

A *Schoenus carsei* survey of Maitahi Scientific Reserve, Dargaville

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Introduction

This article summarises notes and plants of interest found during the surveys for the Threatened – Nationally Critical sedge *Schoenus carsei* (Cyperaceae) (see Appendix 1), undertaken for the Department of Conservation Dargaville office under the 'Species on the Brink' funding. A survey to relocate and record this sedge species was carried out on 2-4 February 2023.

Conservation Status assessment (de Lange et al. 2018a) is a tool used to categorise the threat status of plants. These categories include Threatened, At Risk-Declining and Data Deficient. Data Deficient means that a species may be either Threatened or At Risk but there is a lack of current information about its distribution and abundance (de Lange et al. 2018a). This assessment and the Ecological District report for Kaipara were used for plant threat assessments (Smale et al. 2009). Similar assessments are used on lichens and liverworts (de Lange et al. 2018b; de Lange et al. 2020).

Results: Maitahi Wetland Scientific Reserve

Maitahi is a wetland of regional and national significance (Fig. 1) located North of Dargaville. It is

the largest gumland (230 ha) left in southern Northland and forms part of the Kaipara catchment (Smale et al. 2009) and includes freshwater wetlands which are also regionally significant. Maitahi offers a diversity of habitat and successional types and is mesic to early oligotrophic in fertility. This, along with its large size, provides a scarce wetland type (Peter de Lange, unpublished notes). These wetland complexes have yet to be dated with confidence but are thought to be very young. The rare plants found during these surveys highlight the importance of Maitahi, not just at a regional scale but a national one. Maitahi is a stronghold for many threatened species. The vascular species record for Maitahi has been updated to 201 vascular plant species with 8 new records collected during the survey (Appendix 2).

The Nationally Critical and Chronically Threatened Regionally sedge *Schoenus carsei* was relocated at Maitahi on 3 February 2023. This is a known population, first collected by Lisa Forester in 1999 (AK246919). One plant was found on the edge of what appears to be an animal track, with *Machaerina teretifolia*, *Netrostylis capillaris*, a few scattered mānuka (*Leptospermum hoipolloi*) seedlings, and



Figs. 1–4: 1. View north over gumland scrub into Maitahi wetland with far hills of the reserve in the background. All photos by lead author in February 2023. 2. White nuts of *Schoenus carsei*. 3. Large area dominated by *Schoenus carsei*. 4. Spikelets of the sedge *Carex fascicularis*.



Figs. 5 & 6: 5. The flowering orchid *Spiranthes australis* or ladies' tresses. 6. The marsh fern *Thelypteris confluens*.

some sporelings and fronds of tangle fern (*Gleichenia dicarpa*). This plant was growing in up to a foot of water and had many white nuts (Fig. 2).

On the 4th February a larger population was found, indicating that Maitahi could be the national stronghold for this species, with an estimated area of 6000 m², >0.5 ha (Fig. 3). These plants were seen growing in what appeared to be old 30 cm deep pools of water, slightly lower than the surrounding wetland. *Schoenus carsei* dominated the sedgeland, growing with *Machaerina teretifolia*, *Netrostylis capillaris*, tangle fern, *Empodisma robustum* and mānuka seedlings present on margins. The bryophytes *Distichophyllum pulchellum* and *Riccardia crassa* were common at the base of *Schoenus carsei* plants, suggesting that these bryophytes appear to be earlier colonisers of lake and wetland edges as water levels recede. Maitahi hosts a large diversity of sedges with 20 species present. Appendix 1 provides a key to distinguish *Schoenus carsei* from similar species.

In this study *Schoenus carsei* was found to be associated with micro-disturbances, individual plants often growing on small drains, animal track edges and slightly open sparser areas of vegetation, while large populations grew in what appeared to be old water edges or pools.

Other threatened plants

Maitahi hosts a wealth of diversity with a 141 native species, many of them threatened plants.

At Risk – Declining and Naturally Uncommon

The large bright green sedge *Carex fascicularis* (Declining) was occasional throughout the wetland (Fig. 4). A few plants of the Naturally Uncommon gum grass (*Pentapogon inaequiglumis*) were seen on the trackside edges in the southern gumland. A few scattered plants of the orchid ladies' tresses (*Spiranthes australis*) were seen growing in 30 cm of water at Maitahi wetlands (Fig. 5). Nationally this plant is Declining and regionally Chronically Threatened. The marsh fern *Thelypteris confluens* was scattered throughout the wetland (Fig. 6). Nationally this plant is Naturally Uncommon and regionally it is Chronically Threatened.

