Flora of Taitua Forest, Awhitu Peninsula

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Introduction

After earlier disappointments of trying to purchase Taitua Forest (then known as Hamiltons Bush), Corso assisted Ngaati Te Ata. Since 1992 Corso worked closely with Ngaati Te Ata and specifically with Waatara Black. After several difficulties negotiating with the former owners, on 31 March 1995 the Taitua ki Awhitu Trust purchased Taitua Forest off Hamilton Road by Awhitu Central. Corso's main purpose for their active involvement in the Taitua Project was to be part of building a positive working relationship with Maori at hapu level as a model for other organisations to follow. This should not be taken that Corso has a priority to protect native bush. The area includes 40 ha of tall forest and 8 ha of pasture. I was asked by Waatara Black, Trustee, if I'd act as botanical advisor for the Trust, a role which I accepted with pleasure.

The Taitua Forest area is culturally significant to Ngaati Te Ata and is part of an intricate system of Maori ridge paa that made up the famous village Puketapu.

I first visited Taitua Forest on 31 May 1995, again on 10 & 19 October 1996, and 2 December 1997. Twenty-five members of the Auckland Botanical Society (ABS) visited the area on 19 October 1996 and were joined by Waatara Black (Fig. 1). The following account is based on the above four visits, and the July 1970 visit by ABS recorded briefly by Young (1970). The forest area now is completely fenced, funded from a Nga Whenua Rahui covenant (administered by Department of Conservation). Franklin District Council has granted full rate relief to the Taitua ki Awhitu Trust for Taitua Forest.

The geology of the peninsula is mainly terraced Pliocene, Pleistocene and Holocene fixed dunes (McEwen 1987). During 1999 there were many slips on the Awhitu Peninsula, including some in the Taitua Forest (W. Black pers. comm., Nov 2000).

Fig. 2. Location of Taitua Forest on the Awhitu Peninsula, and two other forest areas

Vegetation of Awhitu Peninsula

There is little published information on the vegetation and flora of the Awhitu Peninsula. From the peninsula, south to the mouth of the Waikato River, constitutes the Awhitu Ecological District, one of the smaller ecological districts within the Auckland Ecological Region. Botanically it is probably the poorest known and it is certainly the poorest collected Ecological District in the Auckland Region. The Auckland Museum herbarium (AK) holds only 225 native plant specimens from Awhitu Ecological District, compared with >4,000 for each of Tamaki, Waitakere and Great Barrier Ecological Districts. Carse (1901) was probably the first botanist to write about the southern area he called the Mauku District (the western third of Mauku would be included in the Awhitu Ecological District). Information on some of the Awhitu forest areas is published in the ABS Newsletters and Journals: Cookson (1965) recorded two bush areas visited by ABS (actual locations uncertain); Young (1970) records an ABS trip to Hamiltons Bush (previous name for Taitua Forest) and an adjacent area; Cameron (1994) surveyed a private bush area in

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Fig. 1. ABS members in the lush pasture below Taitua Forest during the field trip, 19 October 1996. Photo: Sandra Jones.

the Tatangarau Valley; and Green & Cutting (1995) surveyed the private Kemp Road Bush.

Most of the original native vegetation of the Awhitu Peninsula has been cleared. Both Cameron (1994) and Green and Cutting (1995) briefly cover this aspect, and Newnham and Lusk (1990) looked at mid-Quaternary plant fossils near Karioitahi Beach. In 1994 only 9% of the Awhitu Ecological District was in any form of natural cover; of that 9% most of it was scrub (84%), and less than 20% had any form of legal protection (ARC 1994). Therefore the value of protecting Taitua Forest, with 40 ha of tall forest, is way in excess of its size. Taitua is now the largest area of protected forest, and one of the largest remaining forested areas, in the Awhitu Ecological District (S. Myers pers. comm.). Several of the Taitua records (see Appendix 1) appear to be new for the Awhitu Ecological District.

Taitua Forest

It is located on the south side of Hamilton Road some 600 m south-west of the Awhitu Central hall, latitude 37° 06′ and longitude 174° 35′, map R12 508546, 70-160 m asl (see Fig. 2). Most of the forested area has a southern aspect and is on a generally steep slope. A small stream dissects part of the area and along the lower margin of the forest is the 8 ha of pasture on more or less level land. Along the interface of pasture and forest are small swampy areas where pukatea (*Laurelia novae-zelandiae*), maire tawake (*Syzygium maire*), wheki (*Dicksonia squarrosa*), manuka (*Leptospermum scoparium*) and sedges (mainly *Carex* spp.) are present.

