#Sematophyllum ?homomallum
#Syntrichia papillosa (Tortula papillosa)
#Syntrichia antarctica (Tortula princeps)
#Thuidium furfurosum
#Thuidium sparsum
#Tortula muralis
#Trichostomum brachydontium
#Triquetrella papillata
#Weissia controversa
Wijkia extenuata
Zygodon minutus

Acknowledgements
My thanks to the Chamberlin family for the opportunity to make further study of the island's mosses, and to other members of Bot. Soc., for their contributions to the list (see above), and for their good company in the field.

References
Beever, J.E. 2000: Mosses recorded on Ponui Island, Hauraki Gulf. *Auckland Botanical Society Journal 55(1):* 39.
Beever, J.E; Allison, K.W; Child, J. 1992: Mosses of New Zealand. University of Otago Press, Dunedin. 214pp.
Cameron, E.K. 2000: Field trip to southern Ponui Island, Hauraki Gulf, Auckland. *Auckland Botanical Society Journal 55(1)*: 34-38.
Cameron, E.K.& de Lange, P.J. 2006: Vegetation and flora of Ponui island Hauraki Gulf – a return visit. *Auckland Botanical Society Journal 61(1)*: 3-14.

Opuatia wetland field trip, 19/11/05.

Anthony Keen

Attendees: Tricia Aspin, Enid Asquith, Paul Asquith, Jonathan Boow, Jan Butcher, Ewen Cameron, Lisa Clapperton, Brian Cumber, Geoff Davidson, Graeme Jane, Peter de Lange (co-leader), Jo Fillery, Rhys Gardner, Leslie Haines, Graeme Hambly, Shelley Heiss-Dunlop, Melinda Habgood, Peter Hutton, Anthony Keen (co-leader), Jenny Lux, Alistair MacArthur, Jeff MacAuley, Tim Martin, Elaine Marshall, Mike Wilcox, Maureen Young.

Meeting outside the Rangiriri pub, Peter de Lange and I gave directions to head across the Waikato River and drive out to the Churchill Road entrance to the wetland. A good crowd of 26 had gathered that day and the weather would be good to us for the duration. Opuatia is an interesting complex of peat and mineral wetland types that cover a large area associated with the Opuatia River and directly affected by water levels in the nearby Waikato River. The restiad-dominated peatland we see today is largely a result of the volcanic events going back to the Taupo eruption of 1800 yrs. before present (B.P.). Subsequent to the eruption, the Lake Taupo end of the Waikato River was temporarily blocked, this natural bund soon gave way and a gigantic flood of Taupo pumice alluvium (Lowe and Green 1992) travelled down the Waikato River system, blocking off tributaries like Opuatia and the nearby Whangamarino. This had an effect of raising water tables and assisting the development of peat forming systems in these areas. Overtime the area went through various stages of succession to the point that conditions became more and more ombrogenous (acidic), creating ideal conditions for the colonisation of fen and bog species including the wire rush (*Empodisma minus*), *Schoenus brevifolius*, *Baumea teretifolia*, *Gleichenia dicarpa* and *Sphagnum cristatum*.

Following a briefing of the swamp conditions and potential hazards, we accessed the swamp via a long causeway that stretches across to what is called the island by the local farmer. We had our first encounter with willow carr, dominated by *Salix cinerea* (grey willow). The reed sweet grass, *Glyceria maxima* together with the tall wetland grass *Phalaris arundinacea* formed thick swards on the edges of the willow and swamp alder (*Alnus glutinosa*) stand. We saw plenty of the parrots feather, *Myriophyllum aquaticum* growing on the side of the causeway.

Patches of *Carex subdola* could be found closer to the island end of the causeway. Walking to the top of the Island, we had an excellent view of the entire wetland from river to bog. Peter de Lange was able to share his knowledge on the history and natural development of this wetland complex whilst we took in the expanse of the area (Fig. 1). We also saw the small Lake 'Opuatia' where special submerged plants like fennel leaved pondweed *Stuckenia pectinata* had been discovered during ecological surveys of Waikato lakes in the early 90's (Champion et al. 1993).

