6.
PULLING NATURE BACK FROM THE BRINK
INTERWEAVING CULTURE, SCIENCE, POETRY AND *SPORADANTHUS*

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Ki te kotahi te kaakaho ka whati, ki te kaapuia e kore e whati

When reeds stand alone they are vulnerable, but together they are unbreakable

Kiingi Taawhiao (Waikato)

It's difficult to imagine the impact that the potential loss of *Sporadanthus ferrugineus* would have had on the overall health and well-being of Te Awa o Waikato, particularly in the eastern and more southern areas of the lower catchment. For this reason, we want to mihi to our tupuna awa. We also acknowledge the hapuu of the lower Waikato who suffered immeasurable losses to their practices and environmental knowledge as a result of this plant and its associated ecosystems almost being completely decimated. We cannot turn back time, but we can do our best to better facilitate the reinvigoration of memory and connection. We hope this chapter provides renewed interest and support of this valuable peatland taonga.

– Ngaa mihi, naa Julian maatou ko Beverley, ko Corinne, ko Robert

SPORADANTHUS: THE PLANT THAT WAS AND THEN ALMOST WASN'T

If you've ever had the chance to wander through Lake Rotopiko, a peat lake located in the Waikato region, you may be in awe of the stunning remnant kahikatea (*Dacrycarpus dacrydioides*) stands, or of the swathes of sphagnum moss interspersed with obscure native grasses like swamp millet (*Isachne globosa*). As well, there are slowly expanding dense swards of tall, rush-like plants called *Sporadanthus ferrugineus,* also known as bamboo rush, giant wire rush, or cane rush.

Previous page: *Sporadanthus ferrugineus*, Kopuatai Peat Dome, Waikato. Photo: Beverley Clarkson

Sporadanthus ferrugineus population at Lake Rotopiko, Waikato. Photo: Beverley Clarkson

