

8 Donlin Road,  
Pukerua Bay,  
9 September 1980

On L. 1110  
orchids  
on  
disease

TO: PORIRUA CITY COUNCIL,  
PARKS AND RECREATION DEPARTMENT

RAROA AND WAIRAKA RESERVES, PUKERUA BAY  
WITH REFERENCE TO THE 1979 PORIRUA CITY COUNCIL  
MANAGEMENT PLAN *ym*


R26 680173

Background

The Raroa Reserve and Wairaka Road Reserve are defined on a hand-corrected map of Pukerua Bay in the "Porirua Reserves Management Plan" received 20.7.80 from the Parks and Reserves Department of the Porirua City Council. These reserves were regarded as a single "Recreation Reserve" by the Hutt County Council, when I wrote a submission to that Council on 29.2.72 requesting fencing of the area from domestic stock. Parts of this submission were repeated in my "Report on Raroa Reserve Pukerua Bay, with special reference to the effects of herbicide upon it" 16.5.76, to the Porirua City Council. One of these submissions appears to have been used as part of the background data for the present management plan for Raroa Reserve. Although I am pleased that my original submission was of use beyond obtaining the requested fencing, there are a number of errors in the management plan resulting from:

- (a) a misunderstanding that my 1972 submission only applied to Raroa Reserve - it covered both the Wairaka Road and Raroa Reserves of the present Management Plan map (e.g. the rare plant, Schoenus concinnus, is only in Wairaka Road reserve);
- (b) new information, based on my 10 years' exploration of both reserves and other natural vegetation of Pukerua Bay;
- (c) typographical and editorial errors (e.g. 12155m<sup>2</sup> is not 30 acres, but nearer 3 acres).

As I presume that a management plan will be forthcoming on the Wairaka Road Reserve, I wish to take this opportunity to supply the following information on both reserves.

  
C.C. Ogle

Vegetation of Raroa Reserve, Pukerua Bay

In vegetation and topography, "Raroa Reserve" consists of two major parts:

(a) roughly 25% of the area is coastal broad-leaved forest which extends from the tops of very steep coastal hills at c.70m a.s.l. through a gently sloping valley running N.E. to Raroa Place. Within this forest there are several vegetation types which have arisen partly through site differences, and partly from the relative age of the stand:

- (i) Karaka forest; near cliff edge
- (ii) Kohekohe/Kaikomako forest; in shelter of the Karaka forest
- (iii) Ngaio-Kaikomako-Kohekohe; young mixed forest nearer Raroa Place
- (iv) Tall Kanuka forest and young shrublands; close to Raroa Place and the tall pines on boundary.

(b) roughly 75% of the area comprises steep coastal cliffs, partly stabilised or loose scree, and partly rock outcrops. These support a complex vegetation mosaic of shrubland, and grassland reverting to shrubland. Some associations are:

- (i) Pohuehue - Coprosma propinqua shrubland; mainly on stable or semi-stable scree.
- (ii) Karaka "forest"; remnant stands of karaka, understorey totally eaten out by sheep.
- (iii) Montpellier broom Senecio angulatus shrubland; exotic weedy vegetation spreading westwards from western-most houses.
- (iv) Mountain flax "tussockland"; on rocks with soil pockets.
- (v) Microlaena stipoides grassland; mainly near cliff tops in western-most part of reserve.
- (vi) Mixed Leptocarpus/Selliera - Scirpus cernuus "salt marsh"; tiny pockets between the road and high-tide mark, on the rock and shingle shore. These areas are extremely vulnerable to road-widening operations.

The accompanying species list (Appendix) shows that areas (a) and (b), as defined above, combine to give a reserve which is very diverse in native species - only about 30 species (mostly trees and shrubs) occur in both parts of the reserve. The area remains one of the largest protected coastal areas of the Wellington Region.