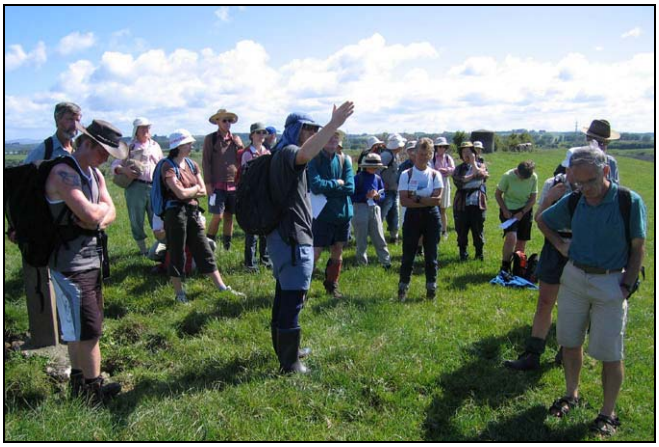

Fig 1. Peter de Lange describing the vegetation of Opuatia wetland. [Photo: J.Boow]

We walked off the island down into the wetland proper, and were immediately surrounded by dense swards of the baumeas; *B. arthrophylla*, *B .rubiginosa,* and *B. tenax* through which shrubs of *Coprosma propinqua* and *C. tenuicaulis* were common through here. Also encountered here was our first example of the Waikato bog form of manuka (*Leptospermum scoparium*) growing here sympatrically with another type of manuka typical of the surrounding clay country. A few putative hybrids were seen. Peter explained that recent, as yet unpublished DNA sequence data suggests that *L. scoparium* is divisible into several entities, certainly many were impressed by the distinctiveness of the Waikato Bog form from the plant we know so well around Auckland The canopy consisted of grey willow for most of this initial part until we walked out into a clearing next to a small pond. Much of the pond edge vegetation had been chewed out and trodden on by resident Canadian geese and we were unable to find *Utricularia australis* usually very conspicuous at this time of the year in this particular part of the wetland. Despite this we found some interesting plants here including *Carex gaudichaudiana*, *Baumea articulata* and the small marsh herb, arrow grass (*Triglochin striata*). A debate was entered into over the common wetland *Galium*, which some people thought was the indigenous, and now rather scarce (in the Waikato anyway), *G. trilobum*, Peter pointed out that the rather angular cymes bearing 5 or more flowers indicated that we were "probably" looking at the naturalised *G. palustre* rather than the 3-flowered (and fruited) *G. trilobum*. He said "probably" because he remains unclear over the distinction between *G. palustre* and another naturalised species *G. debilis*, also recorded from the Waikato.

From the pond we headed for drier ground as the canopy became dominated by hawthorn (*Crataegus monogyna*). The understory changed and soon we encountered small clumps of the parsley fern (*Botrychium australe*) (Fig. 2). This sparse population had hung on from near extinction in the area from browsing deer and other hungry herbivores. Nearby Peter pointed out a large patch of the nationally endangered stalked adders tongue fern (*Ophioglossum petiolatum*) which we had not been able to find during our recce to the area a month earlier. This whole area where the adders tongue fern was on this day had been under 20 cm depth of water previously. Notes from the New Zealand Plant Conservation Network website (www.nzpcn.org.nz) discuss its seasonally dormant character and its typical preference for ephemeral wetland habitats in marginal zones.

This site had been pointed out from the island hilltop earlier because of a large thicket of bamboo (*Bambusa oldhamii*) which had been there as long as Peter could remember. Previously, Peter had discovered the remains of an old still here, probably set-up during the prohibition.

Fig 2. Parsley fern (*Botrychium australe*).

Sharp eyes from Enid Asquith uncovered our first orchid *Microtis unifolia*, Peter found the wind grass, *Lachnagrostis elata*, and others found some remains of the still Peter had mentioned (alas, without any grog!). Another interesting find in this area was the native buttercup *Ranunculus urvilleanus*. This buttercup was noticeable because of its obvious hairiness. It is worrying that it has declined markedly in its abundance since it was discovered here in 1986. We attributed this to deer, which one of our party (who farms red deer) stated preferentially browsed buttercups.

Moving on from this interesting site we wisely avoided the large cannabis plantation we had found on our earlier recce trip, and headed for the bog proper. On the way Peter found a small patch of a rather non assuming sedge admixed within clumps of *Schoenus tendo*, this on later inspection turned out to be fountain grass (*Lepidosperma filiforme*). Fountain grass is an indigenous species found in Australia and New Zealand. In New Zealand it occurs mainly in the far north, from Te Paki to about Whangarei, from which it is absent until North West Nelson. So its presence at Opuatia was not only a major southerly range extension for the species in the North Island but also rather unexpected!

On our way out to the bog we came across a small orchid allied to *Pterostylis graminea* (Fig. 3). These tiny plants were rather obscure and easy to walk past. This orchid was often found on raised mounds with the dwarf bog-rush *Schoenus maschalinus*. Through this area Mike Wilcox stopped to take some photos of the very tall and conspicuous, royal fern (*Osmunda regalis*) (Fig. 4) which has invaded many of our wetland areas in the Waikato. Patches of the swamp nertera, *N. scapanioides* became more common as we headed for the bog edge and soon the canopy disappeared and we passed through a margin of

harakeke (*Phormium tenax*) and manuka out onto patches of the wire rush, *Empodisma minus*. In 1986 Peter and Paul Champion had discovered the other bog restiad *Sporadanthus ferrugineus* on the other side of the Opuatia bog from where we were, and it was noted that John Bartlett had also recorded this species from the bog in 1980. We searched, alas in vain.