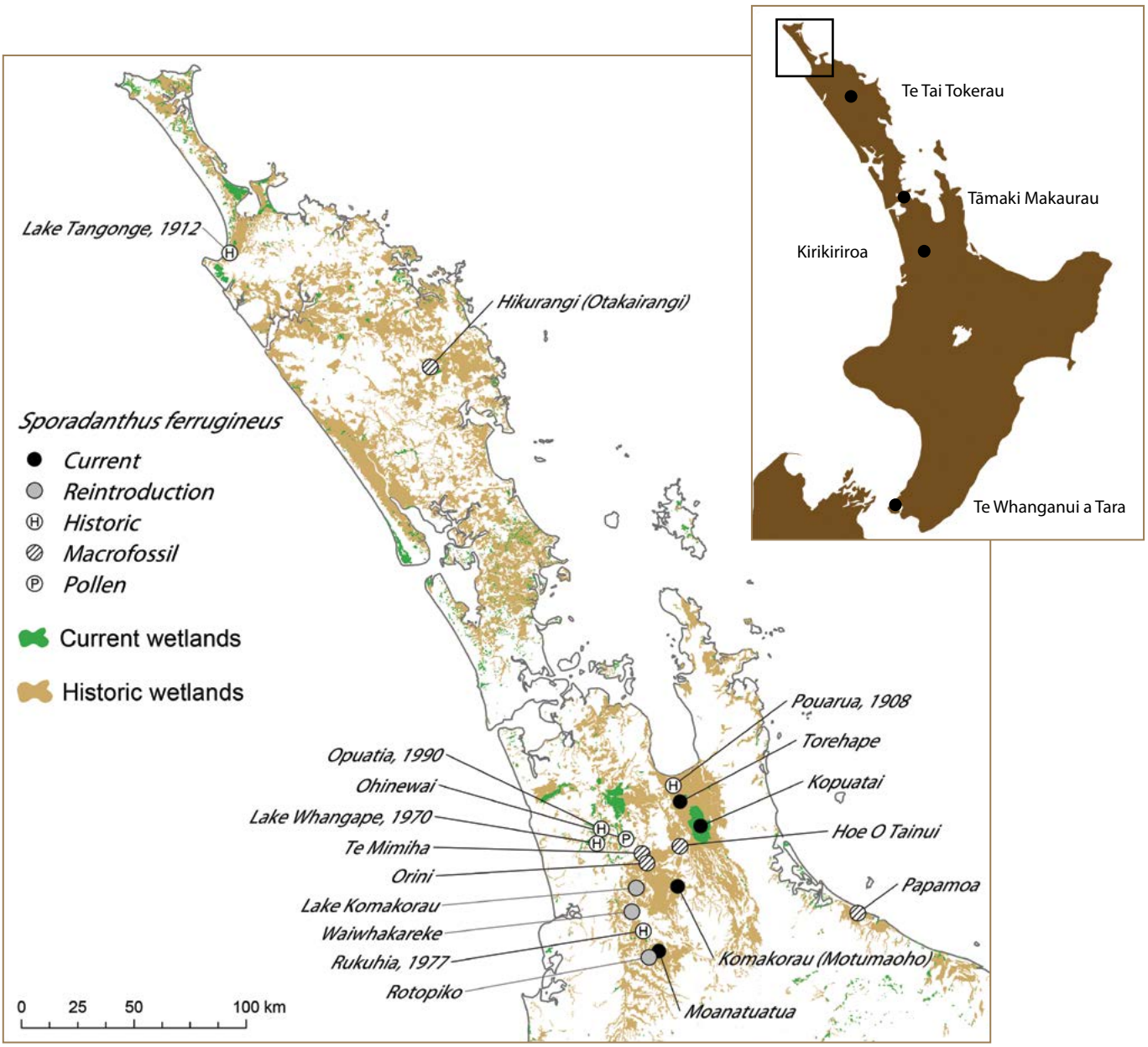


Figure 1. Map of historic (1840) and current (2008) records of *Sporadanthus ferrugineus* in New Zealand.
Adapted from de Lange et al. 1999, Manaaki Whenua – Landcare Research

Sporadanthus ferrugineus once dominated more than 100,000 ha of northern North Island (Fig.1), including the Waikato region from Ohinewai – Hoe o Tainui – Pouarua in the north, to Moanatuatua in the south. With such a large expanse of this unique plant featured across the Waikato peatscapes, it would have been well known – at least to local hapuu (sub-tribes) and whaanau (families). However, there's a familiar sad tone to the story of *Sporadanthus*, as there is for a number of our indigenous and endemic wetland plant species.

Late 19th Century, in the wake of Raupatu (land confiscation throughout the Waikato) suffered by Waikato peoples, *Sporadanthus* rapidly disappeared from the landscape following extensive wetland draining and agricultural conversion. Today, little more than 3000 ha – only a fraction of the original extent (3%) now remains. It is currently listed as a threatened species – at risk and relict – by the Department of Conservation, which means it is confined to very few fragments, all in the Waikato region.

Along with the loss of *Sporadanthus*, potentially a huge body of knowledge, including the ingoa (names), whakapapa (connections), and tikanga (customary values and practices) associated with the plant seem to have also disappeared. We have not been able to locate any maatauranga (knowledge) about *Sporadanthus* or the traditional relationship with hau kaainga (local people). Such is the sad reality of native plant species loss – when they disappear, ecosystems steadily disappear, whakapapa is fractured, and the kaumaatua (elders) who remembered it eventually pass away.

COLLABORATIVE EFFORT TO BUILD KNOWLEDGE OF A DECLINING PLANT

This chapter is a collaboration between a diverse range of people with an interest in *Sporadanthus* and its valuable ecosystem. Our team comprises tangata whenua affiliated with the traditional lands and natural resources with historic *Sporadanthus*-dominated peatlands; ecologists who have studied the unique wetland ecosystem including plants and invertebrates; a scientist with a particular fondness for poems, and a very special skinny caterpillar.

