

Port Waikato field trip, 17 March 2018

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In 2016 Waikato District Council commissioned Wildland Consultants Ltd to prepare an Ecological Enhancement Plan for an area covering c.414 ha at Port Waikato (Wildland Consultants 2016). The project area encompassed most of the residential dwellings at Port Waikato, the sandspit to the north of the township, and about two kilometres of the margins of the Waikato River. Recent erosion of the dunes and sandspit area had triggered discussions between Waikato District Council, Department of Conservation, local iwi (Ngāti Karewa Ngāti Tahinga), and the local Port Waikato Beach Care community group. These discussions also highlighted ecological threats relating to the Port Waikato village, particularly in terms of land development and pest plant species cultivated in the village which have spread into the dunes.

The resulting Ecological Enhancement Plan included baseline information derived from field surveys, assessment of current issues (and potential future issues), and identification of options to restore and enhance the biodiversity of the sandspit, dunes, wetlands, and streams at Port Waikato. The Plan provides a works strategy, timeline, and indicative costs which span a 10-year period, with a focus on pest plant management and ecological enhancement opportunities, along with suggestions on plant species suitable for the site (Wildland Consultants 2016).

As part of our background research prior to field work, a literature search was undertaken for a plant species list for the area. Not readily locating any recent botanical information on the area, I then contacted the local botanical societies and botanists, confident that there would be information available, as Port Waikato is relatively close to both Auckland and Hamilton. However, the only botanical literature located was in Kirk's (1870) article "Notes on the botany of certain places in the Waikato District, April and May, 1870". One of the people contacted during the 2015 search was Ewen Cameron, who subsequently suggested that I lead a field trip to Port Waikato. This article reports on the Auckland Botanical Society Field Trip on 17 March 2018.

Port Waikato Spit is located on the west coast of the North Island, almost equidistant between the Manukau Heads and Raglan, and is within Meremere Ecological District (c.100,000 ha), which extends from Port Waikato along the west coast to Lake Waikare to the east, and from Mercer in the north to Taupiri in the south.

The coastal sand dunes have a mixture of indigenous and exotic vegetation. The southern dunes, especially those that adjoin residential property, are dominated by exotic vegetation, including a range of pest plant species. In 2008, a large fire swept through part of the dunes complex, destroying approximately 17.5 ha of vegetation, including habitat that is known to support the threatened katipō spider (*Latrodectus katipo*). The spit has extended northwards over the past 150 years; dunes on the northern side of the river have eroded and the river mouth has shifted northwards (Tonkin & Taylor 2007).

In 2016 we mapped the vegetation on the spit and identified 25 vegetation types, as described in Wildland Consultants (2016) and listed in Table 1 below.

Table 1: Vegetation types at Port Waikato Spit.

No.	Vegetation Type
1	Pampas-tall fescue-pōhuehue grassland
3	Raupō- <i>Machaerina articulata</i> reedland
4	Ti kōuka/cabbage tree-mānuka shrubland
6	Mixed indigenous-exotic scrub
7	Wīwī-tauhinu-lupin-pampas-pōhuehue shrubland
8	Pampas-lupin-tauhinu-pōhuehue-wīwī tussockland
9	Spinifex-tauhinu grassland
10	Spinifex sandfield
10a	Spinifex sandfield with shell beds
11	Tauhinu-spinifex shrubland
12	Pampas tussockland
15	Saltwater paspalum-wīwī-sea primrose-arrowgrass grassland
16	Punakura-saltwater paspalum-sea primrose herbfield
17	Sea primrose-glasswort herbfield
18	Tall fescue-kikuyu-pōhuehue grassland
21	Marram-pīngao-sand sedge grassland
22	Pīngao sandfield
23	Spinifex-tauhinu grassland with shell beds
24	Arrow grass-mudwort herbfield
25	Lupin-pampas-marram-tauhinu-spinifex shrubland
26	Pampas-gorse tussockland
27	Alligator weed-pōhue-tall fescue herbfield
28	Gravel groundsel-gazania-haretail herbfield
29	Pampas-wīwī-lupin-haretail tussockland
30	Sandfields



Fig. 1. Herbfield in damp seepage undisturbed by vehicle or pedestrian traffic. All photos by Sarah Beadel, 7 Dec 2015.



Fig. 2. Spinifex grassland with occasional pīngao. 7 Dec 2015.