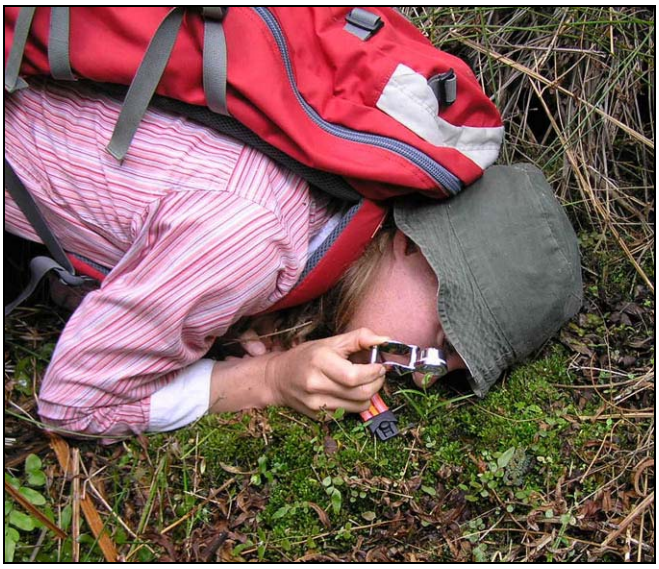

Fig 2. Jenny Lux checking out *Pterostylis graminea*. [Photo: A.MacArthur].

Fig 4. Jan Butcher and Lisa Clapperton are dwarfed by tall royal fern (*Osmunda regalis*) [Photo: A.MacArthur]

All of the area we traversed had been burned to the water table by a major fire in 1981. Peter, who first learned his wetland plants from his forays into this bog as a teenager, pointed out that the subsequent lack of fires had greatly reduced the floral and faunal diversity of the wetlands. Indeed several nationally uncommon species known in the past from the wetland have now disappeared as the vegetation has given over to dense tangles of wire rush, in places 1-2 m high

Irrespective of fires we also noted that the overall loss of diversity in the bog community we traversed is a natural function of succession and changing nutrient status. Several months earlier a colleague from Waikato University, Christian Fritz together with legendary "Bogman", Keith Thompson had cored parts of this bog to a depth of 10 metres. This area has had such a long history of development and parts of it are now rather nutrient starved and acidic.

Amongst the wire rush patches of tangle fern (*Gleichenia dicarpa*) were common together with more stunted forms of *Baumea rubiginosa*, *B. arthrophylla* and *B. tenax*. In this more nutrient deprived bog zone we also encountered large swards of *B. teretifolia*. All of these are particularly hard to identify as they are often devoid of flowering parts, making knowledge of vegetative characteristics essential. In the bog zone Peter pointed out our first true bog orchid *Pterostylis paludosa* and soon we saw many patches, including several still in flower. Growing typically amongst the bog sedges, this orchid is in serious decline, largely because of habitat loss due to accelerated wetland drainage for agricultural purposes affecting most of the Waikato peatland areas (Clarkson 2002; de Lange et al. 1999). Near by we also came across the bog inkberry, *Dianella* aff. *nigra,* which has an erect, tussock forming habit, basally red to reddish pink leaf sheaths, and which does not spread laterally by long creeping rhizomes, as is the case for *D. nigra* s.s. Opuatia is of interest because on the low lying clay patches separating the bog proper from the Opuatia Stream, *D. nigra* s.s. and *D.* aff. *nigra* are widely sympatric. For the bird watchers, fernbirds were encountered regularly through these bog areas.

Hunting through the sedges we got down to another level of detail, to identify *Schoenus brevifolius* amongst the baumea's. The giveaway feature of this sedge was the little nib near the tip of the culms. I had found this species to be quite variable in height during my vegetation work at the other end of the bog, finding they could range from just under a metre in length to 1.8 metres in length.

A very common sedge of this wetland is *Tetraria capillaris* which is much more slender than the other sedges identified. As we moved towards the middle of the bog Peter beckoned us to look for the elusive, nationally threatened *Schoenus carsei* which is largely confined nowadays to the Whangamarino and Opuatia wetlands. Peter soon became confused and opined that the changing nutrient status was affecting the morphology of the plants (in other words he couldn't find any), Rhys Gardner who stood nearby was roped in to pronounce a judgement (having published on the cryptic distinguishing characters between *Tetraria capillaris* and *Schoenus carsei*) wisely he avoided the issue with some non-committal statements.