In coming together, we do so as woven strands of a kete (harakeke basket) or even as a kaakahu (a form of cloak woven from the fibres of harakeke) to surround, protect, and enhance the little understanding we have of this intriguing plant. We use the best available knowledge, tools and experience at our collective disposal to share this message. As a result, we share everything we know in this chapter – cultural memories and clues; scientific and technical information; imagery; experience of our experimental plots and monitoring in the Waikato, and even poetry.

We have only just started to 'weave this kaakahu'. We hope that our readers and next generation of indigenous knowledge holders, orators and scientists – along with our fellow non-Maaori scientists and poets – will keep building on, and eventually help us complete this precious garment of a plant that 'almost wasn't'.

Sporadanthus ferrugineus also known as bamboo rush, giant wire rush, or cane rush. Photo: Beverley Clarkson

HE AHA TE INGOA I TUKU IHO O TE TAONGA NEI? REDISCOVERING PIECES OF THE JIGSAW PUZZLE OF WAIKATO PEATLANDS

Sporadanthus ferrugineus is a remarkable plant from raised peat bogs in northern Aotearoa New Zealand – it survives solely in ultra-low nutrient rainwater, instead of nutrient-rich ground water (like most other plants). Early botanists commented on its immense abundance in the Waikato, as it stretched to the horizon in a smooth waving field of brown tasselly tops – the description of the scientific name *ferrugineus* (rust-coloured) refers to.

There have been previous names for *Sporadanthus ferrugineus* in the botanical literature: *Calorophus* sp., *Lepyrodia traversii*, and *Sporadanthus traversii*. Originally, the North Island species was thought to be the same as *Sporadanthus traversii*, which is widespread in bogs on Rekohu Chatham Island. However, in 1999, taxonomic and ecological investigations revealed two distinct species, each endemic (confined) to these botanical regions. This means that instead of one larger population of the same species spread across two locations, we have two smaller but separate populations of related plants. This difference is important to ensure the two species are not mixed in restoration projects, thus maintaining ecological integrity of each population.

Through a mix of historical records, maps of wetland extent and land use changes over time, pollen analyses, and study of wetland ecology and processes, we can start to assemble a rough picture of what has and is happening to *Sporadanthus*. These tools allow us to quantify impacts to the plants and restoration success which, when combined, can be used to build plans and strategies to enhance the health and well-being of *Sporadanthus*-dominated wetlands. However, there are elements within the wider narrative of *Sporadanthus* and peat wetland systems that are not as easy to measure; such as the human component.

Sporadanthus ferrugineus rust coloured flower heads (tassels). Photo: Beverley Clarkson

The interactions between human communities, species and ecosystems are important for understanding the wider wetland story. However, these stories usually only start at European settlement in the early 19th Century, resulting in centuries long gaps in knowledge. Recognising these gaps enables us to understand the profound cultural and ecological disruption resulting from European settlement. Events like the large-scale Raupatu throughout the Waikato facilitated the suppression of knowledge, until, in some cases, it was then 'lost'.

The impact of lost land and lost cultural knowledge is hard to measure. It is difficult to put a number or data set to something when we are not sure where the actual start point was. These are some of the realities that we now face in wetland restoration: we are not just trying to physically restore these valuable ecosystems, but also to find ways to restore knowledge that, although 'lost' at the moment, is just (we hope), waiting for the right trigger to help it resurface.

Slowly, but increasingly, the traditional names and descriptions given to native plant species by hapuu and iwi, are valued as more than just a name. Embedded within these names are narratives describing anything from the origin of the species, to its wider whakapapa and ecology, its use by the hau kaainga, and events or people that it may be associated with. In researching *Sporadanthus,* we quickly discovered that its names, as understood by Waikato peoples, are difficult to locate. Finding a name may not seem that important, but when the narratives embedded in the name of the species as discussed, its absence raises questions:

- What are we (Maaori and non-Maaori) losing in our understanding of plant species, and even peatlands, by not knowing its names as given by tuupuna?
- How can we bring back its names?
- But more importantly, who should be tasked with reviving plant species names given by tuupuna?