The canopy is diverse and composed of advanced regenerating forest. There has been a relatively long history of browsing by stock, goats and feral fallow deer. A depleted understorey and ground cover reflects this. Tawa (*Beilschmiedia tawa*), kohekohe (*Dysoxylum spectabile*), karaka (*Corynocarpus laevigatus*), mangeao (*Litsea calicaris*) and totara (*Podocarpus* spp.) dominate the canopy; kahikatea (*Dacrycarpus dacrydioides*), mamangi (*Coprosma arborea*) and kanuka (*Kunzea ericoides*) locally dominate. Over ten canopy species occur occasionally, puriri (*Vitex lucens*) being the largest; kauri (*Agathis australis*), pukatea and kowhai (*Sophora microphylla*) occur only locally; and hinau

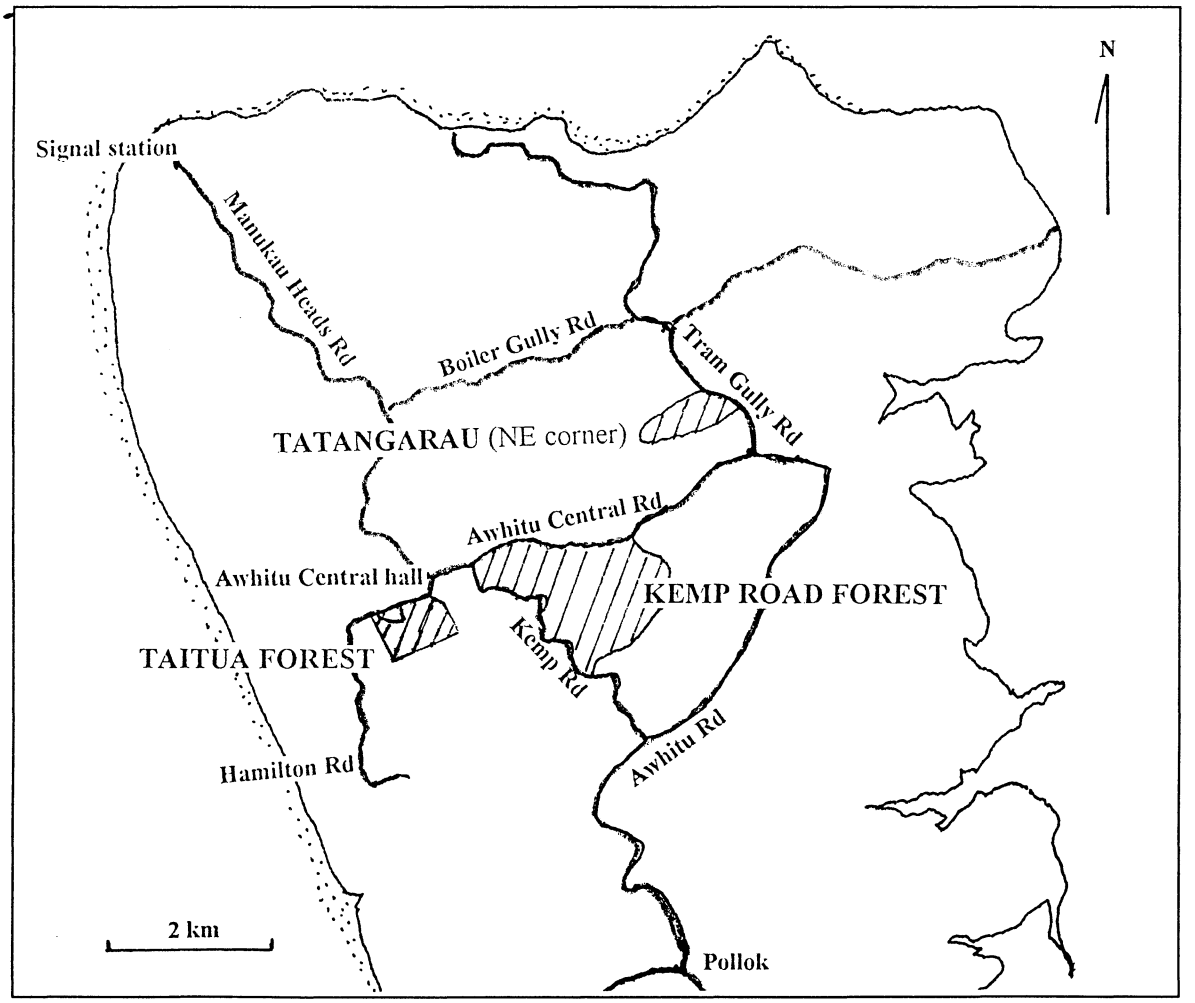

Fig. 2. Location of Taitua Forest on the Awhitu Peninsula, and two other forest areas.

