

10 Land and Freshwater Invertebrates.

Terrestrial invertebrates

Terrestrial invertebrates include a vast range of microscopic forms, and all the insects, spiders, worms, molluscs and crustaceans that eat vegetation, live in soil, rotting wood and freshwater, or are parasitic on other life-forms. There may be as many as 5000 species on Great Barrier Island¹. John Early (Auckland Museum) has documented just over a thousand different terrestrial invertebrate species, mostly insects, from collections made over recent years mainly from three locations on Great Barrier Island (Table 10.1). The huge diversity of beetles (462 species, almost half the total) is impressive.

Table 10.1 Terrestrial Invertebrates recorded on Great Barrier Island by J. Early.

Insect Group	Common name	No of species
Coleoptera  <i>Brounia thoracica</i> . A very rare beetle found on Great Barrier Island.	Beetles, weevils  <i>Lichenobius sp.</i> Fungus weevil. 2.5mm long. Only one specimen known – found on Great Barrier Island.  <i>Zecillenus sp.</i> Rare ground beetle found on beaches on Great Barrier Island.	462
Hymenoptera	Ants, wasps, bees	209
Diptera	Flies	152
Hemiptera	Plant bugs  A well known introduced garden pest! Green Shield bug. (juvenile). (<i>Nezara viridula</i> : Hemiptera)	102
Araneae	Spiders	16

Lepidoptera	Butterflies, moths  Red admiral – kahukura - at Awana May 2009.	16
Trichoptera	Caddisflies	14
Orthoptera	Grasshoppers, weta, crickets	10
Blattodea	Cockroaches	8
Opiliones	Harvestmen	6
Neuroptera	Lacewings	6
Phasmatodea	Stick insects	6
Chilopoda	Centipedes	3
Ephemeroptera	Mayflies	3
Dermaptera	Earwigs	2
Mantodea	Praying mantids	2
Diplopoda	Millipedes	1
Megaloptera	Dobsonflies	1
Plecoptera	Stoneflies	1
Strepsiptera	Twisted-wing parasites	1
All species caught:		1021

Photos: from John Earl; John Ogden

There are several rare beetles (*Coleoptera*) on Great Barrier Island, three of them illustrated in Table 10.1 Only eight specimens of *Brounia thoracica* have ever been collected in New Zealand. The *Zencillenus* species lives where freshwater seeps into the top of sandy beaches. It is rarely encountered on the mainland, but there are good populations at Awana and Whangapoua, indicating healthy beaches. The little fungus weevil (*Lichenobius* sp.) collected on Great Barrier Island is the only known specimen. It differs from related species known from other islands (Chathams, Snares, Stewart) in the possession of wings. A carabid beetle (*Mecodema* sp.) found at Rosalie Bay may be related to other carabids found in Northland and Coromandel.

	<p>Fig 10.1 Wasp’s nest – Northern Great Barrier Island Summer 2008 / 09</p> <p>Wasps (<i>Vespula germanica</i>) destroy native insects in huge numbers and are very effective competitors for food of native birds. In some South Island forests:</p> <p><i>“The biomass of introduced wasps in these (beech) forests has been estimated to be more than that of all the birds, rodents and stoats combined”ⁱⁱ</i></p> <p>Quite apart from stinging – they are a major pest!</p>
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Photo: Dave Speir

The Lepidoptera, with only 16 species, are certainly under-represented in Table 10.1; New Zealand has over 1800 species of moths and there must be several hundred on Great Barrier Island. The beautiful green and silver puriri moth, and six species of butterflies are quite common. In the case of red admiral (*Bassaris gonerilla*), the larvae feed on nettles, which are not known on Great Barrier Island, so the specimen photographed in Table 10.1 must have flown from the mainland. Table 10.1 is especially incomplete for the aquatic insects; for example it records only three species of mayflies, but Maddisonⁱⁱⁱ noted that 24 species of this group have been found on Great Barrier Island, including the rare fringe-gilled mayfly (*Isothraululus adbitus*). Spiders and mites are also under-represented as these require targeted collection. The black form of the katipo spider (*Latrodectus katipo*) is quite common on the Great Barrier Island dunes, while it is disappearing from similar habitats on the mainland. High levels of human use and dune stabilisation with introduced plants seem to be the main reasons for the decline of this spider elsewhere (eg Pakiri and Tawharanui).