Threatened – Nationally Vulnerable, Nationally Endangered and Nationally Critical

The small sedge *Centrolepis strigosa* was a new record for Maitahi (Fig. 7). It has been recorded nearby from Lake Kai Iwi and the west coast near Dargaville (CHR 214231). This plant is Nationally Endangered and Regionally Significant. Plants appeared almost dead, scattered on the hard pan along the track. The tree rawiri kānuka (*Kunzea linearis*) is Nationally Vulnerable and Acutely Threatened Regionally and was locally common in



Figs. 7–12: 7. The small sedge *Centrolepis strigosa*. 8. The tree rawiri mānuka (*Kunzea linearis*) in gumland. 9. The seed head of *Paspalum orbiculare*. 10. A flowering plant of *Pimelea orthia* in gumland. 11. Flowers of the forked sundew *Drosera binata*. 12. A scrub of tamingi (*Epacris pauciflora*) in flower.

the gumlands of Maitahi (Fig. 8). The Nationally Vulnerable grass (*Paspalum orbiculare*) was a new record for Maitahi, this was seen on the Northern edge of the gumland on the road margin (Fig. 9). The Nationally Critical shrub *Pimelea orthia* was noted in flower on the edge of a trackside in the southern gumlands. (Fig. 10).

Regionally significant

The Regionally Significant swamp coprosma or hukihuki (*Coprosma tenuicaulis*) was a common component of the scrub in the Maitahi wetland. The Regionally Chronically Threatened swamp blueberry (*Dianella haemata*) was common throughout the gumland scrub and wetland. The gumland grass tree (*Dracophyllum lessonianum*) was common in the gumland scrub and wetland margins of Maitahi. The forked sundew (*Drosera binata*) was scattered throughout the wetland, some plants in flower and fruit (Fig. 11). The rush (*Empodisma robustum*) (recently segregated from *E. minus*) was a common component of some areas of the wetland. Tamingi (*Epacris pauciflora*) was scattered throughout the gumland scrub, some plants bearing flowers (Fig. 12). The willow herb *Epilobium chionanthum* (which should be Regionally Significant) was local in the wetland, sometimes with large flowers (Fig. 13). The herb *Nertera scapanioides* (which should be Regionally Significant) was scattered throughout the wetland (Fig. 14). One patch of bur reed (*Sparganium subglobosum*) was seen in the wetland. Arrow grass (*Triglochin striata*) was common throughout the centre of the wetland.

Lichens

The Data Deficient lichen species *Cladonia strangulata*, *Haematomma sorediatum* and *Hypotrachyna pseudosinuosa* and the naturally uncommon lichen species *Parmotrema robustum* were all seen.

Threatened plants not seen in this survey

Many threatened plants previously recorded from Maitahi (see Appendix) were not seen during this survey. This could be due to seasonality of some plants (e.g., orchids) and the fact that some areas of the reserve were not surveyed. These species include:

- Necklace fern (*Asplenium flabellifolium*)
- Swamp astelia (*Astelia grandis*)
- *Calochilus herbaceus*
- *Pentapogon quadrisetus* (*Deyeuxia quadriseta*)
- *Utricularia australis*
- *Utricularia delicatula*
- *Utricularia dichotoma*
- *Ranunculus urvilleanus*
- *Thelymitra tholiformis*

Weeds

In total, 60 exotic plant species have been recorded from Maitahi. During the survey some weeds were marked with GPS (for DoC records), including:

Royal fern (*Osmunda regalis*) was scattered throughout the wetland, mainly on the southern side of the channel. This weed is recommended for control as its fast-growing-coloniser habit enables



Figs. 13–14: 13. The large flower of *Epilobium chionanthum*. 14. The bright orange fruit of *Nertera scapanioides*.



Figs. 15–16: 15. *Agrostis castellana* on gumland track edge. 16. Spikelet of the exotic *Rhynchospora globularis* in gumland.

it to outcompete other species, especially the rare ferns present. A large infestation of pampas (*Cortaderia selloana*) appears to be spreading in the wetland to the southwest of the reserve and is recommended for control. An unusual weed recorded was tree heath (*Erica arborea*); one patch was seen trackside in the gumland to the south of the wetland. It is recommended for control before it spreads further.

