Case study prepared for ecological management unit
Ecological Principles and Processes
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Establishing a survey for the great New Zealand katipo spider *Latrodectus katipo* on Motupipi sand spit, Golden Bay

Carried out on the 25/11/05

Published by
Department of conservation
Golden Bay Area Office

Contents

1. Introduction:

The *Latrodectus katipo* is New Zealand's only native poisonous spider yet most New Zealanders have never seen them let alone been bitten by one. Ironically, this unique spider is threatened with extinction. There are only two endemic widow spiders found in New Zealand the red katipo *Latrodectus katipo,* and the other is the black katipo *Latrodectus atritus* only found in the northern third of New Zealand. The *L atritus* is very similar to the true katipo except it is lacking the red stripe. The genus *Latrodectus* belongs to the Theridiidae family spiders of this family are characterised by their untidy webs consisting of only a few threads. They are cobweb spiders also to known as comb-footed spiders[1]. Whether admired or feared Katipo is one of the two widow spider species that is native and endemic to New Zealand 'found nowhere else in the world.

The katipo is assessing category B on the threatened species list i.e. a second-priority of threatened species. People have feared the great Katipo and instantly do not like them because of its high potency venom. This is understandable as it is the only native spider known to have killed people. Two people died in the 19th century. The katipo has acquired a fearsome reputation but only the female is able to penetrate human skin to deliver its venom[1].

Figure 1

Here is a male *Latrodectus katipo* spider. It is only one-sixth the size of the adult female[1]. Careful searching resulted in a female 40cm away from him. Males mature after four moults and live from just four to ten weeks.

1.2. Distribution in New Zealand

Its habitat has been lost or grossly modified and or impacted on forcing its distribution to become largely fragmented. It is clear that *Latrodectus katipo* has suffered a dramatic reduction nationwide, in both numbers and distribution[7]. Occasionally referred to as true katipo it is established along sandy beaches in both North and South Islands. However, *L* katipo is rare or extinct in the north of the North Island and sparse in the south of the South Island[12]. It does not extend further south than Karitane on the east coast of the south island and Grey mouth on the west coast. The black katipo absent of the south Island it is restricted to the northern third of the north Island[2]. Forster & Forster[1] explained the northern distribution of black katipo following experiments suggesting that black katipo spiderlings and egg sacks require a temperature of at least 22^{0}C or more for development, whereas those of red katipo require only 17^{0}C or more. This threshold temperature for development helps to explain the southern limit of *L katipo,* but does not explain why it is so rare in the northern New Zealand. People are growing and spreading out to more remote destinations and unfortunately people want to live on the coast where the katipo live they are strictly coastal specialists found in a variety of sand dune systems.

Figure 2

This is the female *L. katipo* found in the native pingao grass. She is about the size of a pea 25mm in total[5]. Her overall colour is black. With a more distinctive hour-glass red patch on the underside of the abdomen. A prominent red stripe on the upper dorsal surface the red stripe is framed by a white boarder this can be more distinctive in some spiders. Females take six moults to mature and live for up to two years[1].

2. Aims:

- Main objective is to count:

- katipo adult male/female egg sacks
- juvenile plus any
- *Steatoda carpensis.* present.

- To make practical recommendations to help preserve this threatened species.

- To measure the total abundance of katipo within the core area

- To identify the vegetation cover favoured by katipo .

- Assess the conservation status of *L.* katipo.

- To see if management of the enclosure has increased or decreased the number of katipo

3. Method:

To measure total abundance of the given area the random method was used. Myself and three other staff measured 100m horizontal along the edge of the fenced area facing north another tape 30m along the eastern side of the enclosure. We had a random sheet of numbers and by multiplying (x) by 20 to give a random figure to measure our searching area. Example 0.72x20=14.4m we would use that figure to measure the core area into the enclosure. (Grid reference 977-416).

For the other side it same again with a random figure to measure. Four People did 10 plots each, with a random location and a peg pushed into the ground with a one-meter string attached to the peg, searching the area within the space provided. Once we got into a rhythm, it worked well. Numbers of katipo were recorded so were egg sacks percentage of cover e.g., such as bare sand, pingao, spinfex, marram driftwood and other were visually accessed. The abundance of *Steatoda. Capensis* was recorded to see if there is any evidence of competitive displacement and there interactions.

