

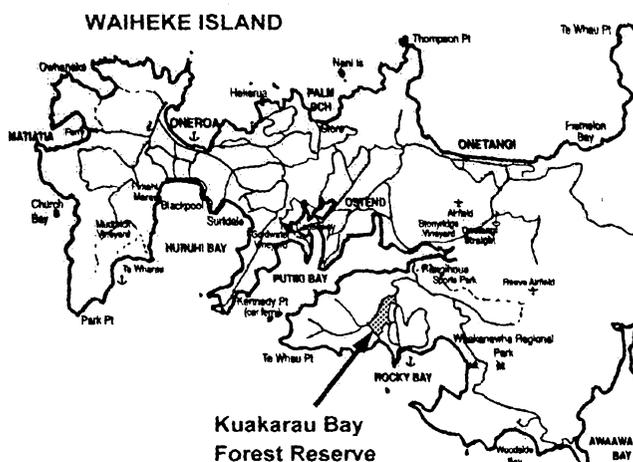
A Report on Kuakarau Bay Forest Reserve, Waiheke Island

Peter White

Introduction

The fifteen-hectare Kauakarau Bay Forest Reserve is contained within the Inner Gulf Islands Ecological District. It is situated in Te Whau Peninsula, Waiheke Island. It consists of a dense stand of forest covering the steep northern slopes of Rocky Bay and forms an important visual backdrop to this island village.

The reserve has a central ridge spur ("Kowhai Ridge"). To the north and east of this spur the reserve slopes down to a stream originating in the top north-eastern part of the reserve. The stream contains native fish (unidentified) and many impressive boulders covered in mosses and some with ferns (*Asplenium lamprophyllum* and *Arthropteris tenella*). To the south of the ridge the land slopes steeply to the bordering houses of Kuakarau Bay and an accessway reserve, Wairoa North Reserve.



Historical Background

Prior to European occupation of Waiheke Island, much of the native forest of Te Whau Peninsula was still standing. Predominantly it was covered in kanuka (*Kunzea ericoides*) forest, with small pockets of broad-leaf forest, such as Kuakarau Bay Forest, within it.

Though there were major Maori settlements in nearby areas, the Peninsula was not well populated. Most of the archaeological sites in the Peninsula consist of small undefended settlements occupied by small numbers of people. Within the Kuakarau Bay Forest itself there are no recorded sites, though there is what appears to be a whare site situated near the top of the Kowhai Ridge in the central part of the reserve.

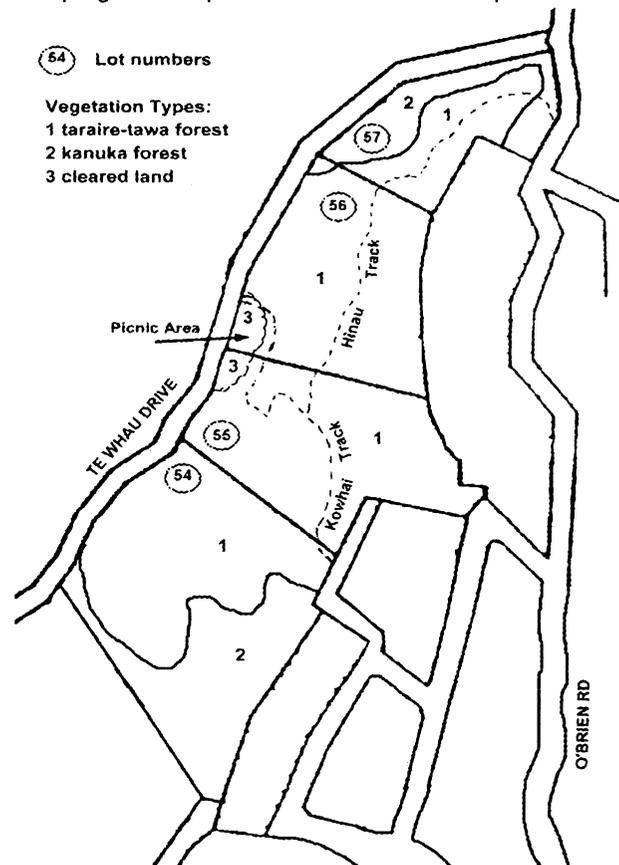
From the 1840s onward, Te Whau Peninsula was gradually cleared of forest by the European, though patches of forest remained standing, including the Kuakarau Bay Forest. In the second half of the 19th century, the Forest suffered from the impact of kauri (*Agathis australis*) logging, but much of the Forest remained untouched, and the areas affected by the logging quickly regenerated. Though no evidence now remains it is likely that kauri were extracted from the

upper hill slopes of the reserve, including possibly Kowhai Ridge. A clue to this lies in the existence of a kauri slide on the southern side of Kowhai Ridge.