Other less invasive weeds of interest that are not yet widespread include the large grass highland bent (*Agrostis castellana*) (Fig. 15) localised on the gumland tracks of Maitahi with the sedge *Rhynchospora globularis* (Fig. 16). The small herb *Centaureum tenuiflorum* was growing with the very similar *Centaureum erythraea*, the former a new record for the site.

Fauna

The At Risk/ Declining mātātā or North Island fernbird (*Poodytes punctatus* ssp. *vealeae*) was

common throughout the wetland. Other threatened wetland bird species likely to be present at Maitahi are the Australasian bittern or matuku-hūrepo (*Botaurus poiciloptilus*), banded rail or moho pererū (*Gallirallus philippensis*) and spotless crake or pūweto (*Zapornia tabuensis*). The large Broun's Marbled Orb-Weaver spider (*Backobourkia brouni*) was seen building webs in the sedge lands.

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Appendix 1. Vascular plants and fungi recorded at Maitahi.

The list includes: species recorded during previous surveys by Forester et al. (2002), Young et al. (2006) and Calder et al. (2009); and Auckland Museum herbarium records (AK). The RH column shows the lead author's observations on 2-4 Feb 2023, and collections by the author (MFxxxx) or others (AKxxxxxx) at dates shown.

* = adventive; # = iNaturalist entry; + = species not recorded in previous lists

Taxa (Native + Exotic)	Threat Status	Forester et al. (2002)	Young et al. (2006)	Calder et al. (2009)	Ford Feb 2023
Ferns and Fern Allies 31 (30 + 1)					
<i>Asplenium flabellifolium</i>				x	
<i>Adiantum aethiopicum</i>		x			
<i>Adiantum hispidulum</i>			x		
<i>Alsophila tricolor</i> (syn. <i>Cyathea dealbata</i>)		x			
<i>Azorella pinnata</i> *		x			
<i>Deparia petersenii</i> subsp. <i>congrua</i>		x			
<i>Dicksonia squarrosa</i>		x			
<i>Diplazium australe</i>		x			
<i>Doodia australis</i>		x			
<i>Gleichenia dicarpa</i>		x			#
<i>Gleichenia microphylla</i>			x		
<i>Histiopteris incisa</i>		x			
<i>Hiya distans</i>		x			
<i>Hypolepis ambigua</i>		AK292357			
<i>Lateristachys lateralis</i> (syn. <i>Lycopodiella lateralis</i>)		x	AK306885		
<i>Lindsaea linearis</i>		AK292349	AK306893		#
<i>Microschizaea fistulosa</i>		x			
<i>Osmunda regalis</i> *		x			
<i>Paesia scaberula</i>		x			
<i>Palhinhaea cernua</i> (syn. <i>Lycopodiella cernua</i>)			x		
<i>Parablechnum minus</i>		x			
<i>Parablechnum novaezelandiae</i>		x			
<i>Phylloglossum drummondii</i>	Threatened – Nationally Endangered	x			
<i>Pseudolycopodium densum</i> (syn. <i>Lycopodium deuterodensum</i>)		x			
<i>Pteridium esculentum</i>		x			
<i>Pteris macilenta</i>		x			
<i>Pteris tremula</i>		x			
<i>Schizaea bifida</i>	Regionally significant				# MF1598
<i>Sphaeropteris medullaris</i> (syn. <i>Cyathea medullaris</i>)		x			
<i>Sticherus flabellatus</i>			AK306894		
<i>Thelypteris confluens</i>	At Risk – Naturally Uncommon Regionally Chronically Threatened	AK287536, AK292352			MF1577
Gymnosperms 3 (1+2)					
<i>Pinus pinaster</i> *				x	
<i>Pinus radiata</i> *		x			
<i>Podocarpus totara</i> var. <i>totara</i>		x			

