?*Stereopsis* sp.	Ma
Stereum vellereum	Ma
Stropharia aeruginosa	Memorial Park
*Suillus luteus**	KF
Thelephora ?*terrestris**	MR
Tomentella sp.	MR
Trametes versicolor	ES
Tremella fuciformis	FW
Tricholoma ?*terreum**	KF
T. viridiolivaceum	Matapuna Road
T. sp.	RS
Tricholomopsis rutilans	KF
Tylopilus brunneus	MS
T. formosus	Ma, MR, Matapuna Road, MS RE
*Volvariella speciosa**	FW
Weraroa erythrocephala	OL
W. virescens	Erua Road, ES, FW, JW, MR
Xerocomus cf. *subtomentosus*	RS

Myxomycetes

Arcyria denudata	?
Ceratiomyxa fruticulosa	ES, MR, RE, RS
Fuligo septica	MR
Lycogala epidendrum	ES, RF
Stemonitis ?*virginiensis*	MR

Flora and fauna of two islets at Opoutere, southeast Coromandel Peninsula

E K Cameron

During four family holidays at Opoutere during 1997-2001 on the southeast coast of the Coromandel Peninsula, I visited two small islets off Opoutere Beach: Hikunui Island – at the south end in the mouth of the Wharekawa Harbour off Ruahiwihiwi Point; and Motuhaua Rock – 4.2km up the Opoutere Beach by Ohui (Fig. 1).

The vegetated sand dunes extending for >0.5km inland behind Opoutere Beach, support a mix of different-aged pine plantations (*Pinus pinaster*) with native understoreys, manuka (*Leptospermum scoparium*) and bracken (*Pteridium esculentum*) scrub areas, and spinifex (*Spinifex sericeus*) dominated fore-dunes. The vascular flora of these dune habitats and the northern headland was documented by Ogle (1976, 1989) who recorded a total of 86 indigenous and 80 exotic vascular species. In a national dune inventory Partridge (1992) rated the degree of naturalness of the Opoutere dunes as 8/20 based on the diversity of vegetation and landforms, native sand vascular species present, the degree of modification and the number of weeds present. The adjacent sand-spit to Hikunui Island is a Wildlife Refuge and an important nesting site for New Zealand dotterel and variable oystercatchers and is regularly trapped for pests, including mustelids, by Department of Conservation.

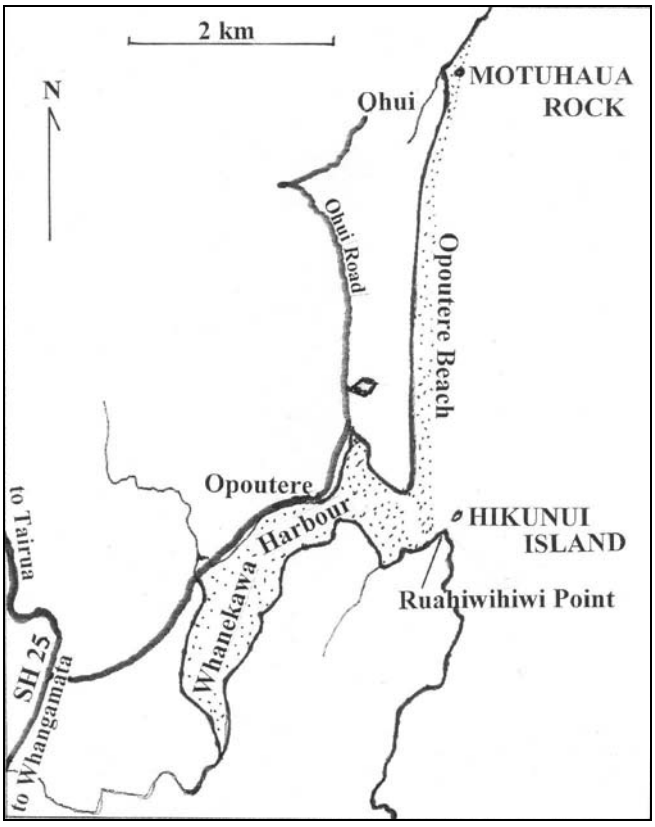

Fig. 1. Location of Hikunui Island and Motuhaua Rock, Opoutere.

Hikunui Island (Fig. 2)
I waded/swam out with a boogie board the short distance (<100m) at low tide to the rocky islet on two occasions: 22 February 1997 and 17 April 1998 (map reference: T12 672504). Evidently it's possible to wade all the way in the right conditions (Wendy Hare pers. comm.). Being in the mouth of the Wharekawa Harbour it can be a difficult islet to reach because strong currents sweep both sides; it would be rarely visited by humans.