Others were not fooled and we failed to definitively find the species, which, from herbarium evidence anyway was once so common in this bog system. For those not in the know, *S. carsei* is somewhat more

slender than S. *brevifolius* and has much finer glumes. But it is very easy to confuse with *T. capillaris* and while a key feature is the longer panicles with more distant fascicles of branches found on *S. carsei* (Johnson and Brooke 1998) in sterile material you need a good hand lens and Rhys Gardner's notes (Gardner 1998a,b). That problem aside we must also mention the fairly abundant forked sundew, *Drosera binata* that grew up through the masses of wire rush, and let us not forget the two *Pinus pinaster* dated at 18-20 years of age by former forestry employee Graeme Jane, that were felled by a group of rabid weed busters – the ring count proved Graeme to be pretty much bang on (they were 18 and 22 years old respectively).

After our bog experience Peter headed for the other side of the wetland and we marched in single file behind him. The uneven terrain is a typical feature of these bogs, being described as a pool and hummock micro-relief. We encountered a specimen of *Epacris pauciflora* on our way (again a species which had once been more common in the wetland a decade or so ago). Short, stunted grey willows were also sporadic through the bog zones of the wetland as well.

On the other side we cut through an edge of more harakeke into another patch of grey willow carr. The substrate became more mineralised here and the water rose up to our knees in places. Lucky for those with Pukeko legs! The species richness was on the increase again and we encountered a variety of Carex sedges including *C. virgata*, *C. maorica*, *C. fascicularis* and *C. lessoniana*. Lots of *Coprosma tenuicaulis* grew under the willow canopy here together with *Blechnum novae-zelandiae* and *Blechnum minus*, more *Baumea rubiginosa* and *B. tenax* and a couple of rushes including the native *Juncus pallidus* and the introduced *J. acuminatus*. Royal fern was again common here, showing its preference for the mineralised zones, with a willow canopy above. In other areas where I have sampled vegetation in Opuatia, royal fern appears to out-compete most native species, subsequently creating a very monospecific understory.

Galium palustre entwined everything here with a ground cover of *Dichondra repens,*, *Viola lyallii*, *Hydrocotyle pterocarpa*, *H. novae-zeelandiae*, as well as more patches of *Triglochin striata* and *Schoenus maschalinus*. Much of these ground covers survived above the water line on the bases of willows, royal fern and carex sedges, and it is here growing out of moss mounds (probably a *Thuidium sp.*) that Peter showed us the last major discovery of the day, the highly threatened *Pterostylis micromega* (Fig. 5). This greenhood orchid is considered "Nationally Critical" and following our visit to this area a team of threatened plant and wetland experts from DoC Waikato visited the site to survey the population further. The orchid had been known from the bog from a small area near the lake, where it was last seen there by Peter and Lisette Collins in November 1999. At the beginning of the trip, Peter had promised a six-pack of Guinness or for the non-drinkers a box of Chocolates to whoever rediscovered it. Rhys Gardner won, and was delighted with his beers at the Rangiriri Pub soon after!

Fig 5. *Pterostylis micromega* flower.

A special day indeed for our last walk of the year as a society. I feel we will see and hear a lot more about Opuatia in the future as Environment Waikato and DoC Waikato increase their interest in management initiatives in this wetland area. As you can see from the species list developed by Peter de Lange, there are many more species and habitats that one could discover in Opuatia.

Acknowledgments
Thank you to Peter de Lange for adding comments to this article and for his valuable help in organising and conducting field trip.
Thank you to Mike Wilcox and Alistair MacArthur who provided quality photos to me of the expedition.

References
Champion, P. D; de Winton, M. D.; de Lange, P. D. 1993: Vegetation of 38 Lakes in Lower Waikato. Hamilton, Department of Conservation.
Clarkson, B. R. 2002: Swamps, Fens and Bogs. Pp. 49-58. *In*: Botany of the Waikato. Clarkson, B.D.; Merrett, M.; Downs, T. (*eds*). Hamilton: Waikato Botanical Society Inc.
de Lange, P. D; Heenan, P.B.; Clarkson, B.D.; Clarkson, B.R. 1999: Taxonomy, ecology, and conservation of *Sporodanthus* (Restionaceae) in New Zealand. *New Zealand Journal of Botany 37*: 413-31.
Gardner, R.O. 1998: *Schoenus carsei* and *Tetraria capillaris*. *Auckland Botanical Society Journal 53*: 38-40.
Gardner, R.O. 1998: *Schoenus carsei* revisited. *Auckland Botanical Society Journal 53*: 56-57.
Johnson, P. and P. Brooke. 1998: Wetland Plants of New Zealand. Christchurch: Manaaki Whenua Press, Landcare Research,.
Lowe, D. J. and J. D. Green. 1992: Lakes Pp. 107 - 143. *In*: Landforms of New Zealand. J. M. Soons and M. J. Selby. (*eds*) 2 ed. Auckland: Longman Paul.