Taxa (Native + Exotic)	Threat Status	(2002)	(2006)	(2009)	Ford 2023
Dicotyledons 85 (48+37)					
<i>Acacia paradoxa</i> *		x			
<i>Centaureum erythraea</i>		x			
<i>Centaureum tenuiflorum</i>					MF1596
<i>Centella uniflora</i>		x			
<i>Cirsium vulgare</i> *		x			
<i>Cotoneaster</i> sp. *		x			
<i>Coprosma tenuicaulis</i>	Regionally significant	x			
<i>Coprosma propinqua</i> x <i>C. robusta</i>		x			
<i>Coprosma robusta</i>		AK286610			
<i>Cotula coronopifolia</i>		x			
<i>Banksia integrifolia</i> *			x		
<i>Blackstonia perfoliata</i> *		x	AK306887		
<i>Dracophyllum lessonianum</i>	Regionally significant	x			
<i>Drosera auriculata</i>		x	AK306886		
<i>Drosera gunniana</i> (as <i>Drosera peltata</i>)		x	AK306888		# AK316329 (P.deLange 2010)
<i>Drosera binata</i>	Regionally significant	x			
<i>Epacris pauciflora</i>	Regionally significant	x	AK306877		# AK316330 (P.deLange 2010)
<i>Epilobium chionanthum</i>	Regionally significant	AK292348			MF1603
<i>Epilobium pallidiflorum</i>	Regionally significant	x			
<i>Erica arborea</i> *					# MF1569
<i>Erica baccans</i> *		AK286609			
<i>Erica lusitanica</i> *		x			
<i>Erigeron sumatrensis</i> *		x			
<i>Euchiton japonicus</i> (as <i>E. audax</i> ?)		x			
<i>Euchiton involucratus</i>		x			
<i>Galium divaricatum</i> *		x			
<i>Gamochaeta coarctata</i> *		x			
<i>Gaultiera antipoda</i>		x	AK306876		
<i>Geniostoma ligustrifolium</i>		x			
<i>Gonocarpus incanus</i>		x			
<i>Hakea salicifolia</i> *		x			
<i>Hakea sericea</i> *		x			#
<i>Hydrocotyle novae-zeelandiae</i>					+
<i>Hydrocotyle pterocarpa</i>		x			#
<i>Hypericum pusillum</i>		x			
<i>Jacobaea vulgaris</i> *		x			
<i>Kunzea linearis</i> (previously <i>K. ericoides</i>)	Threatened – Nationally Vulnerable	x			+
<i>Leucanthemum</i> sp.		x			
<i>Leontodon saxatilis</i> *		x			
<i>Leptospermum hoipolloi</i> (previously <i>L. scoparium</i> agg.)	Nationally At Risk – Declining	x			
<i>Leptostigma setulosum</i>		x	AK306891		
<i>Leucopogon fascicularis</i>		x			
<i>Lobelia anceps</i>		x			

Taxa (Native + Exotic)	Threat Status	Forester et al. (2002)	Young et al. (2006)	Calder et al. (2009)	Ford Feb 2023
<i>Lotus angustissimus</i> *		x			
<i>Lotus pedunculatus</i> *		x			
<i>Lotus subbiflorus</i> *		x			
<i>Lysimachia arvensis</i> *		x			
<i>Mentha pulegium</i> *		x			
<i>Muehlenbeckia complexa</i>		x			
<i>Myosotis laxa</i> subsp. <i>caespitosa</i> *		x			
<i>Nertera dichondrifolia</i>		x			
<i>Nertera scapanioides</i>		AK292354, AK248061	AK306892		
<i>Olearia furfuracea</i>		x			
<i>Ozothamnus leptophyllus</i>		x			
<i>Parentucellia viscosa</i> *		x			
<i>Persicaria hydropiper</i> *		x			
<i>Phytolacca octandra</i> *		x			
<i>Pimelea orthia</i>	Nationally Critical			AK316332	
<i>Pimelea prostrata</i> subsp. <i>seismica</i>		AK292358			
<i>Pimelea</i> sp. AK286613			AK297733	x	
<i>Plantago lanceolata</i> *		x			
<i>Pomaderris amoena</i>		AK286611	AK306883	x	
<i>Pomaderris edgerleyi</i>	Nationally At Risk – Declining	AK292353	AK306879		# AK286614 (Jamieson 1999)
<i>Pomaderris kumeraho</i>		x	AK306881		#
<i>Pomaderris phyllicifolia</i> subsp. <i>phyllicifolia</i>	Threatened – Nationally Critical	x			
<i>Prunella vulgaris</i> *		x			
<i>Pseudognaphalium luteoalbum</i>		x			
<i>Pterophylla sylvicola</i>			AK306895		
<i>Ranunculus urvilleanus</i>	Nationally At Risk – Declining	AK282128			
<i>Rubus fruticosus</i> agg. *		x			
<i>Taraxacum officinale</i> agg. *		x			
<i>Trifolium repens</i> *		x			
<i>Senecio bipinnatisectus</i>				x	
<i>Senecio minimus</i>		x			
<i>Solanum nigrum</i> *		x			
<i>Solanum opacum</i>	Nationally Data Deficient				# AK370838 (P.deLange 2018)
<i>Styphelia nesophila</i> (syn. <i>Leucopogon fraseri</i>)		x			
<i>Ulex europaeus</i> *				x	
<i>Utricularia australis</i> (as <i>Utricularia protrusa</i>)	Threatened – Nationally Critical	x			
<i>Utricularia delicatula</i>	Nationally At Risk – Relict	x			
<i>Utricularia dichotoma</i> subsp. <i>novae-zelandiae</i>	Regionally significant	AK241956			
<i>Wahlenbergia violacea</i>		x	AK306889		
<i>Verbena incompta</i> * (as <i>V. bonariensis</i>)		x			
<i>Vicia sativa</i> *		x			