Fig. 2. Hikunui Island from northwest, Opoutere. Mayor Island in background. Photo: February 1997.

The narrow islet is c.50m long (NE-SW long axis), <0.2ha (cf. 0.38ha of Taylor 1989) and is mainly bare rock composed of two heavily eroded main blocks, the northeast block (c.12m asl) is c.1m taller than the southwest one. Most of the islet rock is cracked and there is a cave on the northwestern side. The islet is very steep with no soil except for thin layers on some of the upper ledges – a harsh environment for plant life. The rock is spherulitic rhyolite (B. W. Hayward pers. comm., from a small piece that I brought back) – the surface has small 'bumps' of sharp chips cemented together making it painful for bare feet.

Vegetation and flora
I recorded 14 vascular plant species, 11 natives and 3 exotics (see Appendix 1). The two main species were taupata (*Coprosma repens*) and ice-plant (*Disphyma australe*), and the three exotic species were a very minor part of the vegetation. Mats of ice-plant and prostrate shrubs of taupata were on a few upper ledges on the northwest side. Where the taupata was erect and open, clumps of ice-plant, dichondra (*Dichondra repens*) and *Einadia trigonos* were associated with it. The small coastal grass, *Lachnagrostis littoralis* and shore groundsel (*Senecio lautus*) were confined to cracks in the rock and prairie grass (*Bromus willdenowii*) was limited to the southwest summit among prostrate taupata where the red-billed gulls had been nesting. The tallest plants on the islet were several erect shrubs of taupata to 3m tall and a single (or two growing as one?) 1.8m tall coastal mahoe (*Melicytus novae-zelandiae*) which were partly protected in a gut between the rocks running up to top of the southwest end. Bryophytes appeared to be absent, but lichens (unrecorded) were common on the upper rocks and clothing taupata branches.

From a Rotorua Bot Soc field trip to the general area in March 1989, Beadel (1990) recorded seven vascular plant species from this islet without other comment – five are listed in Appendix 1. Of the other two species: *Einadia triandra*, I'm assuming is my *E. trigonos* record; and pohutukawa (*Metrosideros excelsa*) was not seen by me – either I missed it (the steep southeast side was not fully viewed by me), or it died during the eight years between our visits. Note – the latitude/longitudes should be reversed for the map reference given by Beadel.

Fauna
22 February 1997: c.60 white-fronted terns were resting on the islet, including some fledglings; 6 adult red-billed gulls, 5 fledglings, 2 small chicks and 3 old eggs in 2 deserted nests; a (little?) shag nest with 3 chicks (1 larger than the other 2) in a taupata; 1 adult pied shag roosting; and 4 black-backed gulls (2 adults, 2 fledglings).

17 April 1998: 1 kingfisher; 5 starlings; 6 empty shag nests in 2 taupata shrubs; several old red-billed gull eggs present, and 3 dead fledglings. Shore crabs (*Leptograpsus variegata)* were abundant in the frequent cracks in the rocks; native shore earwigs (*Anisolabis littorea*) were present; no lizards or rat droppings were seen. Observations by other people have recorded the following nesting birds: 50-70 pairs of white-fronted terns; 100-120 pairs of red-billed gulls; a pair of reef herons (in the islet's cave); and 3-4 little shag nests in the taupata (Bev Woolley pers. comm., April 1998); although the pair of reef herons were regularly present in the 1999/2000 season, they were not seen in the 2002/03 season (Wendy Hare, pers. comm., Aug 2005); a couple of black-backed gulls nest there sporadically and little shags also nest on the rocks at the Harbour entrance (Jason Roxburgh pers. comm., Aug 2005).

Motuhaua Rock (Fig. 3)
At the north end of Opoutere Beach, Motuhaua Rock is surrounded by sand and can be accessed with dry feet from mid-tide down (map reference T12 672546). I visited the islet on 29 March 1997, 16 April 1998 and 26 May 2001. From the well-worn track to the flat islet summit, it appears that it is visited frequently by most people who venture to this more remote part of the beach, and during each of my visits two-three people were fishing off the outer part of the islet. Midden shell was eroding out in places and the flat top of the island appeared unnatural and appeared to be human-shaped. There is recorded a pa at Motuhaua (Maori Land Court records, 17 January 1870, Coromandel Minute Book 1: 179-181). But the island because of its accessibility and small size seems inappropriately identified as a pa, and the reference may have been to the unnamed pa on the steep hill above the northern

end of the beach – Motuhaua Rock would have been used by Maori as either a meal place or as a brief stay camp (Louise Furey, pers. comm., Sep 2005).

Fig. 3. Motuhaua Rock from southwest, Opoutere. Mounds of *Cakile edentula* in the foreground. Photo: April 1998.