4. Results and Discussion:

This study was carried out on little Motupipi sand spit as part of an on going survey to measure the total abundance of katipo in the enclosure. Furthermore to see if management of marram has increased or decreased the number of katipo. In addition, to see if *Sterotoda carpensis* is present and what effect it has on katipo. This is the first survey done on Motupipi sand spit in the area of the enclosure. So therefore, there is no data to compare results. The main objective of this survey is to make practical recommendations to help preserve this threatened species.

Figure 3

Motupipi sand spit is a unique and productive inlet the red square indicates the area of the enclosure where the survey was carried out.

4.1 The site

Located in the Motupipi district this unique site is in close proximity to human settlement with a golf course situated east of the enclosure. West of the site is a natural boundary where the Motupipi river mouth encounters the sea separating the site from human settlement. North of it is Golden Bay Tasman Sea looking towards farewell spit directly south of that is a small but productive inlet, which inhabits a number of living flora and fauna. Grid reference 977-416 this site has been fence with wire netting to help with the survival of Pingao and spinifex plantings. The enclosure is two hundred meters by two hundred meters and was put in place with the help of Department of Conservation and the community with a eagerness to see our great NZ grasses on our shores once again as it is not a common grass on New Zealand coasts any more.

The introduced marram grass is out competing our endemic native grasses 'so much in fact that they are in serious decline. With the control of marram by spraying in and around the fenced area. The results are very rewarding' communities that get involved in this restoration work become aware of the importance about the state of New Zealand's coastal environment. It is very rewarding and good education for the up and coming generations.

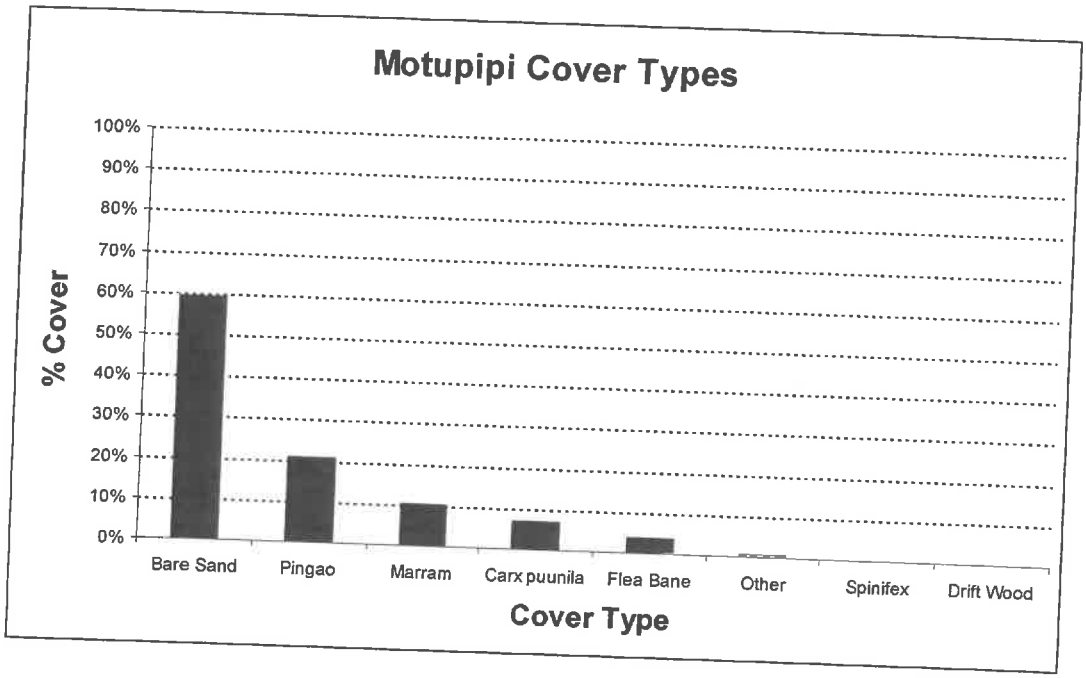

Figure 4
Bar graph indicating vegetation, and cover type in the plot where the katipo were found in the enclosure.