Taxa (Native + Exotic)	Threat Status	(2002)	(2006)	(2009)	Ford 2023
Monocotyledons 83 (62+21)					
<i>Agrostis castellana</i> *					# MF1602
<i>Agrostis stolonifera</i> *				x	
<i>Anthoxanthum odoratum</i> *		x			
<i>Apodasmia similis</i>		x			
<i>Astelia grandis</i>			x		
<i>Aristea ecklonii</i> *			x		
<i>Austroderia splendens</i>		x			
<i>Briza minor</i> *		x			
<i>Caladenia chlorostyla</i>		x			
<i>Calochilus herbaceus</i>	Threatened – Nationally Critical	x			
<i>Carex fascicularis</i>	Nationally At Risk – Declining	AK294608			#
<i>Carex longibrachiata</i> *		x			
<i>Carex longii</i> * (previously recorded as <i>C. ovalis</i> ?)				x	#
<i>Carex maorica</i>		AK292351			
<i>Carex secta</i>		x			
<i>Carex virgata</i>		x			
<i>Cenchrus clandestinus</i> *		x			
<i>Centrolepis strigosa</i>	Nationally Endangered Regionally Significant.				MF1597
<i>Cordyline australis</i>			x		
<i>Cortaderia selloana</i> *		x			
<i>Dianella haemata</i>	Regionally significant	x			
<i>Digitaria aequiglumis</i> *					MF1600
<i>Eleocharis acuta</i>		x			
<i>Eleocharis gracilis</i>		x			
<i>Eleocharis sphacelata</i>		x			
<i>Empodisma robustum</i> (previously recorded as <i>E. minus</i>)	Regionally significant	AK286616, AK231291			
<i>Ficinia nodosa</i>		x			
<i>Holcus lanatus</i> *		x			
<i>Isolepis inundata</i>		x			
<i>Genoplesium pumilum</i> (syn. <i>Corunastylis pumila</i>)	Nationally At Risk – Naturally Uncommon		x		
<i>Isolepis levynsiana</i> *				x	
<i>Isolepis reticularis</i>		x			
<i>Isolepis prolifera</i>		x			
<i>Juncus acuminatus</i> *		x			
<i>Juncus bulbosus</i> *		x			
<i>Juncus dichotomus</i> * (as <i>J. tenuis</i>)		x			# MF1581
<i>Juncus effusus</i> *				x	
<i>Juncus pallidus</i>		x			
<i>Juncus planifolius</i>		x			# MF1582
<i>Juncus prismatocarpus</i>		x			
<i>Juncus sonderianus</i> * (as <i>J. capitatus</i>)		AK251998			# MF1580
<i>Lepidosperma australe</i>			x		
<i>Lepidosperma laterale</i>		x			