The islet is c.40m long (west-east long axis), c.0.1 ha (cf.<0.1ha of Taylor 1989), flat-topped and about 8m asl; it is composed of flow-banded rhyolite (B. W. Hayward pers. comm.), capped with a good layer of topsoil on the level areas which support a grassy turf with scattered native shrubs and a few trees of pohutukawa. Bare rock is exposed on the steep faces and around the inter-tidal base.

Vegetation and flora

I recorded 69 vascular plant species: 33 natives and 36 exotics (see Appendix 1). The only trees were pohutukawa 5-7m tall, the main shrubs were native: coastal karamu (*Coprosma macrocarpa*), taupata, mingimingi (*Leucopogon fasciculatus*) and low mats of patotara (*L. fraseri*). The only exotic shrubs were the occasional plants of lupin (*Lupinus arboreus*) and barberry (*Berberis glaucocarpa*). The flat-topped summit area measuring c.12 x 8m was dominated by exotic grasses: paspalum (*Paspalum dilatatum*), sweet vernal (*Anthoxanthum odoratum*) and Indian doab (*Cynodon dactylon*) with scattered *Ficinia nodosa* clumps around the edges. Large patches of moss, *Thuidium furfuracea*, were present on the south and west sides above the inter-tidal rocks on the steep faces on rocky ledges.

Fauna

Rat droppings present all over the island were identified from their size as from Norway rat and small burrows (c.45mm diameter) on northwest side were probably also formed by these rats. However, since at least summer 1998/99 until present, the resident Opoutere warden ran traps in the sand dune vegetation at the Ohui end of the beach adjacent to Motuhaua – the majority of rats caught were ship rats and both possum and mustelid tracks (most likely stoats) were observed on the beach (Wendy Hare pers. comm., August 2005). Therefore two rat species may have been present on Motuhaua Rock. There was no evidence (droppings) of possums present and the pohutukawa foliage was not chewed. Native praying mantis (*Orthodera novaezealandiae*) was present. No birds were seen on the island; however, a few red-billed gulls do nest on the island (Jason Roxburgh pers. comm., Aug 2005). On the adjacent beach red-billed gulls, black-backed gulls, white-fronted terns, New Zealand dotterels, variable oystercatchers were present on each occasion. By the adjacent stream mouth in March 1997 spur-winged plover, paradise ducks and a little shag were present. Rabbits were present on the adjacent dunes, but no rabbit droppings were seen on the islet.

Plant additions to the adjacent sand dunes

Twenty-two species of vascular plants from Hikunui Island and Motuhaua Rock are additions to the two Ogle lists from the adjacent sand dunes and northern rocky headland (Ogle 1976, 1989). However, I recorded two of those "additions" as also being present on the adjacent dunes: *Cakile edentula* and coastal karamu; and the herbarium voucher of Ogle's (1989) record of *Geranium homeanum* (CHR 404475 A&B) contained specimens of both *G. homeanum* and *G. gardneri* – reducing the additions to 19 species (see Appendix 1). Although no attempt was made to update the dune plant list some additions were noted (where supported by a herbarium voucher the AK number is included; * = naturalised species):

Fore-dunes (area A of Ogle): *Cakile edentula*, Conyza parva** 233653, *Osteospermum fruticosum** 235534 and *O. jucundum** 235533;

Hind-dunes (area B of Ogle): coastal karamu 256820 (probably = *Coprosma robusta* record of Ogle (1976));

Wharekawa Estuary (only for part shown as area G of Ogle - not the whole estuary): *Anemone* x*hybrida** 233651, *Celastrus orbiculatus** 256819, *Persea americana** 233848, *Ruppia polycarpa* 235535, *Syzygium paniculatum** 256816, *Tecomaria capensis** 256821 and *Vallota speciosa** 233844.

Comparison of the two islets

Four vascular plant species on Hikunui Island, all native, were not recorded on the Motuhaua Rock (see Appendix 1) or the adjacent sand dunes (cf. Ogle 1976, 1989): *Einadia trigonos*, coastal mahoe, *Spergularia media* and *Lachnagrostis littoralis*. Fourteen vascular plant species on Motuhaua Rock, two native and 12 exotic species, were not recorded on the Hikunui Island or in the adjacent dune vegetation. Two others, shore groundsel and sow thistle (*Sonchus oleraceus*), were recorded on both islets but not on the adjacent dunes. Note – that the two Ogle surveys (Dec-Jan) were at a different time of year than mine (Feb-May) and this may account for the additional annuals being recorded by me. Also,

some of the naturalised species may be recent arrivals to the area.