The first European occupants of Te Whau Peninsula were Charles and Adele de Witte, who purchased 207 acres of the Peninsula in the early 1840s. In 1856 their eldest daughter Helene married Auckland lawyer Laughlin O'Brien. Later on Helene came to inherit the land and over the years the O'Brien property eventually grew to a total of 2,500 acres. It remained in the O'Brien family until 1963, when it was sold to Robert and Maureen Rothschild. They in turn sold the land to Chris and Margaret Reeve, keeping a small portion for themselves.

Proposals to subdivide the Peninsula were advanced by Chris Reeve in 1986. The original intention was to subdivide into 36 lots, but eventually 55 lots were approved. At the time the landowners assured concerned local residents that the Kuakarau Bay Forest (lots 54-57 of the subdivision) would be vested in reserve. However, when the final subdivision proposal was unveiled, only two of the lots comprising the Kuakarau Bay Forest were vested to Council as part of reserve contribution, lots 54 and 57. Despite a number of submissions opposing the breaking up of the Forest, the subdivision proceeded in that form and the two lots in between, lots 55 and 56, were put on the market.

It was at this point that the author spearheaded a campaign to acquire lots 55 and 56 as public reserve



so that the whole forest would be saved for future generations, a campaign I energetically pursued during the early 1990s. The objective was finally achieved in 1996, when Forest and Bird purchased the two lots through grants from five sources – Nature Heritage Fund, ASB Charitable Trust, Fullers Gulf Ferries, Auckland City Council (Waiheke Community Board), Auckland Regional Council and NZ Lottery Grants Board.

Vegetation

There are two main vegetation types within the reserve. The major portion consists of taraire (*Beilschmiedia tarairi*)-tawa (*B. tawa*) forest with kohekohe (*Dysoxylum spectabile*), karaka (*Corynocarpus laevigata*), mamangi (*Coprosma arborea*) and scattered puriri (*Vitex lucens*) and hinau (*Elaeocarpus dentatus*). The puriri are of impressive size, the largest, at 5.5m girth, being situated at the top of the Kowhai Track (see map). Around the margins of this forest and on a central ridge there are stands of coastal kowhai (*Sophora chatthamica*). Some taraire lying in the gully at the eastern edge of the reserve are at the upper limits of their growth, some 22-25m tall. Nikau (*Rhopalostylis sapida*) and kohekohe are commonly seen in the subcanopy and shrub tiers. In the ground tier *Asplenium lamprophyllum* and *Gahnia lacera* are common along with many seedlings of nikau and canopy species.

The northern and south-western margins consist of tall kanuka forest. The margins of this forest contain an understorey of mamangi, twiggly coprosma (*Coprosma*

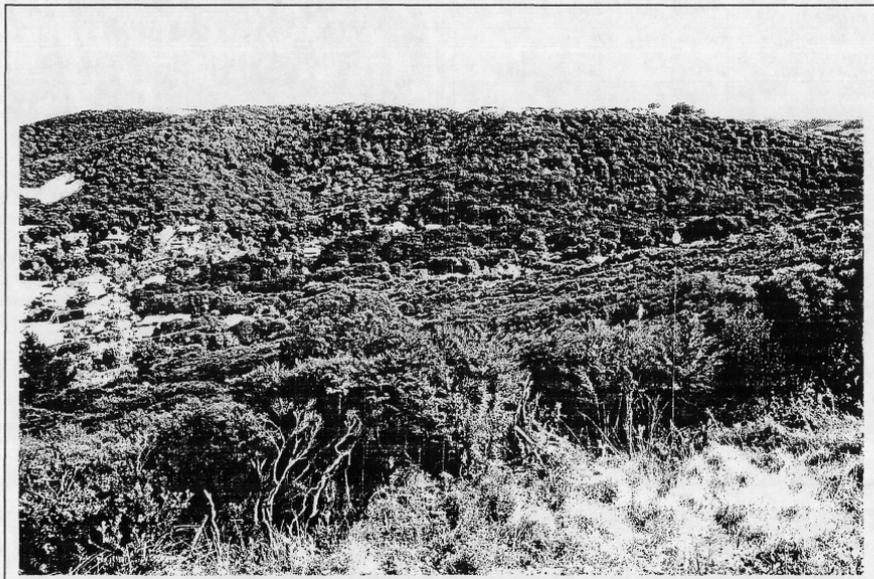
rhamnoides), mahoe (*Meliccytus ramiflorus*), manuka (*Leptospermum scoparium*) and mapou (*Myrsine australis*).