Taxa (Native + Exotic)	Threat Status	Forester et al. (2002)	Young et al. (2006)	Calder et. al. (2009)	Ford Feb 2023
<i>Machaerina arthropophylla</i>		x			
<i>Machaerina articulata</i>		x			
<i>Machaerina juncea</i>		x			
<i>Machaerina tenax</i>					
<i>Machaerina teretifolia</i>		x			
<i>Machaerina rubiginosa</i>			x		
<i>Microtis uniflora</i>		x			
<i>Morelotia affinis</i>		x			
<i>Netrostylis capillaris</i> (syn. <i>Tetraria capillaris</i>)		x	AK306884		#
<i>Orthoceras novae-zelandiae</i>		x			#
<i>Paspalum dilatatum</i> *		x			
<i>Paspalum orbiculare</i>	Threatened – Nationally Vulnerable				# MF1578
<i>Pentapogon avenoides</i> (syn. <i>Deyeuxia avenoides</i>)		x			
<i>Pentapogon crinitus</i> (syn. <i>Dichelachne crinita</i>)		x			
<i>Pentapogon inaequiglumis</i> (syn. <i>Dichelachne inaequiglumis</i>)	Nationally At Risk – Naturally Uncommon				# MF1599
<i>Pentapogon quadrisetus</i> (syn. <i>Deyeuxia quadriseta</i>)	Nationally At Risk – Declining	x			
<i>Phormium tenax</i>		x			
<i>Potamogeton cheesmanii</i>		x			
<i>Rhynchospora globularis</i> *		AK251997			# MF1605
<i>Schoenus apogon</i>		x			
<i>Schoenus brevifolius</i>		x	AK306878		
<i>Schoenus carsei</i>	Threatened – Nationally Critical	AK246919			# MF1601
<i>Schoenus maschalinus</i>		x			
<i>Schoenus tendo</i>					
<i>Sisyrinchium</i> sp. *		x			
<i>Sparganium subglobosum</i>	Regionally significant	x			#
<i>Spiranthes australis</i>	Nationally At Risk – Declining	AK206331			# MF1594
<i>Stenotaphum secundatum</i> *		x			
<i>Thelymitra aemula</i>		x			
<i>Thelymitra colensoi</i>	Nationally Data Deficient			x	
<i>Thelymitra longifolia</i>		x			
<i>Thelymitra pauciflora</i>		x			
<i>Thelymitra pulchella</i>		x			
<i>Thelymitra tholiformis</i>	Nationally At Risk – Naturally Uncommon	x			
<i>Thelymitra</i> aff. <i>ixioides</i>			x		
<i>Triglochin striata</i>	Regionally significant	x			
<i>Typha orientalis</i>		x			
Bryophytes (5)					
<i>Distichophyllum pulchellum</i>					+ #
<i>Kurzia compacta</i>					AK317228 (J.E.Braggins 2010)
<i>Leptoscyphus compactus</i>					# MF1653

Taxa (Native + Exotic)	Threat Status	(2002)	(2006)	(2009)	Ford 2023
<i>Marchantia berteroana</i>					+
<i>Riccardia crassa</i>					# MF1655
<i>Sphagnum</i> sp.		x			
Lichens (15)					
<i>Cladonia capitellata</i>					+ #
<i>Cladonia confusa</i>					+ #
<i>Cladonia darwinii</i>					+
<i>Cladonia glebosa</i>					# MF1551
<i>Cladonia strangulata</i>	Nationally Data Deficient				# MF1553
<i>Haematomma solediatum</i>	Nationally Data Deficient				# MF1552
<i>Hypotrachyna pseudosinuosa</i>	Nationally Data Deficient				+ #
<i>Leioderma erythrocarpum</i>					+
<i>Leptra</i> sp.					+
<i>Leptogidium contortum</i>					# MF1550
<i>Lichenomphalia</i> sp.					+
<i>Megalaria grossa</i>					+
<i>Parmotrema reticulatum</i>					+
<i>Parmotrema robustum</i>	Nationally At Risk – Naturally Uncommon				+
<i>Pseudocyphellaria crocata</i>					+
<i>Usnea rubicunda</i>					+ #
Fungi (7)					
<i>Coltricia oblectans</i>					+ #
<i>Cortinarius</i> sp.					+
<i>Gliophorus</i> sp.					+ #
<i>Hebeloma victoriense</i>					+
<i>Inocybe</i> sp.					+ #
<i>Scleroderma macrosporum</i>					+ #
<i>Trametes coccinea</i>					+ #

Appendix 2. *Schoenus carsei* identification notes.

Notes to aid field survey of *Schoenus carsei* 2023 compiled from Gardner (1998 a & b) & de Lange (2023). An illustration from Gardner (1998b, p. 57, fig. 1) is reproduced here (Fig. 17).

Distribution (from de Lange 2023)

"Indigenous. Present in Australia. In New Zealand confined to the North Island where it is now known from North Cape to Hinehopu mire in the Rotorua Lakes district. It formerly grew at Ngaere Swamp (Taranaki).

Habitat

Coastal, lowland to montane. Usually in moderately fertile to acid wetlands. Often on the margins of burn pools or other slow-moving water channels where it often grows in association with *Machaerina*

rubiginosa, *M. teretifolia*, *Netrostylis capillaris* and *Empodisma robustum*. Occasionally associated with the margins of small ephemeral dune ponds.