Vegetation of Wairaka Reserve, Pukerua Bay

Wairaka Reserve is almost totally enclosed with the gorge of the Waimapihi Stream, which has cut down through the shatter zone of rocks on the Pukerua Fault Line. The vegetation is tall secondary kanuka forest near the head of the gorge, but this is progressively more stunted and sparse towards the sea, and is replaced by flax-dominated flax-shrublands and herbaceous plant communities.

In places, the kanuka has a dense understorey of ferns and shrubs, some of which will eventually overtop and replace the kanuka to produce a broad-leaved coastal forest. There is a wetter micro-climate within this forest than in Raroa Reserve, as shown by the success of mamaku (tree fern), Coprosma grandifolia, Astelia fragrans, kiekie and other species in the Wairaka Reserve.

The communities of the lower reaches of the gorge are unknown elsewhere in Pukerua Bay, and include some rare species regionally. Some notable plants of this area are discussed in the next section (Aciphylla, Craspedia, Raoulia, Schoenus concinnus), but other plants only known from this site in the Pukerua Bay district include Cotula squalida, Sonchus kirkii, Lachnagrostis richardii, and Blechnum sp (lower pinnae not reduced).

The only Pukerua Bay site for the sedge Lepidosperma australe is on the western rim of the gorge beside the foot-track down the cliffs.

The open nature of this vegetation permits the entry of weed species. Exotic plants such as brush wattle (Albizzia lophantha), and wall-flower (Cheiranthus cheirii), and also native plants which are not, however, indigenous to the Region (e.g. pohutukawa and karo) are increasing. Recent major slips from the edges of the main road and "zig-zag" walking track allow easy new sites for many weeds.

The Notable Plants of Raroa and Wairaka Reserves

Rare species: No plants of either reserve are known to be nationally endangered. However, the following species are of special note:

Species unknown elsewhere in Wellington Region (defined as extending to Waikanae River - Hinutaka summit - C. Turakirae):

1. Accena sp (un-named) : apparently rare nationally; now known near C. Falliser, and similar plants occur near Taihape. Raroa Reserve might still become the Type Locality when the species is formally described and named. (Actually occurs in about 4 other tiny forest remnants on hills, within 500m of the reserve, but unprotected in these other sites.)

2. Schoenus concinnus (= S. nitens var. concinnus in "Flora of N.Z." Vol. 2 : Moore and Edgar).

A distinct species of small sedge, mostly in subalpine sites in the North Island (Egmont, Kaimanawa Ra, Volcanic Plateau); first Tararua finding in 1979 on Ngamaia west of Eketahuna. Only once reported in Wellington region - 1894 "Wellington (S. Coast), East of heads" D. Petrie, and not relocated there. In the Wairaka Reserve, it consists of one diffuse-to-compact patch on steep permanently damp greywacke, covering perhaps 2m<sup>2</sup>. Over the period 1970-80 it appears to have increased its area a little.

Species uncommon and/or endangered in the Wellington Region

1. Cerieria sarmentosa. Only on Wellington coasts in the North Island, more common in South Island, and known on Stewart Is. Low growing "shrub" - dies to ground level each winter. Threatened by smothering with exotic grasses and weeds at many of its locations around Wellington, including the Raroa Reserve cliffs. Being reduced, too, by quarrying elsewhere. Not yet rare in Region, but could become so.

2. Paratrophis banksii. Scattered at coastal localities from near Kaitiaki to the Marlborough Sounds. Rare in Wellington Region (elsewhere seen in K. Gray's forest, Pauatahanui Harbour, and known in one other site in Porirua East.) No regeneration in Raroa Reserve - only 4 semi-adult shrubs known there.)

3. Aciphylla squarrosa. As defined by H. B. Allan ("Flora of N.Z." Vol. 1) this species is widespread on coasts and on mountains of N.Z. from East Cape to Marlborough and N.W. Nelson. However recent comparisons of plants in cultivation from coastal and mountain sites suggests at least two species are included under this name. This means that one species may be confined to rocky coastal sites on the shores of Cook Strait. Around Wellington coasts Aciphylla was once common, but has been much reduced by burning, grazing, quarrying, and while not yet rare could easily become so.