(*Elaeocarpus dentatus*), titoki (*Alectryon excelsus*) and maire tawake are scarce. There are some fine trees of puriri, about 1.5 m diameter. One fantastic puriri had fallen down a forested slope and the side branches developed into "trees". Never say die! There are many fine tawa with tall, straight trunks, and locally tawa and taraire (*Beilschmiedia tarairi*) dominate. One fine karaka stood c.18 m tall.

The understorey is dominated by hangehange (*Genistoma rupestre*), kawakawa (*Macropiper excelsum*), nikau (*Rhopalostylis sapida*) and tree ferns (mainly *Cyathea* spp.). Vines are common and ferns are abundant. Generally there is an abundance of seedlings, particularly mangeao, porokaiwhiri (*Hedycarya arborea*) and nikau.

Grassland or pasture

There is an extensive pasture area (see Fig. 1) on the lower flats (8 ha), and smaller grassy areas along the margin of tracks and forest openings. The smaller areas are mainly pure swards of patiti (*Microlaena stipoides*) but the lower flats include exotic grasses as well, e.g. kikuyu (*Pennisetum clandestinum*), brown top (*Agrostis capillaris*), sweet vernal (*Anthoxanthemum odoratum*) and paspalum (*Paspalum dilatatum*). Gorse (*Ulex europaeus*) is already invading most of these grasslands, especially the larger areas.

The lower pasture has been grazed by stock in the past. Currently it is only used as a horse paddock in the winter (W. Black pers. comm., Nov 2000). The Taitua Trust Appeal brochure (1995) says that "We also intend to replant ... the cleared land [pasture] that lies at the bottom of the bush area." Gorse forms an excellent nurse crop for native forest and should be left to continue to grow and shade-out the grasses. In time the gorse will open up and native species will invade and grow through it, eventually replacing it. Because these grass areas are adjacent to such a large native seed source this process should occur moderately quickly. Therefore there will probably be no need to plant in these open areas.

Flora

Native vascular species number 181 species (73% native), which is high for an area of this size (see Appendix 1). The ferns are particularly high with 45 species. Four species recorded by Young (1970) were not seen during these present surveys. Only 68 adventive species are recorded, and most are herbaceous and insignificant. Apart from the pasture, the native species totally dominate the vegetation. See under `weeds' for a list of the potential troublesome species recorded.

Notes on four selected species:

Atrichum androgynum – a locally common moss on an old bulldozed track through the forest. It is native to Australia and New Zealand, and Taitua Forest appears to be the most northern New Zealand site that it has so far been collected. The next closest northern record appears to be from Te Kauri Scenic Reserve, at 38° 16' (*P. J. Brownsey*, WELT 27009).

Plant group	Native	Adventive	Totals
Fern and fern allies	45	-	45
Conifers	6	2	8
Dicotyledons	85	43	128
Monocotyledons	45	23	68
Totals	**181**	**68**	**249**

Table 1. Vascular flora of Taitua Forest

*Carex punctata** – locally common along the edge of an old bulldozed track through the lower part of the forest. The earliest New Zealand collection known for this exotic species was in 1980 from Waima Valley in Northland (*Esler 6386*, CHR 385301), but it wasn't identified until 1993. Records range from Waima Valley, south to Opuatai wetlands 6 km west of Rangiriri (see Cameron 1993). It was not recorded for Tatangarau (Cameron 1994) or Kemp Road Bush (Green & Cutting 1995), and this record appears to be the first for the Awhitu Ecological District.

Epilobium pedunculare – creeping willowherbs (*Epilobium* spp.) of wet areas, like this species, are rapidly being out-competed in northern New Zealand when areas are disturbed and weeds invade (see Cameron 1997). Only a single plant of this species was seen in a small wetland dominated by low kiokio (*Blechnum novae-zelandiae* - swamp form) and *Carex virgata*, with shrubs of putaputaweta (*Carpodetus serratus*), manuka and the occasional wheki. *E. pedunculare* is regionally threatened and is listed as `Declining' (de Lange et al. 1999). It was not recorded for Tatangarau (Cameron 1994) or Kemp Road Bush (Green & Cutting 1995), and this appears to be the first collection of this species for Awhitu Ecological District (cf. Raven & Raven 1976).

