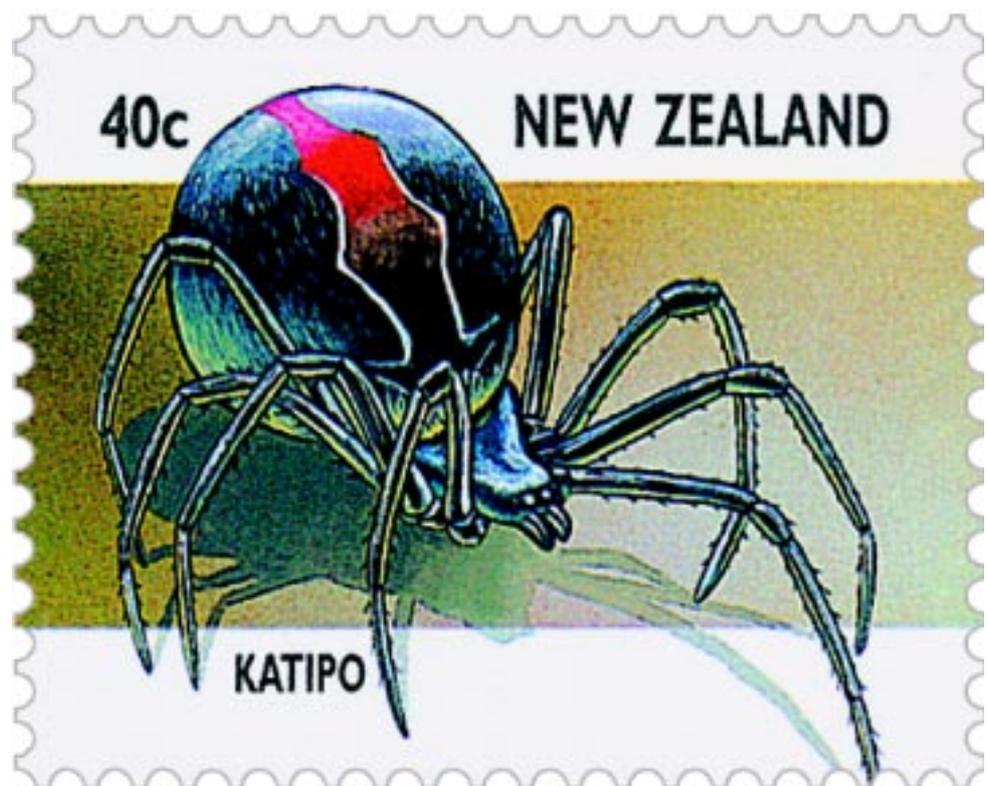


Conservation status of the New Zealand red katipo spider (*Latrodectus katipo* Powell, 1871)

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ABSTRACT

The katipo (*Latrodectus katipo* Powell, 1871) is one of two endemic widow spiders in New Zealand. It is a coastal sand-dune specialist and national invertebrate icon that has suffered a dramatic decline in numbers, contraction in geographical range and population fragmentation. This nationwide survey of the katipo located 26 populations in 90 dune systems sampled of a total of 127 sites visited where it could potentially be found. Details of the 90 dune systems are presented, including the number of adult female spiders found within a standard search time, degree of naturalness of the dunes and location. A survey of sites where katipo had been collected previously, based on specimens in collections, showed that they were present at only 46% of these sites. On the basis of this study, 19 key sites for katipo conservation are proposed.

The katipo is threatened with extinction for a myriad of reasons: the main factors appear to be loss of habitat and declining quality of the remaining habitat. The dramatic changes to its sand-dune habitat following European settlement were due to stock grazing, disturbance and burning, and continue to this day with commercial forestry, recreational use of dune systems and other activities. The subsequent destabilisation of the dunes led to the introduction of marram grass (*Ammophila arenaria*), which continues to displace native sand-binding species. Marram grass can now become so dense that katipo web construction may no longer be possible.

Based on this research, recommendations for the conservation of the katipo are presented. Using the accepted New Zealand invertebrate classification criteria, the katipo is assessed as a Category B threatened species, i.e. a second-priority threatened species.

Keywords: black katipo, distribution, widow spiders, sand-dune

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1. Introduction

1.1 NEW ZEALAND'S ENDEMIC WIDOW SPIDER FAUNA

The katipo (Figs 1, 2) is a widow spider and was formally described as *Latrodectus katipo* by Powell (1871), while Urquhart (1890) described the black katipo, now considered a separate species (*Latrodectus atritus*), as a variety of it. The black katipo is distinguished by the absence of the characteristic red stripe of *L. katipo* and is found only in the northern third of New Zealand.

Over the years, there has been debate on the taxonomy of the 32 species of *Latrodectus* worldwide (Levi 1959; Forster & Forster 1999), and the recognition of two distinct New Zealand species has been no exception (Parrott 1948). Additionally, Urquhart (1887) had mistakenly named the much smaller male of *L. katipo* (Fig. 2) as a separate species, *Theridion melanozantha*. The specific separation of the two New Zealand katipo is now widely accepted pending further examination using molecular techniques (Forster & Forster 1999).