Fig. 3. Southward view with tauhinu-spinifex shrubland in the foreground and evidence of a large fire that swept through the dunes in the middle distance, now dominated by pampas. 8 Feb 2013.

The botany of the spit is very interesting with extensive ephemeral wetlands supporting indigenous herbfields located in damp seepages along the southeastern side of the spit (Fig. 1). These wetlands, and their associated species, are vulnerable to damage by pedestrians, cycles, animals, and vehicles.

The wetlands have low-growing turf communities of arrow grass (*Triglochin striata*) and mudwort (*Limosella lineata*) together with toad rush (*Juncus bufonius* var. *bufonius*), fleabane (*Coryza sumatrensis*), marram (*Ammophila arenaria*), and sand sedge (*Carex pumila*). Pockets of *Lilaeopsis novae-zelandiae* are locally common, with occasional marram. In one area there is a damp seepage dominated by *Isolepis cernua* and punakura (*Lobelia anceps*), along with toad rush, hyssop loosestrife (*Lythrum hyssopifolia*), hawkbit (*Leontodon saxatilis*), tarweed (*Parentucellia viscosa*), hairy birdsfoot trefoil (*Lotus suaveolens*), and *Gamochaeta simplicicaulis*. Sand sedge is locally common, with scattered marram, wīwī (*Ficinia nodosa*), scrambling fumitory (*Fumaria muralis*), and beggar's tick (*Bidens frondosa*). A mixture of indigenous and exotic grasses, sedges, and herbs are also present along the margins, including saltwater paspalum (*Paspalum vaginatum*), sand sedge, marram, penny royal (*Mentha pulegium*), hairy birdsfoot trefoil, punakura, and *Lilaeopsis novae-zelandiae*.

Two 'At Risk' species are present in these ephemeral wetlands: *Centipeda aotearoana* (At Risk-Naturally Uncommon), and a small population of *Eleocharis neozelandica* (At Risk-Declining) was discovered during the field trip.

Spinifex is abundant on the windward face and ridge of the foredune along the western side of the spit (Fig. 2), together with frequent tauhinu (*Ozothamnus leptophyllus*), locally abundant sand wind grass (*Lachnagrostis billardierei*), and occasional pīngao (*Ficinia spiralis*). A few blowouts were present along the foredune. Near the inland margins of the foredune, wīwī and pōhuehue (*Muehlenbeckia complexa*) are locally abundant and dune oxalis (*Oxalis rubens*) occurs occasionally. The margins are dominated by exotic species, such as pampas, lupin (*Lupinus arboreus*), catsear (*Hypochaeris radicans*), and occasional gazania (*Gazania linearis* and/or *G. rigens*). Other species present include occasional prickly pear (*Opuntia monacantha*) and marram.

At the northern end of the spit, there are sandfields with locally common spinifex and occasional pīngao (Fig. 3). This habitat type extends to the end of the spit, where Caspian terns

(*Hydroprogne caspia*) and banded dotterel (*Charadrius bicinctus bicinctus*) utilise the habitat for nesting.

Tauhinu-wīwī-lupin-pampas-pōhuehue shrublands cover a large part of the dunes, and is characterised by shrubland comprising tauhinu, wīwī, and lupin with locally abundant pampas (*Cortaderia selloana*) and scattered pōhuehue. Also present are small pockets of locally common exotic grasses including quaking grass (*Briza maxima*), cocksfoot (*Dactylis glomerata*), and locally abundant populations of *Carex testacea*, taupata (*Coprosma repens*), sand wind grass, and gazania. Around the margins of the shrublands, spinifex is common, along with scattered gravel groundsel (*Senecio skirrhodon*), and dune oxalis.

The core of the spit comprises several main vegetation types. These include pampas tussockland which comprises the c. 17.5 ha of dunes burnt during a fire in 2008 (Fig. 3). Following the fire this area was predominantly recolonised by pampas. Wīwī and lupin are also locally abundant in this area, while Formosan lily (*Lilium formosanum*) is scattered throughout. Elsewhere there is tauhinu shrubland with frequent spinifex and scattered hawkbit, dune oxalis, hairy birdsfoot trefoil, wīwī, pampas, pōhuehue, *Muehlenbeckia australis* × *M. complexa* hybrid, sand wind grass, broomrape (*Orobancha minor*), sow thistle (*Sonchus oleraceus*), lupin, and exotic grasses. This area is in an erosion phase, resulting in tauhinu being situated at the top of the dunes, exposed to the seaward side in some places. Maritime pine (*Pinus pinaster*) and occasional radiata pine (*P. radiata*) are scattered along the margins of the shrubland.