4.2 Katipo Habitat

Katipo are strictly coastal specialists found in a variety of sand dune systems associated with driftwood vegetation such as pingao, sparse marram, rubbish or even stones. Katipo have been found associated with dunes several kilometres from sea, where these extend inland for considerable distances[9]. Both red and black katipo generally live on the landward side of dunes closet to the coast. Here they are sheltered from the moist violent extremes of storms and sand movement. They usually inhabit the foremost dunes, which are usually foredunes or developing foredunes[10]. However, on eroding coasts or on coasts where foredunes are unable to form, this habitat may be another type. Where both foredunes and developing foredunes are present, they are separated by a depression termed swale. Red and black katipo may also inhabit this swale.

The plight of *L.* katipo epitomises the predicament of much of New Zealand's sand dunes and their faunal inhabitants. Sand dunes are Aeolian (wind formed) landforms, composed of small grains of various minerals such as quartzs. They are a feature of 1100km of New Zealand coastline[10] covering approximately 39 000ha[4,10] (Hilton et al.2000) Hesp (2000) clarifies the form, function and origin of sand dunes in the New Zealand context. In doing so, he has also described sand-dune dynamics and clarified terminology. Sand dunes are extreme environments where the inhabitants have to combat incessant winds and drifting sand, together with extremes of dryness and temperature[4,10]. Red katipo survive in dunes by placing their snares off the sand substrate and hidden amongst dense vegetation or dead driftwood[4,10].

Nationwide, New Zealand's coastal sand dunes are under tremendous pressure from forestry, farming and recreation[4]. This pressure follows over a centaury of dramatic change of the form, composition and extent of New Zealand's sand dunes following European settlement (Hilton et al 2000)[4]. calculated that the area of the coastal sand dunes has declined from 129 000 ha in 1900 by 70% to 38 700 ha. Regions such as Northland, Auckland and the Manawatu, which had the largest areas of active sand dunes, have also experienced the largest decline. Large-scale modification of the dunes begin with European farming practices of fire and grazing. These activities led to widespread destabilisation[4].

In near-natural dune systems, red katipo were found amongst a variety of plants and substrates. Low growing native scrubs were a favourite site for their snares[11]. During the present study, red katipo were established within marram grass (*Ammophila arenaria.)* Pingao *Desmoschoenus spiralis* surrounding vegetation was spinifex *Spinifex sericeu)* Fleablane *conyza albida Carex pumila* Tree lupin. Katipo can be extreamly difficuled to locate in such natural situations, so data collection records will probably underestimate their actual abundance and extent.

5. Species Interactions

There is only one known direct predator towards the katipo. A tiny and undescribed species of native wasp genus belonging to the family *Icheumonidae.* Known in Maori as ngaro whiore ('tailed fly') Giant *Ichneumonid* (figure 4) is New Zealand's largest native wasp commonly found in beech forest. They are slender, usually with a long thread like waist and long antennae which quivers nervously all the time. Her antenna's are so sensitive that she can use them to detect and identify a host larvae even when it is hidden deep in wood. The female lays her eggs in the katipo egg masses and the larvae of other insects such as grubs or elephant weevils. Her egg-laying spike (ovipositor) is extraordinarily long but surprisingly strong in order to drill through wood down to depths at which theses grubs and larvae live. These parasitic wasps do not live in colonies they are like hunting wasps. When the eggs hatch, the wasp larvae eat their host, starting out with the non-vital bits[13].

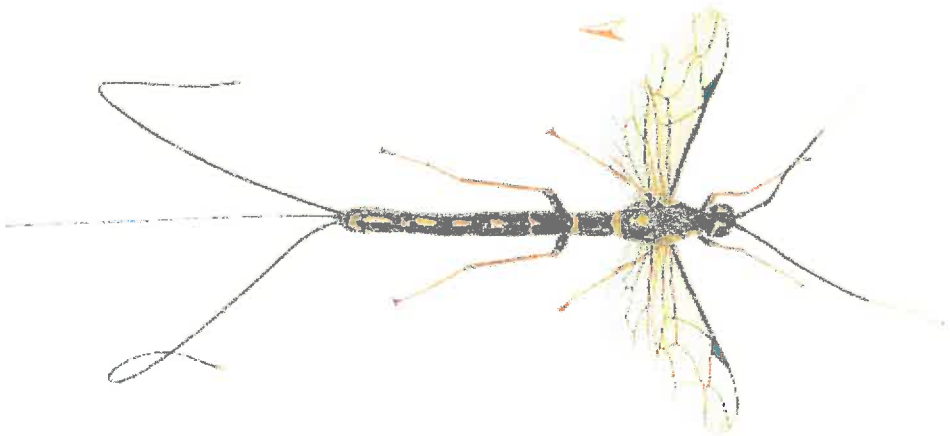

Figure 4

Here is a female ngaaro whiore they are slender usually with a long thread-like waist and long antennae which quivers nervously all the time. Many of the females have a long spike at the back for laying eggs in the larvae of other insects in this case the katipo egg masses. Her egg-laying tail spike (ovipositor) is so strong that she can use it to drill through hard wood to reach the host and inject her eggs. When the eggs hatch, the wasp larvae eat their host starting out with the non-vital bit[13].