Probably the majority (c.80%) of the insect and other invertebrate species found so far are native. However, just as is the case with vertebrates and plants, a few of the introduced species are particularly aggressive and pose a serious threat to native biota – not just other insects, but also in some cases humans, birds and plants. The recent case of the introduced Argentine ants (see below) illustrated the point for many Great Barrier Island residents, but viroa mites, garden pests, and two or three species of wasp (*Vespula* and *Polistes* spp.) are also serious pests (Fig 10.1)^{iv}.

The larger native invertebrates are also at risk from introduced rodents and birds, while the aquatic forms would be seriously jeopardised should introduced fish, such as trout or mosquito fish (*Gambusia* sp.) be released here (they cannot get here without human agency). The Island has almost certainly lost the giant weta, or wetapunga (*Deinacrida heteracantha*), due to predation by ship rats. This ‘invertebrate mouse’ is now restricted to Little Barrier Island (Hauturu). The large cave weta (*Gymnoplecton acanthocera*) is much more plentiful in the rat-trapped area at Windy Hill compared with control areas where rats are abundant.

Invasive Hymenoptera

There are at least two species of stinging invasive wasps on Great Barrier Island: German wasp (*Vespula germanica*) and Asian paper wasp (*Polistes chinensis*). Both these species can reach very large numbers and become a serious nuisance. Wasps can change the whole energy-flow of ecosystems, resulting in extensive loss of native species. Elsewhere in New Zealand they have reduced the populations of their prey insects and compete for food with native birds. In addition there are wild bumble bees and honey bees. Most recently there has been an invasion of Argentine ants.

Case study: Argentine ants – a template for community action against a biosecurity threat.

Argentine ants (*Linepithema humile*) were first reported on Great Barrier Island at Mulberry Grove in January 2006. The Department of Conservation were notified and acted quickly to set up a combined response team with the Auckland Regional Council (Biosecurity). Shortly after this new infestations were reported from various properties in Sandhills Rd., Medlands, Ocean View Rd., Claris and Mohunga Bay, Port FitzRoy, and a few other places. Knowledge of the severity of the ant problem spread throughout the Island. In total c. 200 properties were involved. Property owners were notified, funding was allocated and a response coordinator appointed. The poison Fiprinol (in Xtinguish bait) was made available to those requesting it, but attempts were made to restrict its use until such time as wide areas could be treated synchronously. This was because colonies are capable of warning each other if one colony suffers poisoning, and henceforth the baits are avoided. Teams of volunteers were set up to lay baits on a grid system throughout the main areas of infestation, and this was finally accomplished in all the main areas in February 2007. Subsequent reports from residents and property owners confirmed huge reductions.

However, not all ants were destroyed, and all four main areas (Mulberry Grove, Sandhills Rd., Ocean View Rd. and Mohunga Bay) were re-baited in February 2008 and 2009. Although further reductions may have been achieved, it is unlikely that the ants have been totally eliminated.

This programme has been a template for members of the Great Barrier Island community working together to address an environmental concern, supporting, and supported by, local government and the Department of Conservation. The programme emphasised that the Argentine ant problem was a problem for all islanders. It was important to communicate to the whole community that if ignored the problem would certainly spread throughout the island. It was important to prevent a false sense of security in those whose properties had not been infested. As time went on people's awareness of the speed and extent of the ants' ability to spread led to greater care not to transport the ants around the island.

Honey bees

Honey bees were brought to New Zealand in 1939 and were a significant source of income in the early nineteenth century on Great Barrier Island. The industry is now flourishing again with the interest in honey derived from manuka. The number of hives in operation could not be ascertained, nor is it known if there are wild colonies.

Freshwater invertebrates

The health of freshwater streams can be assessed on the basis of its invertebrate fauna. Such assessments are currently in progress at Windy Hill (see Chapter 12). Key invertebrate fauna include the large crustacean koura (*Paranephrops planifrons*). The aquatic larvae of mayflies, caddisflies and stone flies (Table 10.1) all require well-aerated streams and constitute important food for fish. No detailed information on these, nor on the associated benthic worms, molluscs, crustacea and other invertebrate faunas appears to be available for Great Barrier Island^v.