There is also a small freshwater wetland dominated by raupō (*Typha orientalis*) and *Machaerina articulata*, with a narrow strip of ti kōuka (*Cordyline australis*) and mānuka (*Leptospermum scoparium*) in the southern part of the spit.

Pīngao (At Risk-Declining) occurs in low abundance scattered throughout the northern half of the spit,

sometimes mixed with spinifex. Decayed pīngao roots in eroded areas suggest that this species was once more common than it is now. Pīngao is threatened by adverse effects resulting from competition by marram, dune stabilisation and compaction, browsing, particularly by rabbits, trampling, and off-road vehicles.

To date, 268 vascular plant species have been recorded at the Port Waikato Spit, comprising 83 indigenous species and 185 exotic and naturalised species. These are listed below, along with three moss species (see Appendix).

Shy albatross (white capped mollymawk), a fluttering shearwater, and two dead storm-cast birds were observed during the field trip (Paul Asquith, pers. comm.). A dense small lens of small dead fish which had formed recently was observed at one site in the dunes. These were later identified by Dr Tom Trnski (Auckland Museum) as juvenile grey mullet (*Mugil cephalus*).

After thoroughly exploring the dunes and ephemeral wetlands, at the end of the day we had a brief look at the cliffs at the southern end of the beach. This was one of the highlights of the trip. We found some fossilised plant remains, including *Taeniopteris* sp., in the sedimentary rocks at the south end of the beach (see Blaschke & Grant-Mackie (1976) for more information). The day was completed with a quick dip in the surf, just in time before the surf patrol closed.

It was a great day out with the Auckland Botanical Society; thank you for inviting me.

Mike Wilcox kindly provided a list of attendees: Jenny Andrew, Paul Asquith, Sarah Beadel (leader), Jan Butcher, Michael Kocis, Janeen Collings, Neil Davies, Frances Duff, Leslie Haines, Helen Preston Jones, Miriam Ludbrook, Tim Martin, Philip Moll, Peter Moosberger, Juliet Richmond, Joshua Salter, Samantha Sutherland, Daniel Tait, Mike Wilcox.

References

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Appendix. Vascular plant species recorded at Port Waikato, compiled by Sarah Beadel.

Based on field visits in December 2015, March 2018 (with ABS), and April 2018.