For clarity, in this report I will also refer to the more widespread and familiar red-striped *L. katipo* as red katipo and the wholly black *L. atritus* as black katipo. I propose that red katipo and black katipo are suitable common names for these two spiders.

In the earliest reference to the katipo, Dieffenbach (1843) listed it as a black spider found on the seashore, noting that it was regarded as poisonous. Taylor (1855), in a short list of New Zealand fauna, listed the katipo as the only poisonous spider, describing it as 'black with a red cross on its back'. He also stated that the bite of the female causes immediate inflammation and much pain. The much smaller male does not bite humans (Forster & Forster 1999). According to Buller (1871), the Maori name *katipo* is derived from *kakati*, 'to sting', and *po*, 'the night'—the 'night stinger'. Maori legend records many deaths (Hornabrook 1981), with much of the earliest literature on the katipo published in British and American journals, owing to interest in its potentially fatal bite (Ralph 1857; Wright 1870; Anon. 1873; Meek 1877; Robson 1879; Rey 1887; Karsch 1888; Riley 1889; Pickard-Cambridge 1902). More recently, Hornabrook (1951) lists early records of bites.

The genus *Latrodectus* belongs to the Theridiidae (cobweb spiders), a family of spiders which is represented by a large number of species both in New Zealand and worldwide. Spiders of this family are characterised by untidy webs consisting of only a few sticky threads, and also by the usual presence of a row of curved bristles on the tarsi of the hind pair of legs. This 'comb' has led them to be called the comb-footed spiders, and is used to comb out silk from the spinnerets to cast over prey (Forster & Forster 1999). Although most New Zealand species inhabit forest or shrubland, some of these native species have adapted well to gardens and buildings. Additionally, several species have been accidentally introduced from Australia, Southern Africa and Europe, and have thrived in various habitats here. These aliens include three species that

resemble katipo generally. Firstly, the slightly larger Australian redback (*L. basselli*) has become established since the 1970s and is spreading in mainly dry inland areas of the South Island (Forster & Forster 1999). Secondly, two species of *Steatoda* have become established, doubling the number of species of this genus in New Zealand (Hann 1994). There has been no revision for New Zealand, recent or otherwise, of this diverse family.

Figure 1. A female red katipo (*Latrodectus katipo*) from Karitane Peninsula, Otago. The adult is garden-pea size and is capable of biting humans and administering its potentially deadly poison.



Figure 2. Male red katipo (*Latrodectus katipo*) are about 1/6 the size of the female and resemble juvenile katipo. They are sometimes found at, or close by female retreats.



1.2 HISTORICAL DISTRIBUTION

Although many authors noted that the katipo is confined to the coast, most were unsure of its exact distribution nationwide. Forster & Forster (1999) state that it is found along sandy beaches in both the North and South Islands as far south as Karitane in the east of the South Island, and Greymouth in the west. This stated southern limit of Karitane may be a mistake, or refer to its extant rather than former distribution. Benham (1904) stated that it was not known as far south as Dunedin. Forster (1967), however, illustrated a female from Doctors Point, just north of Dunedin, where it may now be locally extinct. Peat & Patrick (1995) also noted the Doctors Point population as the natural southern limit of red katipo (*L. katipo*). McCutcheon (1976) briefly describes both red katipo and black katipo (*L. atritus*) and describes their distributions nationwide. He notes that the black katipo is found on both the east and west coasts of the North Island, south to Cape Kidnappers and Wanganui, respectively. He notes an overlap in distribution with that of red katipo north of Wanganui to at least New Plymouth.

Sean Hann's nationwide records of *L. katipo* (S. Hann, unpublished data) are based on specimens in collections. These records, although obviously opportunistic, suggest that *L. katipo* has (or had) a scattered distribution in Northland and Auckland Conservancies. The species may now be extinct or extremely rare in these two conservancies, since it has not been seen in either of them recently, despite numerous surveys (Grace Hall, pers. comm.; James Griffiths, pers. comm.). The present observed contraction in the range of *L. katipo* is much more pronounced in the north of New Zealand than in the south. In the South Island, *L. katipo* is still present in dunes north of Karitane, relatively close to its historical southern limit at Doctors Point, Otago. In the northern third of New Zealand, red katipo and black katipo can be sympatric (McCutcheon 1976; Forster & Forster 1999).

Forster & Forster (1999) explained the northern distribution of black katipo following experiments suggesting that black katipo spiderlings and eggs require a temperature of at least 22°C or more for development, whereas those of red katipo require only 17°C or more. This threshold temperature for development helps explain the southern limit of *L. katipo*, but does not explain why it is so rare in northern New Zealand.

1.3 PREVIOUS STUDIES

There have been several detailed studies concerning the life history of *L. katipo*, threats to its existence and conservation issues. These include Smith (1971) at South Brighton Beach in Canterbury, Hann (1990) at Motueka, Nelson, Ward (1998) along the Manawatu-Wanganui coastline and Griffiths in both north and mid-Canterbury (James Griffiths, pers. comm.).