Indigenous vascular flora of Opuatia wetlands

Peter J. de Lange (updated 30 March 2006)
Based on 38 visits to the wetlands between November 1982 and November 2005.
The survey area covered includes all areas of seasonally wet pasture on adjacent farmland, the main wetland system, Lake "Opuatia" and willow carr extending to the Opuatia stream.

Abbreviations

(unc) = uncommon within survey area
* = naturalised (176 taxa)
I = indigenous to survey area (276 taxa)
N = Naturalised (Adventive) to survey area (175 taxa)
P = Planted (2 taxa)
AK = Auckland Museum Herbarium
CHR = Allan Herbarium
WAIK = University of Waikato Herbarium

Lycopods (5) (I:4 N:1)	
Lycopodiella laterale	WAIK 6548
L. serpentina (Locally common following 1982 fire last seen in 1986)	WAIK 6549
Lycopodium deuterodensum	WAIK 6890
L. volubile	
**Selaginella kraussiana* (unc)	

Ferns & fork ferns (35) (I:34 N:1)	
Adiantum cunninghamii (unc)	
Asplenium bulbiferum (unc)	
A. flaccidum	
A. oblongifolium (unc)	
A. polyodon (unc)	
Anarthropteris lanceolata	
Azolla filiculoides	WAIK 6560
Blechnum fluviatile (unc)	
B. minus	WAIK 6545
B. penna-marina subsp. *alpina* (unc)	
B. novae-zelandiae	
Botrychium australe (unc)	AK 282658
Ctenopteris heterophylla (unc)	
Cyathea dealbata	
C. medullaris	
C. smithii (unc)	
Dicksonia fibrosa (unc)	
D. squarrosa	
Deparia petersenii subsp. *congrua*	
Diplazium australe	
Doodia australis	
Gleichenia dicarpa	WAIK 6547
Histiopteris incisa	
Hypolepis ambigua	WAIK 6896
H. distans	
Lindsaea linearis	WAIK 6872
Microsorum pustulatum	
M. scandens	
Ophioglossum petiolatum (unc)	AK 285226
**Osmunda regalis*	AK 294582
Paesia scaberula	
Pteridium esculentum	
Schizaea bifida (unc)	
S. fistulosa (unc)	
Tmesipteris elongata (unc)	

Gymnosperms (4) (I:3 N:1)	
Dacrycarpus dacrydioides	
Dacrydium cupressinum (unc)	
**Pinus pinaster* (unc) – eradicated	AK 294734
Podocarpus totara (unc)	

Monocot trees & shrubs (2) (I:2)	
Cordyline australis	
C. pumilio (unc)	

Dicot trees & shrubs (46) (I: 30 N:15 P:1)	
**Acacia mearnsii*	WAIK 6033
**Alnus glutinosa*	
**Berberis glaucophylla*	
Coprosma areolata (unc)	
C. grandifolia	
C. lucida	
C. propinqua	WAIK 6881
C. rhamnoides (unc)	
C. robusta	WAIK 6555
C. spathulata (unc)	
C. tenuicaulis (incl. *C. tenuicaulis* var. *major*)	WAIK 6557

C. robusta x *C. propinqua* (*C.* x*cunninghamii*) WAIK 6556
**Cotoneaster glaucophyllus*
**Crataegus monogyna*
**Cytisus scoparius*
Dracophyllum lessonianum (unc) WAIK 6590
Epacris pauciflora WAIK 6882
**Erica lusitanica*
Fuchsia excorticata (unc)
F. x*colensoi* (unc)
Gaultheria antipoda (unc)
Hebe stricta var. *stricta* WAIK 6032
Kunzea aff. *ericoides* (b) (Common mainly North Island variant, stout tree, bark peeling in long, leathery, tabular strips; branchlets with appressed, antrorse silky hairs; inflorescences mainly corymbiform)
Leptospermum aff. *scoparium* (a) (common North Island variant, leaves wide, narrowly linear-lanceolate, apex hardly pungent, lamina margins silky hairy) (unc)
L. aff. *scoparium* (b) (Waikato Peat Bog variant, leaves rigid, narrowly linear-lanceolate, apex sharply acute, pungent, lamina margins silky hairy) WAIK 6559
L. aff. *scoparium* (a) x *L.* aff. *scoparium* (b) (unc)
Leucopogon fasciculatus WAIK 8531
L. fraseri (unc)
**Leycesteria formosa*
Melicope simplex
Melicytus micranthus AK 11577
M. ramiflorus
Myrsine australis
Pomaderris amoena WAIK 6935
P. phylicifolia (unc) CHR 473119
P. kumeraho (unc) WAIK 8023
Populus nigra 'Italica' (p)
**Prunus persica* (unc)
**Rosa gallica* (unc)
**R. rubiginosa* (unc) AK 294594
**Salix cinerea*
**S. fragilis*
**Solanum mauritianum*
Sophora chathamica (unc)
S. microphylla (unc)
Syzygium maire (unc)
**Ulex europaeus* WAIK 6586