At a few sites on the south Wellington coast, Aciphylla is the only habitat for the endangered large weevil, Lyperobius huttoni, but this animal has not been recorded from coastal Porirua. In the Wairaka Reserve, Aciphylla is confined to the floor of the gorge, and has become less common since 1970. Slips from the main road covered some, but most are being overgrown by vigorous flax plants. Nutrients from treated sewage or faulty septic tanks are suspected to have accelerated flax growth. Some management will be needed to allow Aciphylla to survive in this Reserve - the only known site for the plant in Pukerua Bay, and probably the furthest north site on the Wellington coast. The next-nearest site is Goat Pt, Plimmerton but these might have all been eliminated in a recent major grading of this cliff face. A good population still exists in "Rocky Bay", Onepoto Peninsula.

4. Craspedia uniflora var. maritima. An endemic Wellington plant, but widespread on semi-shaded rocky coastal sites, from Pukerua Bay to Eastbourne. All populations have yellow flowers, except from the north end of Titahi Bay, the coast west of Karehana Bay, Wairaka Point, and Wairaka Reserve, where they have white flowers. More common than Aciphylla in Wairaka Reserve, but as for that species, flax growth is also reducing Craspedia.

5. Raculia sp (un-named, c.f. R. hookeri). A plant endemic to both shores of Cook Strait. Grows on fine shingle, and earth pockets on steep rocky sea cliffs. Once more common than now; threatened by quarrying, spread of grasses and other exotic plants, over-grazing practices, and fires. Only in Wairaka Reserve at Pukerua Bay (probably the northern limit for the species); seen between Wairaka Pt and the Plimmerton Quarry, and occasionally from Titchi Bay - southwards. In Wairaka Reserve, it is on a steep greywacke face near the Schoenus concinnus plants - confined to a few m<sup>2</sup>; not spreading since 1970, but not immediately threatened either.

6. Hypolepis distans. A widespread but uncommon fern in warmer and lowland areas of N.Z. Very rare in Wellington Region (3 known locations : Dr P. Brownsey, National Museum, pers. comm. - these are Pinehaven, Paraparaumu, Pukerua Bay.) In Raroa Reserve there is only one plant, located on a rotting tree stump. In May 1980 I noted a number of tiny "sporelings" beneath the fronds, and some were transplanted to about 6 similar sites within a 50m radius. The success of these transplants remains in doubt. The "parent" plant's situation is obviously temporary, and unless transplants can be achieved, the species' continued presence in the Region is rather doubtful.

7. Pellaea sp. (un-named : c.f. P. rotundifolia and P. falcata). Only recently have I demonstrated to Dr Brownsey that plants of Pellaea on steep fractured-greywacke coastal cliffs of Pukerua Bay are distinct from P. rotundifolia in adjacent coastal forest. Dr Brownsey has since found this species near Red Rocks, and examination of herbarium material suggests some inland Canterbury plants may be similar. Until this species is researched further, Raroa Reserve cliffs are an important botanical site. The same plant does occur on cliffs west of the Reserve, towards Wairaka Point, often with two other uncommon ferns, Cheilanthes sieberi and C. distans. Neither of these latter two occurs within the Raroa Reserve. The Pellaea is most threatened by over-grazing of sheep, and by smothering in grass - where it occurs with grass, light grazing may be necessary to maintain the fern. Fortunately, the Pellaea also grows occasionally in rock crevices which do not support competing grass species.

Management of Raroa Reserve

1. Fencing: There is no doubt that fencing in 1972 has 'saved' this forest from the rapid deterioration of unfenced coastal forest remnants of Pukerua Bay. Continual maintenance is needed on this fence - at the time of writing there are many broken wires in the section near the public entrance from Raroa Place. This has been caused by children using the swing on the first-encountered pine tree. If cattle are grazed in adjacent pastures the fence would not keep them out of the Reserve.