Para or king fern (*Marattia salicina*) – there were over 24 plants, ranging from adults with fronds up to 2.5 m long to young plants. All were within 50 m of each other under a canopy of tawa and taraire on a south-

facing mid-slope. There are other sites on the Awhitu Peninsula (shaded gullies) with quite large populations of para (pers. ob.), one of them is quite close to Taitua Forest on private land. Interestingly it was not recorded for Tatangarau (Cameron 1994) or Kemp Road Bush (Green & Cutting 1995). It is a regionally threatened species and is listed as `Vulnerable' (de Lange et al. 1999). Awhitu Peninsula is one of its regional strongholds.

Weeds

Only a few of the 68 adventive species recorded for Taitua (see Appendix 1) pose a threat to the forest or swampy areas as environmental weeds. Most of these naturalised species are herbaceous and were present in low numbers. Species that pose a threat: climbing asparagus (*Asparagus scandens*), creeping buttercup (*Ranunculus repens*), elaeagnus (*Elaeagnus* x *reflexa*), grey willow (*Salix cinerea*), lilac oxalis *(Oxalis incarnata*), Mexican daisy (*Erigeron karvinskianus*), mist flower (*Ageratina riparia*), pampas grass (*Cortaderia selloana*), woolly nightshade (*S. mauritianum*) and Himalayan honeysuckle (*Leycesteria formosa*). Climbing asparagus is probably the biggest threat. It was common only along the upper forest margin and occasional elsewhere in the forest. Only one plant of woolly nightshade was seen, which was uprooted (Dec 1997).

Fauna

Around 1991 some 100 farmed goats were rounded up from Taitua Forest (W. Black pers. comm.). No goats appear to be present today but the understorey is still recovering from past browsing. Many shrubs palatable to stock are scarce or absent, e.g. scarce: karamu (*Coprosma robusta*), coastal karamu (*C.* aff. *macrocarpa*); absent: Kirk's daisy (*Brachyglottis kirkii*), raupo (*Typha orientalis*), toropapa (*Alseuosmia macrophylla*), kotukutuku or tree fuchsia (*Fuchsia excorticata*) and whauwhaupaku (*Pseudopanax arboreus*). Browsing now appears to have virtually ceased in the forest because seedlings are abundant in most places. Hangehange was particularly common up to c. 40 cm tall in May 1995. This species is capable of rapid regeneration after browsing pres-sure is relaxed, as occurred on Rangitoto Island once wallabies and possums were poisoned (Cameron 1992). Although there is still some browsing signs evident, e.g. topless seedlings, this is probably due to fallow deer.

Feral fallow deer are frequent in small groups. On each of my visits there were fresh deer tracks and apparent sign of deer browsing in the forest, and I once saw two deer (Dec 1997). Waatara Black (pers. comm.) told me that the fallow deer originated from escaped circus deer in Waiuku in the 1930s. The current estimated numbers of feral fallow deer on the Awhitu Peninsula is in the 100s and red deer are also feral (30-40 in number) (from a reliable source). The fences at Taitua are no barrier to them.

Mustelids and rats are present. I saw a weasel on the forest margin (Dec 1997) and a ferret road kill on Kemp Road (Oct 1996). Stoats will be present as well. Ship rats have been commonly seen up the trees at night (W. Black pers. comm.). Norway rats and mice may also be present.

Possums are present, but plant species targeted by them appeared to be healthy, e.g. kohekohe and pohutukawa. Presumably a reflection of low possum numbers. During the winter of 1999 `Talon' bait was spread through the forest, killing possums and rats (W. Black pers. comm.).

I have seen the following birds during my visits: blackbird, California quail, chaffinch, eastern rosella, kahu (harrier), kereru (NZ pigeon), kotare (kingfisher), matata (fernbird), myna, pipiwharauroa (shining cuckoo), piwakawaka (fantail), pheasant, riroriro (grey warbler), skylark, tui, and white-backed magpie. Waatara (pers. comm., 1996) has seen 13 kereru present in a single day at Taitua.

Floral comparison with two adjacent natural areas

In 1994 I surveyed c.50 ha of rather open regenerating forest in the north-eastern part of the Tatangarau Valley, recording 91 native vascular species (Cameron 1994). So far this area is still untouched by exotic forestry (Tanya Cumberland pers. comm., Nov 2000). In the same year Green and Cutting (1995) surveyed the larger (>170 ha) Kemp Road Bush recording 82 native vascular species (Green & Cutting 1995). The native vascular flora of the smaller Taitua Forest being virtually double (180 spp.) that of both of the two areas above reflects the rich diversity of the Taitua Forest flora. However, note that this Taitua account is based on five visits (totalling >12 hrs) at four different times of the year, Tatangarau was based on a single 4 hr visit in February, and Kemp Road on a one day visit in July.