We conclude that a plant's name can only be revealed to its people when it wants to. We wish to share our experiences in the meantime to provide some background for interested whaanau.

Throughout the wetland handbook series, contributors have used the general name of 'wiiwii', which is a kupu Maaori (Maaori word) we recognise for encompassing several rushes and rush-like plants, typical of wetlands throughout the motu (country). However, we cannot say for certain that this is a name that should necessarily continue to be used to describe *Sporadanthus* within Te Ao Maaori or botany.

Examples of other rushes referred to as wiiwii by hau kaainga include:

- *Juncus* species, e.g. our native species such as *Juncus pallidus* and *J. edgariae*; but note that our people do use the same name to refer to exotic species;
- Sometimes oioi *(Apodasmia similis*) can also be referred to as wiiwii;
- *Machaerina* species, e.g. *M. articulata* (*Machaerina* was formerly known as *Baumea*).

In our investigations, we have come across two additional names for *Sporadanthus*: whatipuu and kaho, but the original sources have not been verified and we are also unsure about the dialectal origins.

Juncus edgariae. Photo: Beverley Clarkson

Oioi. Photo: Beverley Clarkson

Machaerina articulata. Photo: Beverley Clarkson

Whatipuu could well refer to the visual display of the vegetation type in the landscape, reflecting the vast brown fields of robust, flexible stems swaying in the wind. 'Whati' might refer to the way the plants bend or move. It could also be in the context of 'break', given *Sporadanthus*, as a member of the jointed 'rush' family (Restionaceae), has stems which break easily at the joints, especially when dry. The 'puu' might refer to their clumping growth form, or could be related to the sound of the stem breaking. With whatipuu in mind, it is possible that the plant could have been useful for thatching, or packing and insulation of whare, similar to the uses of raupoo (*Typha orientalis*).

Kaho can refer to the description of the horizontal batten of tukutuku panels (ornamental lattice-work seen in meeting houses), and so tends to be associated more with the culms of toetoe (*Austroderia* spp.). Toetoe have a very similar tussock-like growth form to *Sporadanthus*, and, considering the depth of observational skills and botanical knowledge of our tuupuna, it is possible the name could have been used as a descriptor, or as part of a traditional classification system.

As highlighted here, however, the challenges of losing plant species – even if we find them again – generate a larger set of complications for our understanding of wetlands, especially when key knowledge systems like those of tangata whenua (Indigenous people) are missing in the broader picture.

Sporadanthus ferrugineus flower head and jointed stems. Photo: Beverley Clarkson

Toetoe. Photo: © Neil Fitzgerald

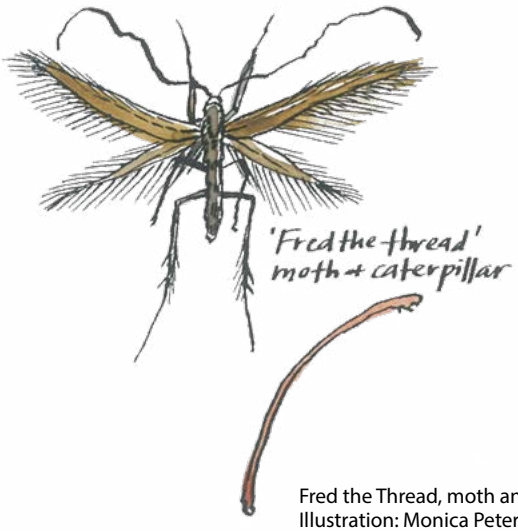
Monitoring reconstructed populations of *Sporadanthus ferrugineus* at Lake Rotopiko, Waipaa district. Photo: Supplied by Beverley Clarkson

HOW *SPORADANTHUS* PEATLANDS ARE BEING RESTORED IN THE WAIKATO AND FINDING 'FRED THE THREAD'

This next section outlines how we are developing our scientific knowledge of *Sporadanthus* and explores the caterpillar/moth associated with it. There are three sites where populations of *Sporadanthus* were reintroduced as part of wider lake catchment restoration initiatives. Sites are adjacent to Lake Rotopiko (Waipaa district), Lake Komakorau (Waikato district) and in the Waiwhakareke Natural Heritage Park (Hamilton city). All reintroductions occurred between 2006 and 2008 using young *Sporadanthus* plants sourced from a peat mine at Torehape on the Hauraki Plains (Fig.1).