In May 1976 I reported to the Council that "although some problems still exist in making it [the fence] stock-proof at the coastal end, a marked improvement in vegetation has resulted from its presence". The situation in mid-1980 is unchanged. Sheep continue to enter the Reserve around the beach end of the fence, but appear to spend much of their time on the cliffs. When they reach the forest, the numbers of sheep are low enough to confine grazing to grassed areas, and in fact they may "release" shrub seedlings from the grass.

Their impact on the coastal cliffs is more evident. Coprosma propinqua bushes continue to be grazed as well as grasses; ideally, the stability of scree slopes is best promoted by encouraging the Coprosma - Muehlenbeckia stands. However, there is an unexpected benefit from light grazing of cliff vegetation too : viz. the reduction of fire hazard by removal of dry long grass in summer and autumn, especially in dry years.

Recommendation: Make the existing fence sheep-proof to just above the high-tide mark. This will prevent most sheep entering the Reserve but with periodic supervision allows enough grazing to reduce grass height without markedly affecting other species. Obviously co-operation of the adjacent farmer would need to be sought in this matter.

2. Nettles: As predicted in my report to the Council on 16.5.76 native nettles have increased in abundance and vigour in areas cleared by herbicide in late 1975. As stated then, the most effective long-term control is to encourage both canopy trees and other understorey shrubs, as Urtica ferox (nettle) requires good light for germination and growth.

Most of the public use of the Reserve is confined to the "play area" near the entrance, and to the fence-line and cliff top. If the public are to use the track through the valley, then hand-cutting of the nettles (only) is the only solution. These should only be removed from, say, 1 to 2 metres each side of the track. This would create a safe public path without letting in too much light.

3. The beach track: At the base of the cliffs is a foot-track which extends westward from a pipe-barrier. Trail-bikes occasionally bypass this barrier and are ridden almost to Wairaka Point. While no appreciable damage is caused directly to vegetation by this practice it has two effects:

- (a) the stock fence beside the stile, and the old fence between this and the pipe-barrier have been completely flattened, it is guessed, by the trail-bike users for easy access. (Initial damage to the fences was by storms);
- (b) pedestrian use of the track is spoiled and even endangered. Possibly the new beach front developments east of the pipe-barrier include a more effective way of stopping trail bikes. If not, then

Recommendation: the current pipe-barrier and stock fence by the stile be extended to prevent motor-cycle access to the Reserve and beyond.

4. Parking area: Protect the remnant "saltmarsh" communities from any extensions of car-park area.

#### Management of Wairaka Reserve

Public use: This is almost totally confined to the rim of the gorge behind the Plunket Rooms and sections backing on to the Reserve from Rawhiti Road. Children create heavy pressure on the limited areas of flat ground, and regeneration of other



forest species under the kanuka is largely prevented. There seems no simple solution to this problem. (However, just over the rim of the gorge from the plywood skate-boarding structure near the Plunket Rooms is a large wet sandy-clay "excavation" which I see as a potential hazard to children who enter the hole and dig further.)

The very limited areas of rarer plants on the floor of the coastal end of the gorge suggest no public track should be made along this area. In addition, the instability of all the near-vertical sides of the gorge means that even minor track formation at their bases could start new landslides.

Recommendations:

1. The Wairaka Reserve should remain an untracked wilderness, to protect the physical features and the flora.
2. Should a track be planned along the stream, then advice should be sought on its route and form from engineers and botanists.

Summary:

The Wairaka and Raroa Reserves combine to give a very wide range of topographical, geological, and botanical features, many poorly represented elsewhere in the Wellington Region.

To protect these values, public use should be restricted by minimal tracking beyond that already existing. The best protection of the Reserves lies in encouraging natural vegetation cover by whatever means are compatible with existing values.

  
C.C. Ogle

12/9/60

APPENDIX

NATIVE PLANTS OF PUKERUA BAY RESERVES

(1) Wairaka Rd gully, (2) Coastal section of Wairaka and Raroa Reserves, (3) Raroa Reserve (bush).