North-eastern Tatangarau bush contained 19 vascular species and Kemp Road Bush 14 species that were not recorded at Taitua Forest (see Appendix 1). Six of these species were both common to Tatangarau and Kemp Road: conifers - tanekaha (*Phyllocladus trichomanoides*); dicots - toropapa, Kirk's daisy, whauwhaupaku; and monocots - turutu (*Dianella nigra*) and *Schoenus tendo*. At least three of these species are probably absent from Taitua because of past browsing pressure: toropapa, Kirk's daisy and whauwhaupaku. With further surveys some of these

seven species will no doubt be found at Taitua, or establish now that the browsing pressure has been markedly reduced.

Taitua contained 26 species of native ferns not recorded at the two localities referred to above, probably reflecting more humid habitats at Taitua. No filmy ferns (which require a high humidity) were recorded at the other two areas. The two additional conifers at Taitua were both exotic and scarce. There were 40 native and 37 naturalised dicot additions, and 23 native and 17 naturalised monocot additions. Note - ten of the native monocot additions were orchids that are only seasonally above the ground.

The Future

The Taitua Trust is to be congratulated in already meeting most of its objectives set out in 1995. Most notably protecting one of the most diverse, if not the most diverse, forest areas remaining on the Awhitu Peninsula. With more surveys other vascular plant species will be added to the list, and non-vascular plants (liverworts, mosses, lichens) require much more work. The forest is regenerating well, but will benefit from regular culling of possums and rats. The high conservation values of Taitua should earn it the status of a `high priority site' by the Auckland Regional Council (ARC) to regularly carry out possum control. The best way of controlling the feral deer would be to eradicate them from the entire Awhitu Peninsula. The grassland at the bottom of the bush should be allowed to naturally regenerate to extend the forest onto this fertile flat land. Regular weeding will be required throughout, but once the few aggressive species are eliminated or severely reduced, this should be less of a task. The bush is a wonderful seed bank for adjacent areas, and for future local replanting projects. The protection of Taitua Forest stands as a wonderful example of how a natural ecosystem can be protected by a local community. Hopefully other natural areas in Awhitu can also be legally protected in a similar manner.

Acknowledgements

I thank Waatara Black for inviting me to survey Taitua Forest, permission to collect voucher herbarium specimens and for information about Taitua Forest; Doug Rogan for allowing his draft lichen list to be published; Shona Myers (ARC) for additional information; Jessica Beever and John Braggins for bryophyte identification; Sandra Jones for Figure 1; the people who accompanied me during these visits, Tanya Cumberland and Viv Rutherford (31 May 95), Doug Rogan (10 Oct 96), ABS members on the field trip and Waatara Black (19 Oct 96), and Bill Sykes (2 Dec 97); and Jessica Beever, Alan Fife and Jeff Fox on for comments on the northern New Zealand distribution of *Atrichum androgynum*.

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Appendix 1. Flora of Taitua Forest.

Vascular plants

Key

a = abundant
c = common
o = occasional
l = local
s = scarce (< 5 plants seen)
x1 = only 1 individual seen

* = adventive species
AK = Auckland Museum herbarium voucher number
A = also recorded for Awhitu Peninsula by Aspin (1999)
K = also recorded at Kemp Rd by Green & Cutting (1995)
T = also recorded at Tatangarau by Cameron (1994)
Y = also recorded at Taitua by Young (1970)

Ferns and fern allies (45 + 0)

Adiantum cunninghamii	lc	common maidenhair; K, T
A. fulvum	c	maidenhair, AK 229414
A. hispidulum	s	rosy maidenhair
A. viridescens	l	maidenhair
Anarthropteris lanceolata	o	lance fern
Arthropteris tenella	s	jointed fern
Asplenium bulbiferum s.str.	l	manamana, mouki, hen & chickens fern, AK 229411
A. flaccidum	o	makawe o Raukatauri, hanging spleenwort
A. hookerianum	l	AK 229407