Kaukarau Bay Forest was surveyed and reported on by Fitzgibbons and Slaven (1988), who described it as the best taraire-tawa forest on the island, with a high level of species diversity. The forest contains several plant species that are uncommon on the island – hinau, puka (*Griselinia lucida*), mangeao (*Litsea callicarus*), wharangi (*Melicope ternata*), kohuhu (*Pittosporum tenuifolium*) and turepo (*Streblus heterophyllus*).

Management of the Reserve

A significant environmental weed in the reserve is climbing asparagus (*Asparagus scandens*). At the start of the campaign to save the Forest from being split up, the species was confined to the road margins, but by the time the purchase was completed it had marched half way down the hillside and covered the understorey in a dense green carpet, climbing in places to four metres above ground.

From 1997 Forest and Bird started a partnership with Auckland City to control the weed under contract. Now five years later the weed is under control, with only spot spraying needed to control small plants. The plants found in the reserve today are mostly new plants from deposited seed and there is only occasional signs of regrowth from plants not completely killed by the herbicide.



Kaukarau Bay Forest Reserve rising above the village of Rocky Bay, Waiheke Island. Glenbrook Reserve (administered by Auckland City) in the foreground.

Other weeds controlled have included woolly nightshade (*Solanum mauritianum*), brush wattle (*Paraserianthes lophantha*), Chinese privet (*Ligustrum sinense*) and tree privet (*L. lucidum*).

Some revegetation has also been undertaken on the road reserve and round the picnic site. Forest and Bird also utilised money left over from the fund raising to construct the Kowhai Track and subsequently was contracted by the Council to construct the Hinau Track.

Species list

Legend

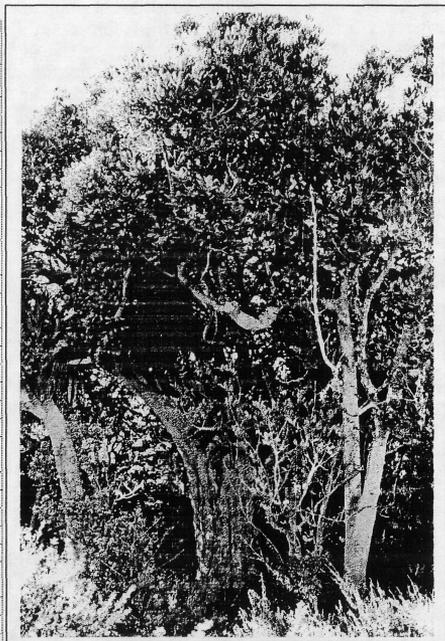
(unc) uncommon (only one or a very few specimens known)