Key P = planted
 N = natural at site

INDIGENOUS VASCULAR SPECIES

Ferns			Dicots - Lianes		
<i>Cyathea dealbata</i>	N	ponga, silver fern	<i>Calystegia soldanella</i>	N	panahi, shore bindweed
<i>Cyathea medullaris</i>	N	mamaku	<i>Calystegia sepium</i> subsp. <i>roseata</i>	N	pōhue
<i>Dicksonia squarrosa</i>	N	whēki	<i>Calystegia sepium</i> × <i>C. tuguriorum</i>	N	pōhue
<i>Doodia australis</i>	N	pukupuku	<i>Muehlenbeckia complexa</i>	N	pōhuehue
<i>Paesia scaberula</i>	N	mātātā	<i>Muehlenbeckia australis</i> × <i>M. complexa</i>	N	
<i>Parablechnum novae-zelandiae</i>	N	kiokio	Dicots - Composite herbs		
<i>Pteridium esculentum</i>	N	rārahu, bracken	<i>Centipeda aotearoana</i>	N	
<i>Pteris macilentia</i>	N	titipo, sweet fern	<i>Cotula coronopifolia</i>	N	bachelor's button
<i>Pyrrosia eleagnifolia</i>	N	leather-leaf fern	<i>Pseudognaphalium luteoalbu</i> agg.	N	pukatea
Gymnosperms			<i>Senecio lautus</i>	N	
<i>Agathis australis</i>	P	kauri	Dicots - Herbs (except Composites)		
<i>Podocarpus totara</i> var. <i>tōtara</i>	P	tōtara	<i>Apium prostratum</i> subsp. <i>prostratum</i> var. <i>filiforme</i>	N	tūtāe-kōau, New Zealand celery
Dicots - Trees and shrubs			<i>Haloragis erecta</i> subsp. <i>erecta</i>	N	toatoa
<i>Alectryon excelsus</i> subsp. <i>excelsus</i>	P&N	tītoki	<i>Lilaeopsis novae-zelandiae</i>	N	
<i>Beilschmiedia tawa</i>	N	tawa	<i>Limosella lineata</i>	N	mudwort
<i>Coprosma macrocarpa</i> subsp. <i>minor</i>	N	karamū, kāramuramu	<i>Lobelia anceps</i>	N	punakura
<i>Coprosma repens</i>	P&N	taupata	<i>Oxalis rubens</i>		sand oxalis
<i>Coprosma robusta</i>	N	karamū, kāramuramu	<i>Samolus repens</i> var. <i>repens</i>	N	māakoako
<i>Coprosma macrocarpa</i> subsp. <i>minor</i> × <i>C. propinqua</i>	N		<i>Sarcocornia quinqueflora</i>	N	ureure, glasswort
<i>Corynocarpus laevigatus</i>	N	karaka	<i>Selliera radicans</i>	N	
<i>Dodonaea viscosa</i>	P	akeake	<i>Tetragonia implexicoma</i>	N	kōkihi, rengamutu, rengarenga, tūtāe-ikamoana
<i>Dysoxylum spectabile</i>	N	kohekohe	Monocots - Trees and shrubs		
<i>Kunzea robusta</i>	N	kānuka	<i>Cordyline australis</i>	P&N	tī kōuka, cabbage tree
<i>Leptospermum scoparium</i> agg.	N	mānuka	Monocots - Grasses		
<i>Leucopogon fasciculatus</i>	N	mingimingi	<i>Lachnagrostis billardieri</i>	N	sand wind grass
<i>Litsea calicaris</i>	N	mangeao	<i>Lachnagrostis filiformis</i>	N	
<i>Melicytus ramiflorus</i>	N	māhoe	<i>Microlaena stipoides</i>	N	pātiti, meadow rice grass
<i>Metrosideros excelsa</i>	P&N	pōhutukawa	<i>Oplismenus hirtellus</i>	N	
<i>Myoporum laetum</i>	P&N	ngaio	<i>Spinifex sericeus</i>	N	kōwhangatara, spinifex
<i>Myrsine australis</i>	N	māpou, matipou, māpau	Monocots - Sedges		
<i>Ozothamnus leptophyllus</i>	N	tauhinu	<i>Bolboschoenus fluviatilis</i>	N	pūrua grass, kukuraho
<i>Piper excelsum</i> subsp. <i>excelsum</i>	N	kawakawa	<i>Carex dissita</i>	N	
<i>Pittosporum crassifolium</i>	N	karo	<i>Carex geminata</i> agg.	N	rautahi
<i>Pittosporum eugenioides</i>	P	tarata; lemonwood			
<i>Pseudopanax crassifolius</i> × <i>P. lessonii</i>	P&N				
<i>Pseudopanax lessonii</i>	N	houpara			
<i>Vitex lucens</i>	N	pūriri			

<i>Carex pumila</i>	N	sand sedge
<i>Carex testacea</i>	N	
<i>Cyperus ustulatus</i>	N	toetoe upoko-tangata
<i>Eleocharis acuta</i>	N	spike sedge
<i>Eleocharis neozelandica</i>	N	
<i>Ficinia nodosa</i>	N	wīwī
<i>Ficinia spiralis</i>	N	pīngao
<i>Isolepis cernua</i>	N	
<i>Machaerina articulata</i>	N	
<i>Machaerina juncea</i>	N	
<i>Machaerina tenax</i>	N	

<i>Machaerina teretifolia</i>	N
<i>Schoenoplectus pungens</i>	N

Monocots – Rushes

<i>Juncus kraussii</i>	N	wi, wīwī, sea rush
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Monocots - Herbs (except grasses, sedges, and rushes)

<i>Apodasmia similis</i>	N	oioi
<i>Arthropodium cirratum</i>	P	rengarenga
<i>Astelia hastata</i>	N	kahakaha
<i>Phormium tenax</i>	P&N	harakeke, flax
<i>Triglochin striata</i>	N	arrow grass
<i>Typha orientalis</i>	N	raupō