Dicot lianes & scrambling plants (14) (I:8 N:6)

Calystegia sepium subsp. *roseata* (unc)
**C. silvatica*
C. tuguriorum (unc)
**C. sepium* subsp. *roseata* x **C. silvatica*
Fuchsia perscandens (unc)
**Lathyrus tingitanus* (unc)
**Lonicera japonica*
Muehlenbeckia australis
M. complexa
Parsonsia capsularis var. *capsularis* (unc)
P. heterophylla
Rubus australis
**R. cissburiensis* (unc)
**R. ulmifolius*

Grasses (36) (I :11 N :24 P :1)

**Agrostis capillaris*
**A. stolonifera*
**Alopecurus geniculatus* (unc)
Amphibromus fluitans (unc) AK 202187
**Anthoxanthum odoratum*
Bambusa oldhamii (one large specimen, probably planted)
**Bromus diandrus*
**B. hordaceus*
**B. willdenowii*
Cortaderia fulvida (unc)
**C. selloana*
**Dactylis glomerata*
Echinopogon ovatus
**Glyceria declinata*
**G. fluitans*
**G. maxima*
**G. striata* (unc)
Hierachloe redolens (unc)
**Holcus lanatus*
Isachne globosa AK 255951
Lachnagrostis elata (unc) AK 295543
L. filiformis
**Lolium perenne*
Microlaena stipioides
Oplismenus hirtellus subsp. *imbecillis*
**Panicum dichotomiflorum*
**Paspalum dilatatum*
**P. distichum*
**Phalaris arundinacea* AK197815
**P. canariensis*
**Poa annua*
**P. trivalis*
Rytidosperma gracile
**R. racemosum*
R. unarede
**Schedonorus phoenix*

Rushes (15) (I:7 N:8)

**Juncus acuminatus* WAIK 6905
**J. articulatus*
J. australis WAIK 6897
**J. bufonius* var. *bufonius*
**J. bulbosus* WAIK 6885
**J. dichotomous* WAIK 6903
J. edgariae
**J. effusus* WAIK 6902
J. pallidus
J. pauciflorus (unc) WAIK 6966
J. planifolius WAIK 6936
J. prismatocarpus
J. sarophorus AK 294605
**J. tenuis* var. *tenuis* WAIK 6574
**Luzula campestris*

Orchids (24) (I :24)	
Anzybas rotundifolius (unc)	AK 294812
Corybas cheesemanii	WAIK 6030
Diplodium trullifolium (unc)	WAIK 6563
Gastrodia aff. *sesamoides* (unc)	
Microtis unifolia	WAIK 6975
Nematoceras trilobum	
Orthoceras novae-zelandiae	
Petalochilus chlorostylus (unc)	AK 202072
Prasophyllum hectorii (unc) (last seen December 1990)	WAIK 6938
Pterostylis banksii (unc)	
P. paludosa	AK 165493
P. micromega (unc)	WAIK 6563
P. aff. *graminea* (diminutive plant of wetlands, = *P.* "sphagnum")	WAIK 6564
P. aff. *banksii* (small plant, leaves broad overtopping galea, flowers small)	
Simpliglottis cornuta	
Singularybas oblongus (unc)	WAIK 8626
Spiranthes novae-zelandiae (unc)	WAIK 6565
Thelymitra colensoi	WAIK 6550
T. cyanea (both blue and white forms)	AK 197766
T. longifolia (small-flowered autogamous form)	
T. pauciflora (large, entomophilous form)	
T. pulchella (unc)	
T. x*dentata* (*T. longifolia* x *T. pulchella*) (unc) (last seen 1994)	
T. aff. *ixioides* (unc)	
T. sp. (unnamed, *sensu T. formosa* of Moore & Edgar 1970) (last seen 1999)	AK 228588

