSITION	SOURCE	RELEASE SITE	REASON	OUT-COME	REFERENCES
Mahoenui giant wētā	*Deinacrida mahoenui*	Feb 1989 – Mar 2000	687	Unknown	Mahoenui Giant Weta Scientific Reserve and adjacent farm, Waikato	Mangaokewa Scenic Reserve, Waikato	2, 3	4	Watts & Thornburrow 2008
Mahoenui giant wētā	*Deinacrida mahoenui*	Dec1993 – Mar 2000	179	Unknown	Mahoenui Giant Weta Scientific Reserve and adjacent farm, Waikato	Ruakuri Caves Scenic Reserve, Waikato	2, 3	7	Watts & Thornburrow 2008
Mahoenui giant wētā	*Deinacrida mahoenui*	Nov 2001, Mar 2002, Apr 2002	287	156 F, 131 M	Mahoenui Giant Weta Scientific Reserve and adjacent farm, Waikato	Warrenheip—private land, Waikato	3	5	Watts & Thornburrow 2008; C. Watts, pers. comm.
Cook Strait giant wētā	*Deinacrida rugosa*	Sept 1977	43	9 AF, 9 AM, 15 J	Mana I., Wellington	Maud I. (Te Hoiere), Marlborough Sounds	0	5	Gaze & Cash 2008; Watts et al. 2008a
Cook Strait giant wētā	*Deinacrida rugosa*	1996	62	21 AF, 25 AM, 6 JF, 7 JM, 3J	Mana I., Wellington	Matiu/Somes I., Wellington	1	5	Gaze & Cash 2008; Watts et al. 2008a
Cook Strait giant wētā	*Deinacrida rugosa*	2001	92	51 AF, 27 AM, 11 JF, 3 JM	Maud I. (Te Hoiere), Marlborough Sounds	Titi I., Cook Strait	1	0	Gaze & Cash 2008; Watts et al. 2008a
Cook Strait giant wētā	*Deinacrida rugosa*	May 2004	13	6 F, 7 M	Stephens I. (Takapourewa), Cook Strait via captive breeding	Wakaterepapanui I., Rangitoto Is., Cook Strait	1	0	Gaze & Cash 2008; Watts et al. 2008a
Cook Strait giant wētā	*Deinacrida rugosa*	31 Oct 2004	42	3 AM, 12 AF, 1 JF, 2 JM, 24 J	Stephens I. (Takapourewa), Cook Strait	Wakaterepapanui I., Rangitoto Is., Cook Strait	1	0	Gaze & Cash 2008; Watts et al. 2008a
Cook Strait giant wētā	*Deinacrida rugosa*	Feb 2007, Feb 2008 ongoing	186		Matiu/Somes I., Wellington	Karori Wildlife Sanctuary, Wellington	1, 8	1	Watts et al. 2008a
Cook Strait giant wētā	*Deinacrida rugosa*	Jan 2008	100	Unknown	Maud I. (Te Hoiere), Marlborough Sounds	Long I., Marlborough Sounds	1	1	M. Aviss, pers. comm.
Wellington tree wētā	*Hemideina crassidens*	Apr 1996, Aug 1997	59	37 F, 21 M, 1 unknown	Mana I., Wellington	Matiu/Somes I., Wellington	1	1	Watts et al. 2008a
Bank's Peninsula tree wētā	*Hemideina ricta*	Jan 2005	28	Unknown	Banks Peninsula	Otamahua/Quail I., Lyttelton Harbour/Whakaraupo	1, 2	3	Watts et al. 2008a
Auckland tree wētā	*Hemideina thoracica*	May 1997	52	36 F, 16 M	Double I. (Moturehu) (east end), Mercury Is.	Korapuki I., Mercury Is.	1	5	Green 2005
Auckland tree wētā	*Hemideina thoracica*	Autumn 2000	100	Unknown	Whangarei area	Limestone I. (Matakohe), Whangarei Harbour	1	7	Clarke 2001
Auckland tree wētā	*Hemideina thoracica*	Nov 2002	55	32 F, 8 M, 15 J	Te Araroa, East Cape	East I. (Whangaokeno I.), East Cape	9	3	A. Bassett, pers. comm.
Auckland tree wētā	*Hemideina thoracica*	2008 ongoing	92	Unknown	Motu Scenic Reserve and Whinray Scenic Reserve, Bay of Plenty	Young Nick's Head, Gisborne	0	1	S. Sawyer, pers. comm.
Mercury Islands tusked wētā	*Motuweta isolata*	May–Sept 2001	84	15 AF, 6 AM, 50 JF, 13 JM	Atiu or Middle I., Mercury Is. via captivity	Double I. (Moturehu) (west end), Mercury Is.	1, 2	5	Stringer & Chappell 2008