Similar taxa

Frequently confused with *Tetraria capillaris* [*Netrostylis capillaris*], a similar rush-like plant with very fine yellow-green culms, which often grows in association with *S. carsei*. From that genus and species, *S. carsei* differs by its wider culms, larger panicles bearing more numerous flowers and by the rhachilla of the spikelet

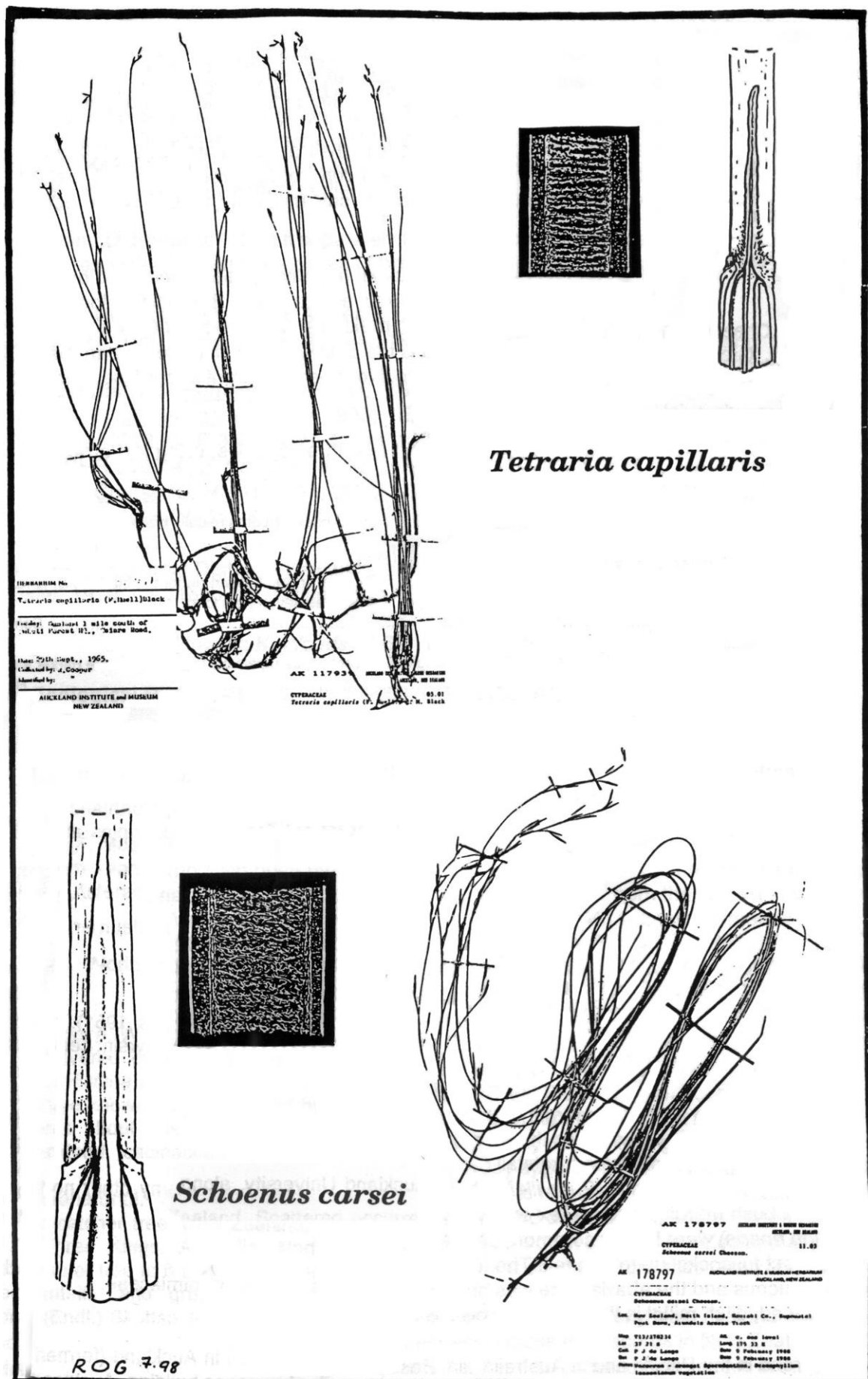


Fig. 17. Specimens of *Netrostylis* (*Tetraria*) *capillaris* (AK 117939) and *Schoenus carsei* (AK 178797). Diagrams of culms in l.s. show comparative details of pith structure, and the mucro at the tip of the basal sheath, all drawn by RO Gardner (Gardner 1998b, page 57, fig. 1).