NATURALISED AND EXOTIC VASCULAR SPECIES

Ferns

<i>Nephrolepis cordifolia</i>	tuber ladder fern
<i>Osmunda regalis</i>	royal fern

Gymnosperms

<i>Araucaria heterophylla</i>	Norfolk Island pine
<i>Cupressus macrocarpa</i>	macrocarpa
<i>Pinus pinaster</i>	maritime pine
<i>Pinus radiata</i>	radiata pine
<i>Taxodium distichum</i>	swamp cypress

Dicots - Trees and shrubs

<i>Acacia longifolia</i>	Sydney golden wattle
<i>Alnus glutinosa</i>	common alder
<i>Banksia intermedia</i>	
<i>Banksia integrifolia</i>	banksia
<i>Callistemon</i> sp.	bottlebrush
<i>Casuarina cunninghamiana</i>	sheoak
<i>Cotoneaster glaucophyllus</i>	cotoneaster
<i>Eriobotrya japonica</i>	loquat
<i>Erythrina × sykesii</i>	coral tree
<i>Euonymus japonicus</i>	Japanese spindleberry
<i>Feijoa sellowiana</i>	feijoa
<i>Ficus carica</i>	fig
<i>Ficus macrophylla</i>	Moreton Bay fig
<i>Gomphocarpus fruticosus</i>	swan plant
<i>Grevillea robusta</i>	silky oak
<i>Juglans regia</i>	common walnut
<i>Lantana camara</i>	lantana
<i>Ligustrum lucidum</i>	tree privet
<i>Ligustrum sinense</i>	Chinese privet
<i>Lupinus arboreus</i>	lupin
<i>Lycium ferocissimum</i>	boxthorn
<i>Melilotus indica</i>	King Island melilot
<i>Myoporum insulare</i>	Tasmanian ngaio

<i>Nerium oleander</i>	oleander
<i>Opuntia vulgaris</i>	prickly pear
<i>Paraserianthes lophantha</i>	brush wattle
<i>Pelargonium</i> sp.	geranium
<i>Populus alba</i> 'Nivea'	silver poplar
<i>Populus nigra</i> 'Italica'	Lombardy poplar
<i>Psoralea pinnata</i>	Dally pine
<i>Raphiolepis umbellata</i>	Indian hawthorn
<i>Ricinus communis</i>	castor oil plant
<i>Robinia pseudoacacia</i>	false acacia, black locust, robinia
<i>Roldana petasitis</i>	velvet groundsel
<i>Rubus</i> sp. (<i>R. fruticosus</i> agg.)	blackberry
<i>Salix cinerea</i>	grey willow
<i>Salix × fragilis</i>	crack willow
<i>Salix matsudana</i> 'Tortuosa'	tortured willow
<i>Solanum mauritianum</i>	woolly nightshade
<i>Tecomaria capensis</i>	Cape honeysuckle
<i>Ulex europaeus</i>	gorse

Dicots - Lianes

<i>Delairea odorata</i>	German ivy
<i>Dipogon lignosus</i>	mile-a-minute
<i>Hedera helix</i>	ivy
<i>Jasminum polyanthum</i>	jasmine
<i>Lonicera japonica</i>	Japanese honeysuckle
<i>Rumex sagittatus</i>	climbing dock
<i>Vitis vinifera</i>	grape

Dicots - Composite herbs

<i>Arctotheca calendula</i>	cape weed
<i>Bellis perennis</i>	lawn daisy
<i>Bidens frondosa</i>	beggars' ticks
<i>Cirsium arvense</i>	California thistle
<i>Cirsium vulgare</i>	Scotch thistle
<i>Crepis capillaris</i>	hawksbeard

<i>Erigeron canadensis</i> (M. Wilcox pers. comm.)	Canadian fleabane
<i>Erigeron sumatrensis</i>	broad-leaved fleabane
<i>Gaillardia</i> × <i>grandiflora</i>	gaillardia
<i>Gamochaeta calviceps</i>	silky cudweed
<i>Gamochaeta coarctata</i>	purple cudweed
<i>Gamochaeta purpurea</i>	spoonleaf purple everlasting
<i>Gamochaeta simplicicaulis</i>	simple-stem everlasting
<i>Gazania linearis</i>	gazania
<i>Gazania rigens</i>	gazania
<i>Hypochaeris radicata</i>	catsear
<i>Leontodon saxatilis</i>	hawkbit
<i>Osteospermum fruticosum</i>	rain daisy, dimorphotheca
<i>Senecio skirrhodon</i>	gravel groundsel
<i>Sonchus oleraceus</i>	puha, sow thistle
<i>Symphyotrichum subulatus</i>	sea aster