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COMMON NAME	SPECIES	YEAR(S) RELEASED	NO. RELEASED	COMPOSITION	SOURCE	RELEASE SITE	REASON	OUT-COME	REFERENCES
Mercury Islands tusked wētā	*Motuweta isolata*	May–Sept 2001, May 2003	67	5 AF, 1 AM, 29 JF, 15 JM	Atiu or Middle I. via captivity, Mercury Is.	Red Mercury I. (Whakau), Mercury Is.	1, 2	5	Stringer & Chappell 2008
Mercury Islands tusked wētā	*Motuweta isolata*	June 2007, July 2007	100	50 JF, 50 JM	Captive-reared from Double I. (Moturehu) (west end), Mercury Is.	Korapuki I., Mercury Is.	1, 2	2	R. Chappell, pers. comm.
Mercury Islands tusked wētā	*Motuweta isolata*	July 2007	100	57 JF, 43 JM	Captive-reared from Double I. (Moturehu) (west end), Mercury Is.	Kawhitu or Stanley I., Mercury Is.	1, 2	2	R. Chappell, pers. comm.
Mercury Islands tusked wētā	*Motuweta isolata*	Nov 2007	100	56 JF, 44 JM	Captive-reared from Double I. (Moturehu) (west end), Mercury Is.	Ohinau I., Coromandel	1, 2	2	R. Chappell, pers. comm.
Mercury Islands tusked wētā	*Motuweta isolata*	Apr 2008	34	17 AF, 17 AM	Captive-reared from Double I. (Moturehu) (west end), Mercury Is.	Cuvier I. (Repanga I.)	1, 2	1	R. Chappell, pers. comm.
Cave wētā: Orthoptera: Rhaphidophoridae									
Cave wētā	Unknown	2008 ongoing	'A few'	Unknown	Motu Scenic Reserve and Whinray Scenic Reserve, Bay of Plenty	Young Nick's Head, Gisborne	1	1	S. Sawyer, pers. comm.
Centipede: Arthropoda: Chilopoda									
Giant centipede	*Cormocephalus rubriceps* (Scolopendromorpha)	2007–2008	11	Unknown	Army Bay, Whangaparaoa Peninsula	Army Bay, Whangaparaoa Peninsula	3	0	S. Chapman, pers. comm.
Spiders: Arthropoda: Chelicerata: Araneae									
Katipō spider	*Latrodectus katipo* (Theridiidae)	Jan 2008	18		Kaitoreke Spit, Lake Ellesmere (Te Waihora)	Kaitoreke Spit, Lake Ellesmere (Te Waihora)	7	1	M. Bowie, pers. comm.; M. Lettink, pers. comm.

How many bat, reptile, amphibian and invertebrate translocations have there been?

Translocation records are essential for understanding the distribution of native species and providing context for ecological restoration. All known translocations of native bats, reptiles, amphibians and terrestrial invertebrates in New Zealand are summarised to provide a central reference for future workers. Recommendations on best practice when undertaking translocations are also included.

Sherley, G.H.; Stringer, I.A.N.; Parrish, G.R. 2010: Summary of native bat, reptile, amphibian and terrestrial invertebrate translocations in New Zealand. *Science for Conservation 303*. 39 p.