Sedges (55) (I:45 N:10)	
Baumea articulata	
B. arthrophylla	WAIK 6587
B. juncea (unc)	
B. rubiginosa	WAIK 8514
B. tenax	
B. teretifolia	
Bolboschoenus fluviatilis (unc)	WAIK 6907
B. medianus (unc)	
Carex breviculmis	WAIK 6884
C. dissita	
**C. divulsa*	WAIK 6880
C. inversa	
**C. flacca*	WAIK 6577
C. flagellifera	WAIK 6891
C. fascicularis	AK 285219
C. gaudichaudiana	AK 286812
C. lessoniana	WAIK 6888
C. maorica	WAIK 6544
**C. ovalis*	AK 294604
**C. punctata*	WAIK 6576
C. secta	WAIK 6573
C. sinclairii	
C. subdola	AK 286813
C. testacea (unc)	
C. virgata	AK 285224
**C. vulpinoides*	
C. sp. aff. *geminata* (unnamed sp., common, coastal and lowland plants, leaves > 20 mm wide)	
**Cyperus congestus*	
**C. eragrostis*	
C. ustulatus f. *ustulatus*	
Eleocharis acuta	WAIK 6579
E. gracilis	WAIK 6578
E. sphacelata	WAIK 6553
Gahnia lacera (unc)	
G. setifolia	
G. xanthocarpa	
Isolepis distigmatosus	WAIK 6883
I. inundatus	WAIK 6581
**I. marginata*	
I. prolifera	
I. reticularis	WAIK 6879
**I. sepulcralis*	
**I. tenella*	WAIK 6876
Lepidosperma australe	WAIK 6886
L. filiforme	AK 294736
L. laterale	
Machaerina sinclairii	
Morelotia affinis	
Schoenus apogon s.s	WAIK 6580
S. brevifolius	WAIK 6580
S. carsei	AK 203228
S. maschalinus	WAIK 8517
S. tendo	WAIK 6566
Schoenoplectus tabernaemontani	
Tetraria capillaris	WAIK 6554

Monocot herbs other than grasses, orchids, rushes and sedges (17) (I:13 N:4)	
Astelia grandis (unc)	
Dianella nigra s.s.	
D. aff. *nigra* (swamp variant, non-rhizomatous, caespitose plants, basal culms carmine to dark red, leaves erect to suberect)	CHR 569904
**Egeria densa*	
Empodisma minus	WAIK 6875
**Landoltia punctata*	
Lemna minor agg.	AK 284667
Phormium tenax	WAIK 8513
Potamogeton cheesemanii	WAIK 7105
**P. crispus*	WAIK 6870
P. ochreatus	WAIK 6869
P. suboblongus (unc)	WAIK 6868
Sparganium subglobosum	WAIK 6878
Sporadanthus ferrugineus (unc) (last seen 1987)	WAIK 6568
Stuckenia pectinata (unc)	
Triglochin striata	
**Wolffia australiana*	

Composite herbs (48) (I:12 N:36)	
**Achillea millefolium*	
**Anthemis cotula*	AK 179371
**Artemisia verlotiorum* (unc)	

**Aster subulatus*
**Bellis perennis*
**Bidens frondosa*
**Carduus nutans*
**C. pycnocephalus* (unc)
Centipeda cunninghamii
**Chamaemelum nobile* AK 179370
**Cirsium arvense*
**C. palustre* (unc)
**C. vulgare*
**Conyza bilbaoana*
**C. sumatrensis*
**Cotula australis*
**Crepis capillaris*
**Dittrichia graveolens* (unc)
**Erechtites hieraciifolia* (unc)
Euchiton audax (unc)
E. collinus
E. involucratus WAIK 7025
E. limosus WAIK 6895
**Gamochaeta calviceps* (unc)
**G. coarctata*
**Helminthotheca echioides*
**Hypochoeris radicata*
**H. glabra* (unc)
**Lactuca serriola* (unc)
Lagenifera pumila
**Lapsana communis*
**Leonotodon taraxacoides* (unc)
Leptinella squalida subsp. *squalida* (unc)
**Leucanthemum vulgare*
**Matricaria dioscoidea*
**Mycelis muralis*
Picris burbidgeae (unc) (two plants seen in 2003) AK 286649
Pseudognaphalium aff. *luteoalbum* (common lowland sp.; Basal and mid cauline leaves lanceolate, acute)
**Senecio bipinnasectus*
S. glomeratus
S. hispidulus
**S. jacobaea*
S. minimus
**S. vulgaris*
**Silybum marianum* (unc)
**Sonchus asper*
**S. oleraceus*
**Taraxacum officinale* agg.

Dicot herbs (153) (i:85 n:68)