One of the unique features of *Sporadanthus* is that it's home to 'Fred the Thread' (*Houdinia flexilissima*), an endemic moth whose larvae are reputed to be the world's skinniest (i.e. thread-like) caterpillar. The moth is also classified as threatened - just as its host plant is. The caterpillar is found only inside *Sporadanthus* stems and in no other plants. 'Fred' is now apparently well-established and thriving at all three reintroduced population sites, indicating the larvae would have been translocated inside the original *Sporadanthus* plants sourced from the peat mine.

Propagation of *Sporadanthus* through sowing seed or transplanting young plants is relatively easy, enabling re-establishment in areas where it once grew, and also for constructing new populations for cultural or educational purposes. Lake Komakorau, Waikato. Photo: Beverley Clarkson



Fred the Thread, moth and caterpillar. Illustration: Monica Peters

Once upon a peatland – Memories of Fred

The story of Fred's discovery begins with the research relationship between researcher Corinne Watts and the plant *Sporadanthus*. While studying the stems at Torehape Peat Dome (Hauraki District) in 2003, Corinne chanced upon squiggly lines decorating the stems and wondered which artist might be responsible. Opening up stem after stem, she discovered amazingly thin, long thread-like larvae (caterpillars) of a reddish orange colour, and the legend of **'Fred the Thread'** was born. Fred has no legs, but he does have a hinged head-capsule that allow him to eat his way along the inside the *Sporadanthus* stem.

No entomologist (a person who studies insects) could work out to what type of insect the Fred larvae belonged. Lepidopterists (a person who studies butterflies and moths) thought they were Coleoptera (beetles); coleopterists (a person who studies beetles) thought they were Diptera (flies); and no dipterists (a person who studies flies) could be found to comment. Eventually Corinne and a lepidopterist colleague, Robert Hoare, reared the larva through to adulthood, and lo and behold, they were indeed moths (Lepidoptera)!

'Fred the Thread' was named *Houdinia flexilissima* – after its remarkable escape from the tight confines of the *Sporadanthus* stem (named after the Great Harry Houdini, escape artist and magician of the late 19th century), and its very thin flexible larva.

FRED THE THREAD

A poem by Robert Hoare

I have a friend (his name is Fred)
He's thinner than a cotton thread
His colour is an orange-red
He doesn't feed on jam or bread
But *Sporadanthus* stems instead.
Such narrow tunnels must he tread
He needs a hinge inside his head
To give his jaws the room to shred
The food that is his home and bed
And stop himself from dropping dead.

Now when our friend is fully fed
And knows the time has come to shed
His final skin, a sense of dread
Begins to filter into Fred:
How fast, he thinks, the time has sped!
And what a sheltered life he's led!
He hopes he'll have some outdoor cred
And won't be thought of as inbred.
He sloughs his skin from A to Zed
And there's a pupa in his stead!

Three weeks have passed, and it's incred-
ible to see the adult Fred,
A mothy person born and bred
To look like that on which he's fed.
He shows an admirable ded-
…ication to his art, his sed-
…entary posture leaving ed-
…ucated mothmen ruby-red,
The effort of locating Fred
Causing a rush of blood to head
Resulting in potential med-
…ical emergency and bed
With cooling drink and favourite ted*
Until delirium has fled.