(p+) planted and naturally occurring

(p) planted

* exotic

Scientific name	Maori name	English name
Ferns		
<i>Adiantum cunninghamii</i>	puhinui	common maidenhair
<i>Adiantum diaphanum</i>		small maidenhair
<i>Adiantum hispidulum</i>		rosy maidenhair
<i>Anarthropteris lanceolata</i>	whare-ngarara	lance fern
<i>Arthropteris tenella</i>		jointed fern
<i>Asplenium flaccidum</i>	makawe o raukatauri, raukatauri	hanging spleenwort, drooping spleenwort
<i>A. bulbiferum</i> subsp. (unc)	mouku	hen and chickens fern
<i>A. lamprophyllum</i>		
<i>A. oblongifolium</i>	huruhuru whenua	shining spleenwort
<i>A. polyodon</i>	petato	sickle spleenwort
<i>Blechnum filiforme</i>	panako	thread fern
<i>Cyathea dealbata</i>	ponga	
<i>C. medullaris</i>	mamaku	
<i>Doodia australis</i>	pukupuku	rasp fern
<i>Histiopteris incisa</i> (unc)	matata	water fern
<i>Hymenophyllum demissum</i> (unc)	irirangi, pipiripi	drooping filmy fern
<i>H. dilatatum</i> (unc)	matua, mauku	filmy fern
<i>H. rarum</i> (unc)		filmy fern
<i>Lastreopsis glabella</i>		smooth shield fern
<i>L. hispida</i> (unc - 1 seen)	tuakura	hairy fern
<i>Lindsaea trichomanoides</i>		
<i>Lygodium articulatum</i> (unc)	mangemange	bushman's mattress
<i>Microsorium pustulatum</i>	kowaowao	hound's tongue
<i>M. scandens</i>	mokimoki	fragrant fern
<i>Nephrolepis cordifolia</i> *		ladder fern
<i>Paesia scaberula</i> (unc)	matata	hard fern, scented fern, lace fern, ring fern
<i>Polystichum richardii</i>	pikopiko	common shield fern
<i>Pteridium esculentum</i>	raharahu, rarahue, rarahu	bracken, Austral bracken
<i>Pteris maclenta</i>	titipo	sweet brake, sweet fern
<i>P. saxatilis</i>		
<i>P. tremula</i>	turawera	shaking brake
<i>Pyrosia eleagnifolia</i>	ngarara wehi	leather-leaf fern
Fern Allies		
<i>Lycopodium varium</i> (unc - 1 known)	iwituna	hanging clubmoss, tassell fern
<i>Timesipteris elongata</i>		fork fern
Gymnosperms		
<i>Podocarpus totara</i> (p)	totara	
<i>Prumnopitys ferruginea</i> (unc - 3 only known + seedlings)	miro	brown pine
<i>P. taxifolia</i> (unc - 1 only known)	matai	black pine



A large puriri with 5.5 m girth, situated at the top of the Kowhai Track.

Scientific name	Maori name	English name
Dicot Trees and Shrubs		
<i>Acmena smithii</i> *		white monkey apple
<i>Alectryon excelsis</i> (unc - 2 only known)	titoki	
<i>Belschmiedia tarairi</i>	taraira	
<i>B. tawa</i>	tawa	
<i>Brachyglottis repanda</i>	rangiora	
<i>Carmichaelia aligera</i>	maukoro	broom
<i>Chrysanthemoides monilifera</i> *		boneseed
<i>Coprosma arborea</i>	mamangi	tree coprosma
<i>C. macrocarpa</i>		
<i>C. macrocarpa</i> x <i>propinqua</i> (unc - 1 only known)		
<i>C. rhamnoides</i>		
<i>C. robusta</i>	karamu	
<i>Corynocarpus laevigata</i>	karaka	
<i>Cotoneaster glaucophyllus</i> *		cotoneaster
<i>Dysoxylum spectabile</i>	kohekohe	