A. lamprophyllum	o	
A. oblongifolium	o	huruhuruwhenua, shining spleenwort; K
A. polyodon	c	petako, sickle spleenwort
Blechnum chambersii	l	nini
B. filiforme	a	thread fern
B. membranaceum	c	T
B. novae-zelandiae	o	kiokio, including swamp and terrestrial forms; K, T
Cyathea dealbata	o-lc	ponga; K, T
C. medullaris	c	mamaku; K, T
Deparia peterseni	lc	T
Dicksonia squarrosa	o	wheki; K, T
Doodia australis	o-lc	prickly rasp fern; T
Histiopteris incisa	l	mata or water fern
Hurpersia varia	s	iwituna
Hymenophyllum demissum	o	filmy fern; Y
H. dilatatum	l	filmy fern
H. revolutum	l	filmy fern
H sanguinolentum	Y	filmy fern, not recorded during present surveys
Lastreopsis glabella	c	AK 229418; K, T
L. hispida	o	old hairy legs
L. microsora	o	
Lygodium articulatum	o	mangemange; K, T
Marattia salicina	l	para or king fern, AK 229416
Microsorum pustulatum	c	kowaowao or hound's tongue; K
M. scandens	o	mokimoki or fragrant fern; K
Paesia scaberula	l	matata or scented fern; T
Pneumatopteris pennigera	c	pakau or gully fern; K, T
Polystichum richardii	o	pikopiko or tutoke or common shield fern
Pteridium esculentum	o	rahurahu or bracken; K, T
Pteris macilenta	c	sweet fern, AK 229422
P. saxatilis	o	AK 229417
P. tremula	o	turawera or shaking brake; T
Pyrrosia eleagnifolia	o	leather-leaf fern; K, T
Tmesipteris elongata	l	T
T. lanceolata	o	
Trichomanes reniforme	o	kidney fern

Gymnosperms (6 + 2)

Agathis australis	l	kauri, up to 35 cm DBH; K, T
*Cupressus macrocarpa**	s	macrocarpa
Dacrycarpus dacrydioides	o-lc	kahikatea; K, T
Dacrydium cupressinum	o	rimu; K, T
*Pinus radiata**	s	radiata pine
Podocarpus hallii	c	Hall's totara, and hybrids; K
P. totara	c	totara: K, T
Prumnopitys ferruginea	o	miro; K

Dicotyledons (84 + 44)

Aceana anserinifolia	lc	piripiri or bidibid
*Ageratina riparia**	o-lc	mist flower, 1 patch 10 x 20m, AK 229413; K, T
Alectryon excelsus	s	titoki; K, T
Beilschmiedia tarairi	o	taraire; K
B. tawa	c	tawa, AK 234545; K
*Berberis glaucocarpa**	l	barberry
Brachyglottis repanda	o	rangiora; K, T
Callitriche muelleri	lc	T
*C. stagnalis**	l	starwort
Calystegia sepium	l	pink bindweed; T
C. tuguriorum	o-lc	T
Carmichaelia australis	s	makaka or NZ broom; T
Carpodetus serratus	o	putaputaweta; K, T
*Centaurium erythraea**	o	centaury
Centella uniflora	o-lc	T
*Cerastium fontanum**	lc	mouse-ear chickweed
*Chamaecytisus palmensis**	s	tree lucerne, originally planted?
*Cirsium vulgare**	o	Scotch thistle
Clematis paniculata	o	puawanaga or clematis; T
*Conyza albida**	o	fleabane
Coprosma arborea	o-lc	mamangi; K, T
C. lucida	l	shiny karamu; T
C. aff. *macrocarpa*	s	coastal karamu
C. rhamnoides	c	T
C. robusta	s	karamu; K, T
Coriaria arborea	s	tutu
Corynocarpus laevigatus	c	karaka; K
*Crepis capillaris**	o	hawksbeard
*Daucus carota**	o	wild carrot
Dichondra repens	l	Mercury Bay weed
Dysoxylum spectabile	c	kohekohe; K
*Elaeagnus x reflexa**	s	elaeagnus
Elaeocarpus dentatus	s	hinau
Epilobium pedunculare	x1	willowherb, AK 229578
E. rotundifolium	l	willowherb
*Erigeron karvinskianus**	lc	Mexican daisy, AK 229576
Euchiton gymnocephalus	l	creeping cudweed
*Galium aparine**	o	cleavers
G. propinquum	l	AK 234544
*Gamochaeta spicata**	o	purple cudweed (= *Gnaphalium coarctatum*)
Gaultheria antipoda	s	tawiniwini or bush snowberry
Geniostoma rupestre	c	hangehange; K, T
Geranium homeanum	o	pinakitere
Gonocarpus incanus	l	
Griselinia lucida	s	puka
Haloragis erecta	o	toatoa; K
Hebe macrocarpa	l	koromiko, flowering 10 Oct 1996
H. stricta	s	koromiko; T
Hedycarya arborea	o	porokaiwhiri or pigeonwood, AK 229393; K
Hoheria populnea	o	houhere or lacebark
Hydrocotyle dissecta	o	
H. novae-zeelandiae	o	hydrocotyle
*Hypochoeris radicata**	o	catsear
Knightia excelsa	o	rewarewa; K, T
Kunzea ericoides	lc	kanuka; K, T
Laurelia novae-zelandiae	l	pukatea: K, T
Leptecophylla juniperina	s	prickly mingimingi; K, T
Leptospermum scoparium	c	manuka; K, T
*Leucanthemum vulgare**	o	oxeye daisy
Leucopogon fasciculatus	o	mingimingi; K, T
*Leycesteria formosa**	s	Himalayan honeysuckle; T
Litsea calicaris	c	mangeao; T
Lophomyrtus bullata	s	ramarama
L. bullata x L.obcordatum	x1	c.6 m tall, AK 229575
*Lotus pedunculatus**	o-lc	lotus; T
Macropiper excelsum	c	kawakawa; K, T
Melicope simplex	s	poataniwha, AK 229406
Melicytus ramiflorus	o	mahoe; K, T
*Mentha pulegium**	o	pennyroyal
Metrosideros carminea	x1	akakura or carmine rata AK 222627
M. diffusa	o	aka
M. excelsa	o	pohutukawa; K, T
M. fulgens	o	rata or aka or rata vine
M. perforata	a	aka or small white rata; T
Mida salicifolia	s	maire-taiki or willow-leaved maire; Y
Muehlenbeckia australis	la	large-leaved muehlenbeckia or puka
M. complexa	l	pohuehue or wire vine
Myrsine australis	o	mapou; K, T
*Nasturium officinale**	lc	watercress, AK 229412; K
Nertera depressa	s	T
N. dichondrifolia	l	T
Nestegis lanceolata	o	white maire; K
Olearia furfuracea	o	akipiro; K, T
Oxalis ? exilis	o	
*O. incarnata**	o-lc	lilac oxalis
Parsonsia heterophylla	c	akakaikiore or NZ jasmine; K, T
Passiflora tetrandra	o	kohia or NZ passion fruit
*Physalis peruviana**	s	cape gooseberry