C.C. Ogle 31.7.80

<u>Dicotyledon Trees and Shrubs</u>	<u>Common name</u>	(1) Wairaka	(2) Coast	(3) Raroa
Alectryon excelsus	(titoki)			r
Beilschmiedia tawa	(tawa)			r
Brachyglottis repanda	(rangiora)		f	r
Carmichaelia arborea var.	(N.Z. broom)		o	o
Cassinia leptophylla	(tauhinu)	o	r	f
Coprosma areolata				o
C. grandifolia	(kanono)	f		
C. lucida	(karamu)			r
C. propinqua		f	a	a
C. repens	(taupata)	f	o	o
C. rhamnoides		o	r	o
C. robusta	(karamu)	f		r
C. propinqua x C. robusta			r	r
Coriaria arborea	(tutu)	f		
C. sarmentosa	(tutu)	o	r	
Corynocarpus laevigatus	(karaka)	o	o	f
Cyathodes fasciculata	(mingimingi)	f		
C. fraseri	(patotara)	f		
C. juniperina	(prickly mingimingi)		r	
Dodonaea viscosa	(akeake)		r	
Dysoxylum spectabile	(kohekohe)	o	r	a
Fuchsia excorticata	(kotukutuku)	r		
Geniostoma ligustrifolium	(hangehange)	f	r	o
Griselinia lucida	(broadleaf)	r	o	o
Hebe stricta var. macroura	(koromiko)	f	o	o
Hebe sp (Veronica arborea)	(tree hebe)	o		r
Hedycarya arborea	(pigeonwood)	o		o
<del>Kanuka</del> Leptospermum ericoides	(kanuka)	r a		f
L. scoparium	(manuka)	f		
Lophomyrtus bullata	(ramarama)			r

<u>Dicotyledon Trees and Shrubs</u>	<u>Common name</u>	(1) Wairaka	(2) Coast	(3) Rarua
<i>L. obcordata</i>	(rohutu)			o
<i>Macropiper excelsum</i>	(kawakawa)	a	r	a
<i>Melicope ternata</i>	(wharangi)	f		f
<i>Melicytus ramiflorus</i>	(mahoe)	a		a
<i>Myoporum laetum</i>	(ngaio)	o	r	f
<i>Myrsine australis</i>	(mapou)	r	r	r
<i>Olearia paniculata</i>	(akeraho)	f	f	r
<i>Paratrophis banksii</i>	(milktree)			r
<i>Pennantia corymbosa</i>	(kaikomako)	o	r	a
<i>Pimelea prostrata</i> var. <i>prostrata</i>	(pinatoro)	o	f	
<i>Pseudopanax arboreus</i>	(5-finger)	a	o	r
<i>P. crassifolius</i>	(lancewood)	o		o
<i>Solanum aviculare</i>	(poroporo)			r
<i>Urtica ferox</i>	(shrub nettle)	r		a
<u>Dicotyledon Lianes (climbers)</u>				
<i>Calystegia soldanella</i>	(sand convolvulus)		o	
<i>C. tuguriorum</i>		r		o
<i>Clematis hookeriana</i>		r	o	r
<i>C. paniculata</i>				r
<i>Metrosideros diffusa</i>	(white rata)			r
<i>M. fulgens</i>	(red rata vine)			o
<i>M. perforata</i>	(white rata)	o		f
<i>Muehlenbeckia australis</i>	(pohuehue)	o		o
<i>M. complexa</i>	(pohuehue)	f	a	a
<i>M. australis</i> x <i>M. complexa</i>			o	
<i>Parsonsia capsularis</i>	(N.Z. jasmine)	f	o	f
<i>P. heterophylla</i>	(N.Z. jasmine)	r	?	r
<i>P. capsularis</i> x <i>P. heterophylla</i>		o	?	f
<i>Rubus cissoides</i>	(lawyer)			r
<i>R. schmidelioides</i>	(lawyer)			r
<i>Tetragonia trigyna</i>	(N.Z. spinach)	f	o	r
<i>Tetrapathaea tetrandra</i>	(N.Z. passionfruit)		r	r