To summarize, he's Fred the Thread,
He's red and has a hingèd head
His head is used to shred his bed,
His bed's the food on which he's fed,
His bed is red and I am led
To think the redness of the Fred
Reflects the bedness of the red
I mean the redness of the bed
The bed he shreddeth with his head
Until the Fred is fully fed
And sheds the skin he has to shed
To flee the bed that must be fled
To lead the life that must be led
To woo the wife that must be wed
To father further Freds of Thread.
Then Fred can smile and drop down dead.
I've said the things I wanted said.

*teddy bear

Fred the Thread is thought to be the world's thinnest caterpillar with a width of up to only 0.9 mm! The caterpillar, pupa and body of the moth are all a distinctive pinkish orange colour, similar to the culms of the *Sporadanthus* stems. The caterpillars hatch from small oval eggs into the stem creating star-shaped or squiggly lines as they feed and the moths rest along the length of the stems. Photos: Birgit Rhode, Manaaki Whenua and © Neil Fitzgerald

WHAT WE CAN DO TO HELP BUILD OUR KNOWLEDGE OF OUR PEATLANDS, AND PLANTS LIKE *SPORADANTHUS*

- **Investigate old maps to see what kinds of wetlands may have existed around your marae, papakaainga, and wider rohe**

  Maps of past and present wetland extent (area) and types can be sourced from Manaaki Whenua, Taihoro Nukurangi (NIWA), Te Papa Atawhai (Department of Conservation), or your local councils. Be sure to ask for maps or information that can help you identify the wetland types. This information is important for understanding the different, and often unique kinds of plants, birds, insects or fish that live in those places, and will also help with gathering your own maatauranga about them.

- **Gather images of the plants, fish and animals associated with the wetland types found in your areas – especially the rare/uncommon ones**

  Maaori names of plants and animals (if they can be found) do not always capture regional and local dialects specific to your hapuu. Getting photos will help trigger memories for whaanau and so may help identify the names and tikanga associated with those species. If possible, try to get live samples of plants from your local nursery to help make the connection more real.

- **Koorero with kaumaatua (elders) and whaanau about the types of spaces that used to exist around your marae**

  When you are able to get the props mentioned above – maps, images, and real plants, dedicate some time to sit down with your whaanau and kaumaatua to talk through what your local environment used to look like. Be sure to talk about the smells, the sounds, as well as the things seen. Our senses can tell us a lot about what was going on, including the abundance of life found in those places, and also give clues as to what you might want to investigate further as a whaanau.

HELPFUL GLOSSARY

Understanding the terminology

Coleoptera – the order (group) of insects known as beetles; this is the largest order of animals on earth

Coleopterist – a person who studies or collects beetles

Diptera – a large order (group) of two-winged insects, also known as true flies; includes mosquitoes

Dipterist – a person who studies or collects true flies, including mosquitoes

Entomologist – a person who studies or collects insects

Larva – juvenile form of insect, e.g. caterpillar. Plural is larvae

Lepidoptera – the order (group) of insects that includes butterflies and moths

Lepidopterist – a person who studies or collects butterflies and moths

WANT TO LEARN MORE?

Note: If you are having problems with the hyperlinks below try copying and pasting the web address into your browser search bar.

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Useful Websites

Find out more about Fred the Thread
Fred the Thread – A poem

https://www.sciencelearn.org.nz/videos/752-fred-the-thread

https://www.rnz.co.nz/national/programmes/afternoons/audio/201823458/critter-of-the-week-fred-the-thread

https://www.abc.net.au/science/news/stories/2006/1767096.htm

Lake Rotopiko – The Serpentine Lakes complex
https://www.wetlandtrust.org.nz/wp-content/uploads/2019/10/Rotopiko-Brochure-Jul-2013.pdf

Wetlands in the Waikato
https://www.wetlandtrust.org.nz/wp-content/uploads/2018/11/Waikato_wetlands_to_visit.pdf

Wetlands and tuna – A story that needs telling
https://tuna.conference.maori.nz/assets/Uploads/ba6ab0208a/Cheri-van-Schravendijk-Goodman.pdf

WhenuaViz – Whenua Māori Visualisation Tool
https://whenuaviz.landcareresearch.co.nz

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