*Phytolacca octandra**	o	inkweed
Pittosporum cornifolium	o	
P. crassifolium	x1	karo, seedling, from wild or cultivated source?
P. tenuifolium	s	kohuhu; T
*Plantago australis**	I	swamp plantain
*P. lanceolata**	o	narrow-leaved plantain
*Polygonum hydropiper**	lc	water pepper
*Prunella vulgaris**	o	selfheal
Pseudopanax crassifolius	o	horeka or lancewood; K
P. crassifolius x *P. lessonii*	s	
Ranunculus amphitrichus	lc	waoriki, AK 234541
*R. parviflorus**	o	small-flowered buttercup
R. reflexus	o	maruru
*R. repens**	lc	creeping buttercup
Rhabdothamnus solandri	o-lc	taurepo, AK 234547
Rubus cissoides	o	tataramoa or bush lawyer; K
R. fruticosus agg.*	o	blackberry; K, T
*Rumex conglomeratus**	I	clustered dock
R. fruticosus agg.*	o	blackberry
*Salix cinerea**	s	grey willow, AK 229577
Schefflera digitata	s	pate; T
*Senecio bipinnatisectus**	o	Australian firewood
S. minimus	o	fireweed
*Sherardia arvensis**	lc	field madder
Solanum americanum	o	raupeti or small-flowered nightshade
S. ? *aviculare*	s	poroporo
*S. linnaeanum**	s	apple of Sodom
*S. mauritianum**	x1	woolly nightshade; K, T
*S. pseudocapsicum**	o-lc	Jerusalem cherry, many uprooted by ABS members
*Sonchus asper**	o	prickly sow thistle
Sophora microphylla	I	kowhai
*Stellaria media**	o	chickweed
Streblus heterophyllus	o	turepo or milk tree, AK 234540
Syzygium maire	s	maire tawake; K
Toronia toru	Y	toru, not recorded during present surveys
*Trifolium dubium**	o	suckling clover
*T. pratense**	o	red clover
*T. repens**	o	white clover
*Ulex europaeus**	lc	gorse; K, T
Vitex lucens	o	puriri; K, T
Wahlenbergia ? ***violacea***	o	rimuroa or harebell, AK 234536

Monocotyledons (45 + 23)