Land snails

A preliminary study of the land snails was reported by Goulstone in 1981 and 1991. Goulstone collected from twenty-three locations between Kaiaraara and the hot-springs track and Whangaparapara in 1982, and from twenty-six locations in the northern half of the Island in 1990. He found a total of 74 native species, of which seven are regarded as rare and

possibly endangered^{vi}. He also notes four species of snail collected by N. Gardner but not seen by him, and provides an illustration of the shell of the Great Barrier Island paua slug (*Schizoglossa novoseelandica barrierensis*). At least three introduced snail species are also present, along with various slugs.

The ‘status’ of the native snail populations – whether they are stable or declining – is not known. However, as some species are of very restricted distribution and not capable of rapid movement, they are at risk due to habitat modification. It is likely that we have lost several species from the former mature kauri ecosystems. Rats have almost eliminated large kauri snails elsewhere in Northland.

Summary – Land and Freshwater Invertebrates

- Terrestrial invertebrates include a vast range of microscopic forms, and all the insects, spiders, worms, molluscs and crustaceans that eat vegetation, live in soil, rotting wood and freshwater, or are parasitic on other life-forms.
- There may be as many as 5000 species on Great Barrier Island; over a thousand different terrestrial invertebrates, mostly insects, have been collected recently.
- The *Coleoptera* (beetles and weevils) are represented by at least 462 species, several of which are rare, and one of which (*Lichenobius* sp.) is known only from Great Barrier Island.
- Several groups of invertebrates are clearly under-represented in the Great Barrier Island collections. These include aquatic species, spiders and Lepidoptera (moths).
- At least 78 different species of native land snails have been collected from the Island. There are also several species of introduced land molluscs – garden slugs and snails.
- Rats and introduced birds have almost certainly reduced the populations of some native insects and other invertebrates, but detailed studies are lacking.
- The majority (c. 80%) of the insect species collected so far are thought to be native to New Zealand. However a few aggressive introduced species (ants and wasps) are present.
- Serious invertebrate pests recently occurring on Great Barrier Island include vairoa mites wasps (2 species), and Argentine ants. The latter has been subject to a combined community, Department of Conservation and Auckland Regional Authority programme of eradication, but this has not yet fully succeeded.

i Maddison, P. 2004. Land and Freshwater Invertebrates. In: Armitage, D. 2004 *Great Barrier Island* Pp104-111. Canterbury University Press, Christchurch, New Zealand.

ii Thomas, C.D.; Moller, H.; Plunkett, G.M.; Harris, R.J. 1990. The prevalence of introduced *Vespula vulgaris* wasps in a New Zealand beech forest community. *New Zealand Journal of Ecology* 13: 63-72. Beggs, J.R. Toft, R.J. Malham, J.P., Rees, J.S., Tilley, J.A.V., Moller, H. & Alspach, P. 1998. The difficulty of reducing introduced wasp (*Vespula vulgaris*) populations for conservation gains. *New Zealand Journal of Ecology* 22(1): 55-63.

iii Maddison, P. 2004. Land and Freshwater Invertebrates. In: Armitage, D. 2004 *Great Barrier Island* Pp104-111. Canterbury University Press, Christchurch, New Zealand.

iv Thomas, C.D.; Moller, H.; Plunkett, G.M.; Harris, R.J. 1990. The prevalence of introduced *Vespula vulgaris* wasps in a New Zealand beech forest community. *New Zealand Journal of Ecology* 13: 63-72. Beggs, J.R. Toft, R.J. Malham, J.P., Rees, J.S., Tilley, J.A.V., Moller, H. & Alspach, P. 1998. The difficulty of reducing introduced wasp (*Vespula vulgaris*) populations for conservation gains. *New Zealand Journal of Ecology* 22(1): 55-63.

v Some lists are given in: Preliminary Water Resources Report, Great Barrier Island 1986. Ministry of Works and Development, Water and Soil Division, Auckland.

vi Goulstone, J. F. 1991. Land snails of Great Barrier Island. *Poirirua* 16 (3): 1-11.