Dicots - Herbs (except composites)

<i>Acanthus mollis</i>	bear's breeches
<i>Alternanthera philoxeroides</i>	alligator weed
<i>Aphanes arvensis</i>	parsley piert
<i>Apium nodiflorum</i>	water celery
<i>Atriplex prostrata</i>	orache
<i>Carpobrotus chilensis</i>	ice plant
<i>Carpobrotus edulis</i>	ice plant
<i>Centaureum erythraea</i>	centaury
<i>Centranthus ruber</i>	spur valerian
<i>Cerastium fontanum</i> subsp. <i>vulgare</i>	mouse-ear chickweed
<i>Cotyledon orbiculata</i>	pig's ear
<i>Daucus carota</i>	wild carrot
<i>Dysphania ambrosioides</i>	Mexican tea
<i>Foeniculum vulgare</i>	fennel
<i>Fumaria muralis</i>	scrambling fumitory
<i>Galium aparine</i>	cleavers
<i>Geranium gardneri</i>	Gardner's geranium
<i>Lathyrus latifolius</i>	everlasting pea
<i>Malva arborea</i>	tree mallow
<i>Linaria purpurea</i>	purple linaria
<i>Linum catharticum</i>	purgings flax
<i>Lotus pedunculatus</i>	lotus
<i>Lotus suaveolens</i>	hairy birdsfoot trefoil
<i>Lycopus europaeus</i>	gypsy wort
<i>Lysimachia arvensis</i>	scarlet pimpernel
<i>Lythrum hyssopifolia</i>	hyssop loosestrife
<i>Medicago nigra</i>	bur medick
<i>Mentha pulegium</i>	penny royal
<i>Myosotis discolor</i>	grassland forget-me-not
<i>Nasturtium officinale</i>	watercress
<i>Ornithopus pinnatus</i>	yellow serradella
<i>Orobanche minor</i>	broomrape

<i>Oxalis incarnata</i>	lilac oxalis
<i>Parentucellia viscosa</i>	tarweed
<i>Persicaria maculosa</i>	willow weed
<i>Plantago lanceolata</i>	narrow-leaved plantain
<i>Plectranthus ecklonii</i>	blue spur flower
<i>Polycarpon tetraphyllum</i>	allseed
<i>Polygonum aviculare</i>	wireweed
<i>Prunella vulgaris</i>	selfheal
<i>Ranunculus repens</i>	creeping buttercup
<i>Rumex obtusifolius</i>	broad-leaved dock
<i>Silene coronaria</i>	rose campion
<i>Silene gallica</i>	catchfly
<i>Solanum nigrum</i>	black nightshade
<i>Trifolium pratense</i> (M. Wilcox pers. comm.)	red clover
<i>Trifolium repens</i>	white clover
<i>Tropaeolum majus</i>	garden nasturtium
<i>Verbascum virgatum</i>	moth mullein
<i>Verbena bonariensis</i>	purple-top
<i>Veronica anagallis-aquatica</i>	water speedwell
<i>Vicia disperma</i>	small French tare
<i>Vicia sativa</i>	vetch

Monocots - Trees and shrubs

<i>Agave americana</i>	century plant
<i>Alocasia brisbanensis</i>	elephants ears
<i>Asparagus aethiopicus</i>	bushy asparagus
<i>Musa</i> × <i>paradisical</i>	banana palm
<i>Phoenix canariensis</i>	Phoenix palm
<i>Trachycarpus fortunei</i>	Chinese windmill palm
<i>Yucca elephantipes</i>	yucca