<u>Dicotyledon herbs</u>	<u>Common name</u>	(1) Wairaka	(2) Coast	(3) Raroa
Acaena anserinifolia	(bidibidi)			r
A. sp. (un-named)				f
Aciphylla squarrosa	(spear-grass)	o		
Apium australe	(sea celery)	o		
Atriplex hastata (?)			o	
Cardamine sp. (C. debilis agg. "broad petal"/"long style")	(bittercress)			o
Centella uniflora		f		f
Colobanthus muelleri		r	o	
Cotula squalida subsp. squalida		o		
Craspedia uniflora var. maritima		o		
Dichondra repens	(Mercury Bay weed)	f	f	o
Disphyma australe	(ice-plant)	f	o	
Epilobium rotundifolium		r		r
<del>Epilobium rotundifolium</del> Galium propinquum		r	o	
Geranium sessiliflorum		o	o	
Gnaphalium audax	(cud-weed)	r	o	
G. gymnocephalum	(cud-weed)			r
G. sp (G. luteo-album agg.)	(cud-weed)	o	o	
Haloragis erecta		o	o	
Hydrocotyle americana	(pennywort)			r
H. moschata	(pennywort)			o
Lagenifera pumila		r		r
Linum monogynum		o	o	
Lobelia anceps		o	o	
Oxalis exilis (?)		?	f	
O. sp-(Upright; 15mm diam.-fls)- <del>perennans</del>			o	
Parietaria debilis				a
Peperomia urvilleana			o	
Plantago raoulii (broad- leaved)	(N.Z. plantain)	o		
Ranunculus hirtus	(bush buttercup)			o
Raoulia sp. (c.f.R. hookeri)		o		
Rhagodia triandra			o	
Salicornia australis	(glasswort)		o	
Samolus repens		o	o	
Scleranthus biflorus			o	
Selliera radicans	(half-star)	o	r	

<u>Dicotyledon herbs</u>	<u>Common name</u>	(1) Wairaka	(2) Coast	(3) Raroa
Senecio hispidulus			r	
S. lautus		o	f	
Sonchus kirkii		o		
Stellaria parviflora		o		o
Tillaea sieberiana		o	o	
Vittadinia australis		r	o	
Wahlenbergia colensoi (?)	(harebell)			r
W. gracilis	(harebell)		f	
W. marginata	(harebell)	o		
<u>Monocotyledon Tree</u>				
Cordyline australis	(cabbage tree)			r
<u>Monocotyledon Lianes</u>				
Freycinetia baueriana banksii	(kie kie)	o		
Ripogonum scandens	(supplejack)	r		*
<u>Grasses</u>				
Agropyron sp (A. scabrum agg.)			o	
Cortaderia toetoe	(toi-toi)	f		
Deyeuxia billardieri	(sand bent)	o		
Dichelachne crinita	(plume grass)	r	o	
Echinopogon ovatus	(hedgehog grass)		o	
Lachnagrostis richardii		o		
Microlaena stipoides			a	f
Poa anceps		f		o
P. laevis	(silver tussock)	f	f	
Rytidosperma clavata <sup>um</sup>				r
R. racemosa <sup>um</sup>			o	o
R. unarede			r	
Spinifex hirsutus			r	
Trisetum antarcticum			o	

\* Died when weedkiller used on shrub nettle, 1975.