Smith (1971), in a detailed study, found *L. katipo* abundant within a narrow zone 10–30 m from the most seaward clumps of introduced marram grass (*Ammophila arenaria*). Native pingao (*Desmoschoenus spiralis*) was still common at the time of his study, along with marram, with introduced tree lupin

(*Lupinus arboreus*) on the inner edge of the system. He found that *L. katipo* preferred pingao and sparse to medium densities of marram, on sloping ground facing north-west. He also examined 32 webs for prey items and listed the contents, of which a native weevil species (*Cecyropa* sp.) was the most common prey item found.

Hann's (1990) study examined the possible displacement of *L. katipo* by the theridiid spider *Steatoda capensis*, an introduced species from South Africa. He studied the competitive interactions of the two species and concluded that there was indeed evidence of displacement. He found that there was a high degree of overlap in both food and space use, that *S. capensis* had a higher reproductive output, and that it replaces *L. katipo* following population crashes (natural or otherwise) of the latter. Interestingly, he found no evidence of direct displacement due to competition. However, because *S. capensis* is also found inland of the coastal habitat it shares with *L. katipo*, this greater population reservoir, combined with its greater fecundity, generally allows it to recolonise vacant habitat more rapidly than the katipo. Once *S. capensis* has become established as the dominant species, it becomes difficult for the reproductively inferior *L. katipo* to re-establish. Hann ultimately concluded that the disappearance of *L. katipo* in the lower North Island (1975–90) was due to increased human interference along the coastal area, perhaps leading to displacement of the species.

Ward (1998) concluded that *L. katipo* had declined along the Wanganui/Manawatu coastline, but was still present and breeding actively. Although *L. katipo* was unclassified by DOC, she used DOC's priority scoring system and found that it was in Category A—'Highest priority threatened species'. She set up monitoring at five of the seven sites at which red katipo were found.

In addition to the above, there have been various other important studies on both red katipo and black katipo (*L. atritus*). Court (1971), in an elegant paper based on Northland and Auckland individuals, described the web structure of black katipo and graphically showed the method of prey capture. McCutcheon (1976) examined the distribution of the black katipo and found that, on the west coast of the North Island, it extends south to Stony River dunes, south of New Plymouth, Taranaki, and on the east coast to Waipatiki Beach, north of Napier, Hawke's Bay. Meanwhile, Forster & Kingsford (1983) studied the early development of *L. katipo* and found that the smaller males mature after four moults and live from just four to ten weeks. In contrast, they found that the females take six moults to mature and live for up to two years. Forster & Forster (1999) describe the snare of *L. katipo* in detail, pointing out that it is typical of the family worldwide.

1.4 STUDY OBJECTIVES

The aim of the present study was to assess the conservation status of *L. katipo* according to criteria set by DOC (Molloy & Davis 1992; Tisdall et al. 1994) and to make practical recommendations, based on these criteria, that DOC can implement.

2. Survey method

2.1 SAMPLING AREA AND NUMBER OF SITES

Sand dunes were sampled nationwide within the known range of *L. katipo*, to provide a regional context for understanding its current conservation status (Fig. 3). Sites were chosen on the basis of historical presence of katipo (Hann, unpubl. data), and also accessibility for sampling, follow-up of recent records, sampling of likely dunes in Nelson, Marlborough, Canterbury, Otago, Waikato, Hawkes Bay and Wellington conservancies where katipo have not been previously recorded and the need to sample as many parts of each conservancy as possible. In total, 127 sand dunes were visited and assessed. Some of these dune systems, such as the north Kaipara Head dunes, Northland, are very extensive and many sites were sampled along their length. Of these, 90 sites which were within the previously recorded distribution of *L. katipo* were fully sampled on at least one occasion and the resultant data listed (Appendix 1). The remaining 37 sand dunes were either outside of the previously recorded distribution and found to have no red katipo, or they had no katipo in any case and were assessed to be in such a grossly modified state as to be incapable of supporting them. A small number of dune systems were assessed by DOC contractors, Robin Craw or Natasha Fijn (Appendix 1). Additionally, this survey contributed to funding James Griffiths, a student at Lincoln University, who was surveying *L. katipo* in the Canterbury region. His data from nine Canterbury beaches are documented in Table 2.

2.2 SURVEY METHOD

The survey methodology was formulated following consultation with katipo specialists and other spider researchers. It was designed for use by Otago Museum personnel as well as other volunteers and students currently researching *L. katipo*. It had to be a relatively simple method easily replicated by multiple users over a large geographic area. Moreover, the method needed to be time-efficient and safe.

The survey method employed was as follows:

- First, apparently suitable sandy habitat (of at least 10 m distance between the sea and inward extent) was examined to ascertain the presence or absence of *L. katipo* or its relatives, in order that the survey target the appropriate sites within the dune system. Apparently suitable habitat that had few, if any, katipo was also measured as a comparison. Highly modified (with little or no vegetation and/or high human usage) sites were not normally measured after initial examination. As the sites are reasonably fragile, it was important to ensure that the site to be measured was free of other human disturbance while being measured as this could disturb the site sufficiently to alter the results. The observer had to wear gloves for safety reasons.

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