being flexuous (wavy), short between sterile nodes and elongated between the fertile nodes.”
(from de Lange 2023)

Key (from Gardner 1998b, p. 56)

“If one has only sterile specimens it is still possible (with some luck) to distinguish *Schoenus carsei* from the very similar *Machaerina tenax* and *Tetraria* [*Netrostylis*] *capillaris* using just a razor blade and x10 lens [see Gardner's fig. 1, reproduced here as Fig. 17] as follows:”

1. Culms at c. 1/2 way up usually less than 0.8 mm diam., pith finely but distinctly septate; mucro of basal sheaths us. projecting less than 5 mm long beyond sheath apex and minutely setose on the basalmargins ***Tetraria* [*Netrostylis*] *capillaris***

1. Culms at c. 1/2 way up usually 0.8–1 mm diam., pith continuous (but liable to compress or break

down under the blade in *S. carsei*); mucro of basal sheaths glabrous **2**

2. Pith of culms longitudinally traversed by denser (living?) plates of tissue in longitudinal section, pale but with one or more darker streaks or lines; mucro rarely exceeding sheath apex by more than two mm ***Baumea tenax* [*Machaerina tenax*]**

2. Pith of culms uniformly pale-parenchymatous; mucro sometimes several cm long ***Schoenus carsei***

(from Gardner 1998b, p. 56)

Local Western Northland records

AK246919 *Schoenus carsei*, Lisa Forester, North Dargaville – Maitahi, 26 November 1999.

AK363118 *Schoenus carsei*, Alan Esler, Poutu – Punahaere, 30 September 1975.

Flora and vegetation of Rākino Island group, inner Hauraki Gulf

Part 1: islets and main reef stacks

Ewen K. Cameron and Shelley Heiss-Dunlop

Introduction

Rākino Island lies in the inner Hauraki Gulf, some 20 km northeast of downtown Auckland City. Heading northeast from the Waitematā Harbour, it is near the end of an island chain, stretching from Rangitoto, Motutapu, Rākino to the Noises/Ōtata Islands (Fig. 1). Rākino covers 150 ha, three-quarters the size of the better-known Hauraki Gulf island, Tiritiri Matangi. It is owned by multiple private owners, with 125 small land parcels and 25 ten-acre (4.05 ha) blocks (Parker 2018), and a permanent population of 20 people and 120 houses (Peart & Woodhouse 2020: fig. 7.1). Rākino lies within the Hauraki Gulf Maritime Park.

Most of the island is covered in rank kikuyu grass (*Cenchrus clandestinus*), a reflection of an earlier era of sheep (and cattle) farming now mainly ceased. An oblique aerial photograph taken by Lloyd Homer (1986) shows the island as predominantly pasture, with a few houses/baches and woody vegetation mainly restricted to large pōhutukawa trees (*Metrosideros excelsa*) scattered around the steep coastal slopes. Over the last decade quite extensive areas of the kikuyu pasture have been planted with thousands of native seedlings, mainly tree species –

no planting has been carried out on any of the islets. Geologically, Rākino Island has Kawau Subgroup (basal Waitematā) conglomerates exposed on the north end of Māori Garden Bay, sitting unconformably on Waipapa Terrane greywacke (Bruce Hayward pers. comm.). Norway rats (Atkinson 1986) were manually eradicated from the Rākino group (referring to Rākino I. and all of its islets) by Auckland Regional Council, assisted by Task Force Green workers, in 2000 (Mike Lee, pers. comm.) and the island group has been mammalian-pest-free since then. Such a pest-free status is unusual for a human-populated Hauraki Gulf island.

Apart from a ‘preliminary vegetation’ report listing 59 native and 12 exotic vascular species by Willmott (2002), no extensive botanical survey of the island has ever been carried out, making it one of the largest Hauraki Gulf islands without a published vascular flora. Presumably this is because the group is so modified, with little original vegetation remaining. Since 2017 we have been irregularly visiting Rākino Island and its islets, recording its flora, vegetation types, obvious fauna and collecting herbarium specimens. This article records the flora, vegetation and birds of the eleven main Rākino islets