<u>Orchids</u>	<u>Common name</u>	(1) Wairaka	(2) Coast	(3) Raroa
Caladenia carnea ✓ <del>Corybas filifera</del>		r		r
Microtis unifolia ✓				r
Pterostylis banksii ✓	(hood orchid)			o
<del>P. alcockii</del>		r		
P. montana ✓	(hood orchid)			r
Thelymitra longifolia ✓	(sun orchid)	o		

Sedges

Carex breviculmis			r	
C. dissita				r
C. flagellifera		r		f
C. geminata var.	(cutty-grass)			r
C. lessoniana	(cutty-grass)			r
C. secta var secta	(niggerhead)	r		
C. virgata		r		o
C. sp (c.f. C. testacea/ C.raoulii)		f		o
Cyperus ustulatus	(cutty-grass)	r		o
Eleocharis acuta		r		
Lepidosperma australe	(4-square sedge)	r		
Schoenus concinnus		r		
Scirpus antarcticus				r
S. cernuus		o	o	
S. nodosus		o	f	
S. prolifer				r
* S. pungens			r	
Uncinia scabra	(hooked sedge)			r
U. uncinata	(hooked sedge)	o		r

Rushes

Juncus caespiticius		r		
J. maritimus var. australiensis (sea rush)			r	
J. pallidus	(leafless rush)	r		o
J. sarophorus	(leafless rush)			o
Leptocarpus similis	(jointed rush)		r	
Luzula banksiana var. banksiana (wood rush)		o	o	
L. picta var. picta (wood rush)		o		o

\* Probably eliminated by parking area extensions, c. 1976/1977.

<u>Other herbaceous monocotyledons</u>	<u>Common name</u>	(1) Wairaka	(2) Coast	(3) Raroa
(i.e. other than grasses, sedges, orchids, rushes):				
Arthropodium candidum	(dwarf renga lily)	r		o
Astelia fragrans		r		
Collospermum hastatum	(perching lily)	r		o
<del>Dianella</del> Phormium cookianum	(mountain flax)	a	f	
Triglochin striatum			r	
<u>Ferns</u>				
Adiantum cunninghamii	(maidenhair)	f		r
Arthropteris tenella				f
Asplenium bulbiferum S.S.	(hen-and-chicken fern)	o		o
A. colensoi				r
A. flabellifolium				f
A. flaccidum subsp. flaccidum		r		o
A. hookerianum				a
A. oblongifolium	(shining spleenwort)	f	o	o
A. polyodon				o
A. terrestre subsp. maritimum			o	
A. bulbiferum x A. flaccidum				r
A. bulbiferum x A. hookerianum				o
Blechnum chambersii		f		o
B. filiforme		o		f
B. membranaceum				o
B. minus	(kio kio)	o		o
B. sp. (B. capense agg. - common large sp.)	(kio kio)	o		
B. sp. (B. capense agg. - lower pinnae not reduced)		o		
Cyathea dealbata	(ponga)			r
C. medullaris	(mamaku)	o		r
Histiopteris incisa	(water fern)	r		r
Hypolepis distans				r
H. tenuifolia		r		f
H. sp (un-named; "lactea")				r
Lastreopsis glabella		o		o
L. microsora				r
L. velutina				o

<u>Ferns</u>	<u>Common name</u>	(1) Wairaka	(2) Coast	(3) Raroa
Paesia scaberula	(ring fern)			o
Pellaea rotundifolia s.s.		o		f
P. sp (un-named; "few scales")			r	
Phymatosorus diversifolius	(hound's tongue)	a	r	r
P. scandens				o
Pneumatopteris pennigera		a		
Polystichum richardii		f	f	f
Pteridium esculentum	(bracken)	o	o	r
Pteris macilenta		r		
P. tremula		r		r
Pyrrosia serpens		r	o	o

Abbreviations: a = abundant, f = frequent, o = occasional  
r = rare.

Summary

Total number of native plants present in Raroa and Wairaka Reserves, including coastal parts of both reserves = 491.

	(1) Wairaka Reserve (Gully)	(2) Coast (pt. Raroa, pt. Wairaka)	(3) Raroa Reserve (forest)
(a) Number of species present	118 113	76	116
(b) % of total present	60 59%	39-40%	59-61%
(c) Number of species found in only <u>one</u> of areas 1, 2, or 3	34 29	20	49
(d) % of species found in only <u>one</u> of areas 1, 2, or 3. (based on totals in (a)).	29 26%	20%	42%