Acianthus sinclairii	lc	A, K, Y
*Agrostis capillaris**	lc	brown top
*Anthoxanthum odoratum**	lc	sweet vernal; T
*Asparagus scandens**	o-lc	climbing asparagus AK 229423
Astelia solandri	s	kowharawhara; K
A. trinervia	s	kauri grass; K
Baumea rubiginosa	lc	K
*Briza minor**	o	small quaking grass
Caladenia chlorostyla	I	AK 234535; A
Carex dissita	c	T
C. lessoniana	lc	rautahi; T
*C. punctata**	lc	AK 229427, 230850, 234546
C. solandri	o	AK 229426
C. spinirostris	o	AK 229410
C. virgata	lc	purei; T
Collospermum hastatum	o	kahakaha; K
Cordyline australis	I	ti, cabbage tree; K, T
C. banksii	o	ti ngahere; K, T
*Cortaderia selloana**	I	pampas grass
Corybas macranthus	c-la	spider orchid, AK 229409; A
C. oblongus	I	spider orchid, AK 229408; A
C. trilobus	lc	spider orchid, AK 229415; A, Y
*Cyperus congestus**	o	purple umbrella sedge; T
*C. tenellus**	lc	
Cyrtostylis oblonga	Y	not recorded during present surveys
*Dactylis glomerata**	o	cocksfoot
Earina mucronata	o-lc	peka-a-waka; A
Echinopogon ovatus	I	hedgehog grass
Eleocharis acuta	lc	T
Freycinetia banksii	o	kiekie; K, T
Gahnia lacera	o	tarangarara; ?K, T
*Glyceria declinata**	lc	glaucous sweet-grass
*Holcus lanatus**	lc	Yorkshire fog
Isachne globosa	la	swamp millet; K, T
Isolepis reticularis	lc	
*I. sepulcralis**	lc	
Juncus ? *acuminatus**	lc	
J. australis	I	wiwi
*J. bufonius**	o	toad rush
*J. effusus**	lc	soft rush; T
J. gregiflorus	o	wiwi
J. planifolius	o	
*J. tenuis**	o	track rush
Lepidosperma laterale	I	K, T
Libertia grandiflora	I	AK 234538
*Lolium perenne**	o	rye grass
Microlaena stipoides	la	patiti or meadow rice grass; T
Microtis unifolia	o	maikaika or onion orchid, AK 229579; A
Oplismenus hirtellus	o	panic grass; K, T
*Paspalum dilatatum**	lc	paspalum; T
*Pennisetum clandestinum**	lc	kikuyu grass
Phormium tenax	o	harakeke or flax, stiff leaves with orange margins, some leaves topping over at tips; T, K
Poa pusilla	I	sheaths virtually glabrous, AK 234537
*P. trivialis**	lc	rough meadow grass
Pterostylis alobula	I	?A
P. banksii	o	tutukiwi; A
P. "graminea" (*P. agathicola/graminea*?)	Y	not recorded during present surveys; ?A
P. trullifolia	I	A, K, Y
Rhopalostylis sapida	c	nikau, AK 229419, 229813; K
Rytidosperma gracile	o-lc	danthonia, other spp. also present? AK 234539
*Schedonorus phoenix**	lc	tall fescue; T
Schoenoplectus tabernaemontani	I	kapungawha or kuta; K
Schoenus maschalinus	o	T
*Sieglingia decumbens**	I	heath grass, AK 234543
Thelymitra pauciflora	s	sun orchid; A, ?Y
Uncinia banksii	lc	hook sedge
U. uncinata	c	kamu or hook sedge; ?K, T
*Zantedeschia aethiopica**	I	arum lily

Non-vascular plants (under recorded)

Bryophytes

Archilejeunea olivacea	lc	AK 234819
Atrichum androgynum	lc	northern NZ geographical limit? AK 229356
Fissidens taxifolius	I	AK 229523
Leptostomum macrocarpum	o	AK 228313
Ptychomnion aciculare	lc	

Lichens - collected (10 & 19 Oct 2000), identified and compiled by D.B. Rogan

Brigantiaea chrysosticta AK 233192
?*Buellia* sp. AK 233199
Chrysothrix candelaris AK 228321
Coccotrema cf. *cucurbitula* AK 228319
Coenogonium implexum AK 228308
Graphis ?*librata* AK 228323
G. sp. AK 228327
?*Lecidea* sp. AK 233196
Megalospora sp. AK 228331
Parmeliella nigrocincta AK 228317
Pertusaria sorodes AK 230723
P. sp. AK 233191
Pseudocyphellaria chloroleuca AK 228325
P. pickeringii AK 228329
Psoroma ?*sphinctrinum* AK 230984
Pyrenula ?*cyrtospora* AK 23098