Scientific name	Maori name	English name	Scientific name	Maori name	English name
<i>Elaeagnus x reflexa</i> (occasional)*		elaeagnus	<i>Ripogonum scandens</i>	kareao	supplejack
<i>Elaeocarpus dentatus</i>	hinau		Dicot Herbs		
<i>Entelea arborescens</i> (unc – p+)	whau	cork-wood	<i>Haloragis erecta</i> (unc)	toatoa	shrubby haloragis
<i>Eriobotrya japonica</i> *		loquat	<i>Plectranthus ciliatus</i> *		plectranthus
<i>Geniostoma rupestre</i> var. <i>ligustrifolium</i>	hangehange	Maori privet	Orchids		
<i>Griselinia lucida</i> (unc – 2 only known)	puka		<i>Bulbophyllum pygmaeum</i>		bulb-leaf orchid, pygmy orchid
<i>Hedycarya arborea</i>	porokaiwhiri	pigeonwood	<i>Corybus trilobus</i> agg.		spider orchid
<i>Hoheria populnea</i>	houhere	lacebark	<i>Drymoanthus adversus</i>		
<i>Knightia excelsa</i>	rewarewa		<i>Earina mucronata</i>	peka-a-waka	bamboo orchid
<i>Kunzea ericoides</i>	kanuka		<i>Microtis</i> sp.		
<i>Leptospermum scoparium</i>	manuka	tea tree	<i>Pterostylis banksii</i>	tutu-kiwi	elf's hood orchid
<i>Leucopogon fasciculatus</i>	mingimingi		Grasses		
<i>Ligustrum lucidum</i> *		tree privet	<i>Cortaderia</i> sp.*		pampas
<i>L. sinense</i> *		Chinese privet	<i>Oplismenus hirtellus</i> subsp. <i>imbecillis</i>		slender panic grass
<i>Litsea calicarus</i> (unc – 3 only known)	mangeao		<i>Pennisetum clandestinum</i> *		Kikuyu
<i>Metrosideros excelsa</i>	pohutakawa		Sedges		
<i>M. robusta</i> (unc – 3 only known)	rata	northern rata	<i>Carex dissita</i>		carex bush sedge
<i>Macropiper excelsum</i>	kawakawa		<i>C. lambertiana</i>		
<i>Melicope ternata</i>	wharangī		<i>C. longibrachiata</i> *		Australian sedge
<i>Melicytus ramiflorus</i>	mahoe		<i>C. virgata</i> (unc)		
<i>Myrsine australis</i>	mapou		<i>Cyperus ustulatus</i> (unc)	toetoe upoko-tangata	giant umbrella sedge
<i>Nestegis lanceolata</i>	maire	white maire	<i>Gahnia lacera</i>		
<i>Paraserianthes lophantha</i> *		brush wattle	<i>Lepidosperma australe</i>		square rush
<i>Phytolacca octandra</i> *		inkweed	<i>Uncinia uncinata</i>	kamu	hook sedge
<i>Pittosporum cornifolium</i> (unc – 2 only known)	tawhirikaro	perching pittosporum	Other Monocot Herbs		
<i>P. crassifolium</i>	karo		<i>Asteliasolandri</i>	kowharawhara	perching lily
<i>P. tenuifolium</i> (unc – 3 only known)	kohuhu		<i>Collospermum hastatum</i>	kahakaha	perching lily
<i>Polygala myrtifolia</i> *		sweet pea shrub	<i>Dianella nigra</i>	turutu	native blueberry
<i>Pomaderris</i> aff. <i>phylicifolia</i> (unc – 1 only seen)	tauhinu		<i>Phormium tenax</i> (p)	harekeke	NZ flax
<i>Pseudopanax arboreus</i>	puahou	five finger	<i>Zantedeschia aethiopica</i> *		arum lily
<i>P. crassifolius</i>	horoeka	lancewood	Mosses		
<i>P. lessonii</i>	houpara		<i>Cyathophorum bulbosum</i>		
<i>P. crassifolius</i> x <i>P. lessonii</i>	horoeka	lancewood	<i>Leptostomum macrocarpum</i>		pin cushion moss
<i>Solanum mauritianum</i> *		woolly nightshade	<i>Leucobryum candidum</i>		milk moss
<i>Sophora chatthamica</i>	kowhai	coastal kowhai	<i>Macromitrium ?ligulare</i>		
<i>Streblus heterophyllus</i> (unc – 1 only known)	turepo	small-leaved milk tree	<i>Macromitrium ?submucronifolium</i>		
<i>Ulex europaeus</i> *		gorse	<i>Papillaria crocea</i>		
<i>Vitex lucens</i>	puriri		<i>Ptychomnion aciculare</i>		
Dicot Lianes			<i>Pyrrobryum bifarium</i>		
<i>Clematis paniculata</i>	pua-wiananga	native clematis	<i>Rhaphidorrhynchium amoenum</i>		
<i>Lonicera japonica</i> *		Japanese honeysuckle	<i>Sematophyllum</i> sp.		
<i>Metrosideros perforata</i>	aka	small white rata vine	Liverworts		
<i>M. fulgens</i>	akatawhiwhi	red rata vine	<i>Heteroscyphus coalitus</i>		
<i>Muehlenbeckia complexa</i>	pohuehue		<i>Heteroscyphus</i> sp.		
<i>Parsonsia heterophylla</i>	kaihua	native jasmine	<i>Lejeunea flava</i>		
<i>Rubus cissoides</i>	tataramoa	bush lawyer	Lichen		
Monocot Trees and Shrubs			<i>Chrysothrix candelaris</i>		
<i>Cordyline banksii</i>	ti-ngahere		<i>Pseudocyphellaria billardieri</i>		
<i>Rhopalostylis sapida</i>	nikau		<i>Pseudocyphellaria homeophylla</i>		
Monocot Lianes			<i>Rimelea reticulata</i>		
<i>Asparagus asparagoides</i> *		smilax	<i>Usnea</i> sp.		
<i>A. scandens</i> *		climbing asparagus	Eumycota (True Fungi)		
			<i>Agrocybe parasitica</i>	tawaka	poplar mushroom
			<i>Armillaria novae-zelandiae</i>	harore	honey or boot lace mushroom
			<i>Aseroe rubra</i>		flower fungus
			<i>Auricularia polytricha</i>	hakeka	ear fungus, wood ears
			<i>Beauveria bassiana</i>		sugar icing fungus