Monocots - Grasses

<i>Agrostis stolonifera</i>	creeping bent
<i>Aira caryophyllea</i> subsp. <i>caryophyllea</i>	silver hairy grass
<i>Ammophila arenaria</i>	marram
<i>Anthoxanthum odoratum</i>	sweet vernal
<i>Arrhenatherum elatius</i> subsp. <i>elatius</i>	tall oat grass
<i>Avena fatua</i>	wild oat
<i>Briza maxima</i>	large quaking grass
<i>Briza minor</i>	shivery grass
<i>Bromus diandrus</i>	ripgut brome
<i>Bromus unioloides</i>	brome
<i>Bromus catharticus</i>	prairie grass
<i>Catapodium rigidum</i>	hard grass
<i>Cenchrus clandestinus</i>	kikuyu grass
<i>Cortaderia selloana</i>	pampas
<i>Dactylis glomerata</i>	cocksfoot
<i>Ehrharta erecta</i>	veldt grass
<i>Glyceria maxima</i>	reed sweetgrass
<i>Holcus lanatus</i>	Yorkshire fog

<i>Lagurus ovatus</i>	haretail
<i>Lolium arundinaceum</i>	tall fescue
<i>Lolium perenne</i>	rye grass
<i>Paspalum dilatatum</i>	paspalum
<i>Paspalum vaginatum</i>	saltwater paspalum
<i>Poa annua</i>	annual poa
<i>Sporobolus africanus</i>	ratstail
<i>Stenotaphrum secundatum</i>	buffalo grass
<i>Vulpia</i> sp.	

Monocots - Sedges

<i>Cyperus congestus</i> (M. Wilcox pers. comm.)	purple umbrella sedge
<i>Cyperus eragrostis</i>	umbrella sedge
<i>Cyperus esculentus</i>	yellow nut grass

Monocots - Rushes

<i>Juncus articulatus</i>	jointed rush
<i>Juncus bufonius</i> var. <i>bufonius</i>	toad rush

Monocots - Herbs (except grasses, sedges, and rushes)

<i>Agapanthus praecox</i>	agapanthus
<i>Alisma plantago-aquatica</i>	water plantain
<i>Aloe arborescens</i>	aloe
<i>Aloe</i> sp.	aloe
<i>Amaryllis belladonna</i>	naked lady
<i>Anigozanthos</i> sp.	kangaroo paws
<i>Arum italicum</i>	Italian arum
<i>Canna indica</i>	canna lily, Indian shot
<i>Crocasmia</i> × <i>crocosmiiflora</i>	montbretia
<i>Gladiolus undulatus</i>	gladiolus
<i>Hedychium gardnerianum</i>	kahili ginger, wild ginger
<i>Iris</i> sp.	iris
<i>Kniphofia praecox</i>	red hot poker
<i>Lilium formosanum</i>	Formosan lily
<i>Tradescantia fluminensis</i>	tradescantia
<i>Watsonia</i> sp.	watsonia
<i>Zantedeschia aethiopica</i>	arum lily

BRYOPHYTES

MOSSES (supplied by Mike Wilcox)

<i>Kindbergia praelonga</i>
<i>Rosulabryum capillare</i>
<i>Tortella rubripes</i>

A botanical visit to Miranda, Firth of Thames

Bec Stanley, Mike Wilcox, Maureen Young

While many of us had previously visited Miranda to look at shorebirds, the Auckland Botanical Society's first field trip to Pūkoro Miranda took place on 20 April 2019. Our group was : *Jenny Andrew, Lawrence Blount, Wendy Blount, Jan Butcher, Neil Davies, Frances Duff, Shelley Heiss-Dunlop, Christine Major, Philip Moll, Helen Preston Jones, Peter Moosberger, Juliet Richmond, John Rowe, Stella Rowe, Joshua Salter, Peter Scott, Rebecca Stanley* (leader), *Ian Whitehouse, Mike Wilcox, Pam Wilcox, Keith Woodley* (resident manager, Shorebird Centre), *Maureen Young*.

The most well-known attractions of the site are roosting shorebirds and the chenier plains they inhabit. The vegetation is predominantly exotic but is well-known in botanical circles for two native

species: green mistletoe (*Ileostylus micranthus*) and the small saltmarsh herb *Thyridia repens*.

Our base for the trip was the Pūkoro Miranda Shorebird Centre which sits on one of fourteen shell chenier ridges that make up the chenier plains of Miranda, an internationally significant landform (Hayward 2013). The ridges are wave-driven successional geological features which form a time series (the oldest c.2 km inland, the youngest at the seaward edge) made of shell and sediment. The newest ridge is described by Hayward (2013) as having formed since 1960 at the southernmost tip of the shorebird area. The whole area is low-lying at around 2–3m above sea level. Between the ridges, mud builds up and some parts eventually become dry land as plants colonise and the area is more and