Acaena novae-zelandiae
Alternanthera aff. *sessilis* (unnamed species of New Zealand, Norfolk and southern Australia; leaves narrowly lanceolate, more or less entire, without obvious serrations or denticles)
**Amaranthus deflexus*
**Apium nodiflorum*
Callitriche muelleri
C. petriei subsp. *petriei*
**C. stagnalis* WAIK 6892
**Cannabis sativa* (unc) (also planted)
**Capsella bursa-pastoris*
Cardamine debilis agg. ("Long style")
**C. flexuosa* (unc)
**C. hirsuta*
**C. pratensis*
C. aff. *corymbosa* (unc)
**Centaurium erythraea*
Centella uniflora
**Cerastium glomeratum*
**C. fontanum* subsp. *vulgare*
**Ceratophyllum demersum*
**Chenopodium album*
**Cuscuta campestris* (unc)
**Daucus carota*
Dichondra repens
D. aff. *brevifolia* (*D.* "slender" of Druce 1993) AK 294591
**Digitalis pupurea*
Drosera auriculata WAIK 8526
D. binata
D. spatulata (last seen November 1999) WAIK 6567
**Duchesnea indica*
**Echium plantagineum*
**E. vulgare*
Epilobium chionanthum (unc)
**E. ciliatum*
E. nummulariifolium
E. pallidiflorum WAIK 6949
E. rotundifolium
**Erodium moschatum*
**Fumaria muralis*
**Galium aparine*
**G. palustre* AK294605
G. propinquum
**Geranium dissectum*
**G. molle*
Gonocarpus micranthus
G. incanus WAIK 6901
Gratiola sexdentata
Haloragis erecta
Hydrocotyle heteromeria
H. microphylla
H. moschata
H. novae-zelandiae s.s
H. pterocarpa
H. aff. *microphylla* (cf. *H. parvifolia* Carse)
**Hypericum humifusum* WAIK 6874
**H. perforatum*
H. aff. *japonicum* (*H. japonicum* of N.Z. and Australian authors non H. japonicum Thunb.) WAIK 6571
**Lepidium didymum*
**L. squamatum*
Lilaeopsis novae-zelandiae WAIK 6582
**Linum catharticum*
**L. marginale*
Lobelia anceps WAIK 6893
**Lotus pedunculatus*
**L. suaveolens*

**Ludwigia palustris*	
**L. peploides* subsp. *montevidensis*	
**Lysimachia nummularia* (unc)	
**Lythrum hyssopifolia*	
**L. junceum*	
**Malva neglecta*	
**Medicago indicus*	
**Mentha pulegium*	
**M.* x*piperita* var. *citrata* (unc)	
**Mimulus guttatus*	
**M. moschatus* (unc)	
**Modiola caroliniana* (unc)	
**Myosotis arvensis* (unc)	
**M. discolor*	
**M. laxa* subsp. *caespitosa*	
**M. sylvatica* (unc)	
**Myriophyllum aquaticum*	
M. pedunculatum subsp. *novae-zelandiae* (unc)	
M. propinquum	WAIK 6900
M. robustum (unc)	
Nertera depressa	
N. dichondrifolia	
N. scapanioides	WAIK 6585
**Orobanche minor*	
**Oxalis corniculata*	
O. exilis	
**Parentucellia viscosa*	
Pelargonium inodorum	
Persicaria decipiens	WAIK 6889
**P. hydropiper*	
**P. lapathifolia* (unc)	
**P. strigosa* (unc)	
**Phytolacca octandra*	
**Plantago australis*	
**P. lanceolata*	
**P. major*	
**Polycarpon tetraphyllum*	
**Polygonum aviculare*	
**P. persicaria*	
Potentilla anserinioides (unc)	
Pratia angulata	
**Prunella vulgaris*	
Ranunculus amphitrichus	WAIK 6871
**R. flammula*	AK 294602
R. macropus (unc)	
R. reflexus	
**R. repens*	
**R. sardous*	
**R. sceleratus*	
R. urvilleanus (unc) (formally common, now very close to local extinction due to feral red deer)	WAIK 6887
R. amphitrichus x *R. macropus*	
**Rorippa microphylla*	
**R. nasturtium-aquaticum*	WAIK 6034
R. palustris (unc)	WAIK 6937
**Rumex acetosella*	
**R. brownii*	
**R. obtusifolius*	
**Sherardia arvensis*	
**Sisymbrium officinale*	
Solanum americanum subsp. *nutans*	
**S. chenopodioides*	
**S. esculentum* (unc)	
**S. nigrum*	
**S. pseudocapsicum* (unc)	
**Spergularia rubra*	
**Stachys sylvatica* (unc)	
**Stellaria alsine*	
**S. graminea*	
**S. media*	
S. parviflora	
**Trifolium arvense* (unc)	
**T. campestre*	
**T. dubium*	
**T. pratense*	
**T. repens*	
**T. subterraenum* (unc)	
Utricularia australis	WAIK 6584
U. delicatula (unc) (last seen 1997)	AK 170323
U. dichotoma (unc) (following 1982 fire widespread, by 2005 only one plant could be found)	WAIK 6865
**Urtica urens*	
**Vicia sativa*	
**V. tetrasperma* (unc)	
Viola lyallii	WAIK 6894
**Verbascum thapsus*	
**V. virgatum* (unc)	
**Veronica anagallis-aquatica*	
V. plebeia	
**V. persica*	
**V. serpyllifolia*	

Indigenous:	**276**
Naturalised:	**176**
Planted:	**2**
TOTAL TAXA:	**454**