Scientific name	Maori name	English name	Scientific name	Maori name	English name
<i>Calvatia cyathiformis</i> (bottom of Kowhai Track)		lilac puffball	<i>Orbilina deliculata</i>		small orange spots on dead wood
<i>Conchomyces bursaeformis</i>			<i>Oudemansiella australis</i>		
<i>Cookeina colensoi</i>		cup fungus	? <i>Pleurotus</i> spp. (grey cap; orange brown cap; white all over)		oyster mushroom
<i>Coprinus micaceus</i>		mica or glistening ink cap	<i>Podoscypha petalodes</i>		wine glass fungus
<i>Coprinus plicatilis</i>		Japanese umbrella	<i>Russula macrocystidiata</i>		purple russula
<i>Cyclomyces tabacinus</i>			<i>Schizophyllum commune</i>		split gills
<i>Dacrymyces stillatus</i> (seen 2000 edge of Hinaiu Track)			<i>Scutellinia badioberbis</i>		
<i>Favolaschia calocera</i> *		orange pore fungi	<i>S. sp.</i> (growing on ground)		
<i>Ganoderma australe</i>		perennial bracket fungus, artist's conk	<i>Trametes versicolor</i>		rainbow bracket
<i>G. aff. mastoporium</i>			<i>Xylaria hypoxylon</i>		candlesnuff or stags horn fungus
<i>Gastrum</i> sp.		earthstar	<i>X. tuberiformis</i>		
<i>Hericium coralloides</i>	pekepeke kiore	fungus icicles	Myxomycete (Slime Moulds)		
<i>Ileodictyon cibarium</i>		white basket fungus, lattice fungus	<i>Arcyria denudata</i>		
<i>Lycoperdon</i> sp.		common puffball	<i>Lycogala epidendrum</i>		

Tony Druce's table of hybrid New Zealand coprosmas

Rhys Gardner

Coprosma (Rubiaceae) is generally thought to be rife with hybridism, to the extent that one is tempted to identify cultivars and other oddities by less than proper means, like Extended Staring (leaf shape), Fuzzy Logic (stipules), or Ask a Reliable Nurseryman (Metcalf 1987; Hutchins 1995).

But before calling a coprosma's parentage into question two important sets of data should be consulted. The first is a list of chromosome numbers (Beuzenberg 1983; Dawson 2000). The diploid (2n) number for the genus is 44, i.e., 22 pairs of chromosomes, and is found throughout the large-leaved coprosmas and in some of the small-leaved ones as well, e.g. *C. arborea*, *C. propinqua* and *C. rhamnoides*. These species can be expected to fertilise one another successfully, though whether they actually do so depends on factors like flowering-time overlap. In the small-leaved coprosmas, by contrast, polyploidy is common, with counts ranging from 88 (tetraploid) to 132, c. 154, and even c. 220 in *C.*

atropurpurea. Sexually-viable polyploid hybrids would generally (not always) come from crosses on the same level of ploidy.

The chromosome information indicates what hybrids might be possible. The second lot of data is what we are told by the Book of Nature, that is, as transcribed by the late A. P. (Tony) Druce in his manuscript "Check-list of *Coprosma* hybrids (wild and cultivated) recorded in New Zealand". My copy is the 1978 version, and represents Tony's twenty or so years of collecting, growing and examining coprosmas. In it the numerous published crosses are listed, with determinations of the voucher specimens if extant. Many hybrids are debunked, or, in Tony's Popperian way, marked "no specimens found". Of particular interest to Aucklanders, for example, is that there is no evidence that *C. grandifolia* crosses with *C. lucida* or *C. robusta* (even though all are diploid). The summarizing table of this work is the essential field-tool, and is reproduced here (Fig. 1), with one additional hybrid indicated.

Acknowledgements

Graeme Jane and Peter de Lange contributed words of advice.

References

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Figure 1 opposite refers.