6. False katipo (Steatoda capensis)

The other threat that is hindering this species is the introduced though' *Steatoda capensis* is frequently mistaken for the katipo and as a result is often called the false katipo. This spider is believed to be responsible for displacing the katipo along the Wellington to Wanganui coast[7]. Though this species does not harm the katipo directly It is found on many beaches where it may share a similar habitat to the katipo. *Steatoda capensis* lives in the same habitat preys on the same food and has twice the sex drive[5]. It is believed to be seriously impacting on the katipo[5].

Figure 5
The introduced *Steatoda capensis* from South Africa found in the native Pingao grass. Other wise known as the false katipo is widely spread throughout New Zealand's shores. The black abdomen of the *Steatoda capensis* is a lot shinier, and the occasional splash of red or orange colour at the back of the abdomen that leads to this frequently mistaken identity. The relationship between each other is competition as they both compete for the same food putting a strain on resources[5].

7. Introduced Marram grass (*Ammophila arenaria)*

Introduced from Europe, marram grass has become an important sand binder along coastal dunes. It is now seen as most useful in stabilising large areas of loose sand. Indeed, it will only grow in shifting sand; it has bamboo like underground stems climbing up when buried by continually sending out new leaves and roots[6]. In this way, marram grass extends to form a huge network of very fine tough roots extending up to four meters across and a meter deep. Binding the sand and allowing some plants to be established. Without much binding a dune can wander inland as a great moving mound, covering everything in its path, including railway lines roads and farmland. It is an extremely hardy plant, very fast growing,' rarely eaten by stock and easy to propagate[1,3]. This suggests that these changes to dune habitat occurred soon after European settlement commenced.

Mar ram can quite easily get out of control, therefore competes with native plants such as pingao. This is a problem more apparent down south, where the climate is cooler and mar ram more aggressive. Although sparse marram can provide a habitat for katipo, dense marram is associated with their absence[6]. Hence, owing to the almost ubiquitous presence of marram is its ability to change drastically the form and composition of New Zealand dunes systems. Control of marram *Ammophila arenaria* has shown an increase in sand dunes indicating that marram stops or slows the erosion process by stabilising large areas of loose sand. The katipo is threatened with extinction in highly modified systems.

8. Human Impact and Restoration

Due to human settlement, its habitat has been lost or grossly modified and or impacted on forcing its distribution to become highly fragmented[2]. There is a rapid decline in Katipo with only a few vital locations left In N.Z such as the famous Kahurangi Point Farewell Spit, Cape Campbell, and Marlborough in this study it was little Motupipi sand spit in Golden Bay[2]. People are growing and spreading out to more and more remote destinations and unfortunately, people want to live on the coast where the katipo live. They are strictly coastal specialists found in a variety of sand dune systems with driftwood, vegetation such as pingao, stones and even found in rubbish[1].

Nationwide, New Zealand's costal sand dunes are under tremendous pressure from forestry, farming 'recreation and human settlement[4]. Humans are growing spreading out to more remote locations invading the katipo's habitat forcing them to relocate new homes[1,6]. Katipo also utilise driftwood and stones in modified dunes, but the previous is commonly, collected for firewood by people living or recreating nearby, and may be scarce as a result[5]. Given the lack of near-natural dunes remaining in New Zealand, it is indeed fortunate that red katipo can survive in semi-natural to highly modified dune systems. They have struggled to adapt to their modified habitat created by human settlement[1,6].

9. Acknowledgements:

I thank Mike Ogel Guided me along with this project and for giving me the chance to perfom this work. Selina Brown confirmed identification *Steatoda capensis* helped carried out sampling method and how to use equipment. Ken Brown helped with excel data input formating. John Taylor for encouragement, pressure and moral support. all (Department of Conservation Golden Bay area Office)

Mike Ogle
Method Katipo report

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