Hikunui Island differs from Motuhaua Rock by having a large population of nesting birds, no rats, few human visitors, and supports a smaller area of vegetation because there is virtually no topsoil. The abundance of ice-plant and taupata, and the presence of coastal mahoe I attribute to the absence of rats – in the absence of water, rats browse certain plants for water (e.g. ice-plant and taupata); and coastal mahoe is now virtually restricted to rat-free islands (rats eat their seed?). The presence of *Einadia trigonos* is related to the high nutrients from the nesting birds. Unlike Hikunui Island, Motuhaua Rock is constantly visited by humans, has few birds nesting, animal pests are present (Norway rats and possibly ship rats and rabbits at times), it has more vegetation but it is heavily modified with the summit vegetation being an exotic pasture – this may be partly the result of a past fire, but I saw no charcoal.

A reflection of the naturalness of the two islets can be illustrated by comparing the native and exotic vascular plant totals: Hikunui Island 14 species, 79% native; and Motuhaua Rock 69 species, 48% native. As noted above (and in Appendix 1) of the 73 vascular plant species recorded from the two islets, 20 species (27%) were not recorded on the adjacent mainland: 7 native and 13 exotic species. Most of these I suspect will be present on the sand dunes but maybe suppressed by rabbit browsing, e.g. sow thistle, medicago and various grasses; others may prefer a rocky substrate (note – the rocky northern end of Opoutere Beach was not visited by me), e.g. shore groundsel, *Crassula sieberiana, Spergularia media, Lachnagrostis littoralis*, *Portulaca oleracea* and *Parapholis incurva*; and coastal mahoe and *Einadia trigonos* are more common on rat-free, guano-rich islands.

Periodic surveys of islets like these assist to document the spread of exotic species and the status of natives. Although small and close to shore, Hikunui Island has high conservation values as a valuable nesting site for sea birds and four of its native vascular plants are unrecorded and unlikely to occur on the adjacent mainland.

Acknowledgements

For identifications: Jessica Beever (mosses), Rhys Gardner (*Geranium*), Doug Rogan (lichens), Graeme Taylor (rat droppings); Colin Ogle for comments on a draft of this article; Wendy Hare, Jason Roxburgh and Bev Woolley for additional comments on the local fauna; Louise Furey for comments and reference regarding possible Maori use of Motuhaua Rock; CHR herbarium staff for the loan of the two *Geranium* sheets; and Karen and Rusty of the Opoutere Youth Hostel for their hospitality and providing a wonderful place to stay.

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Appendix 1. Species list for Motuhaua Rock and Hikunui Island, Opoutere.

Key

a = abundant
c = common
o = occasional
l = local
s = scarce (< 5 plants seen)
B = also recorded by Beadel (1990)
* = naturalised species
† = additional to Ogle (1976, 1989)

	Motuhaua	Hikunui	AK herbarium vouchers
Ferns	**6+ 0**	**0 + 0**	
Asplenium oblongifolium	la		
Doodia australis	s		
Microsorum pustulatum	lc		
Pellaea falcata †	l		233657
Pteridium esculentum	o		
Pyrrosia eleagnifolia	l		
Dicots	**18 + 24**	**9 + 2**	
Anagallis arvensis s.str.*	c		
*Aster subulatus** †	s(1)		
*Berberis glaucocarpa**	l		

	Motuhaua	Hikunui	AK herbarium vouchers
*Cakile edentula**	s(2)		
Calystegia soldanella	l		
*Cirsium vulgare**	s		
*Conyza albida**	a		
Coprosma macrocarpa	l		
Coprosma repens	c	c, B	233846, 235531
Crassula sieberiana †	l		
Dichondra repens	o	o, B	233655, 235580
Disphyma australe	o	a, B	
Einadia trigonos †		lc	
*Euphorbia peplus** †	l		
*Geranium gardneri**	a		235532
*Geranium molle** †	lc		
*Hypochoeris radicata**	o		
*Leontodon taraxacoides**	c		
Leucopogon fasciculatus	s		
Leucopogon fraseri	l		233654
Lobelia anceps	l		
*Lotus suaveolens**	o		
*Lupinus arboreus**	o		
*Medicago lupulina** †	lc		233656
Melicytus novae-zelandiae †		s(1)	232843
*Melilotus indicus** †	c		
Metrosideros excelsa	o	B	
*Modiola caroliniana** †	s		
Muehlenbeckia complexa	c		
*Orobanche minor** †	l		
Oxalis rubens	o		
*Portaluca oleracea** †	l [Motuhaua column]		
*Phytolacca octandra**	S(1)	s(3)	
Pittosporum crassifolium	S(1)	s(1), B	235536
*Plantago lanceolata**	o		
*Polycarpon tetraphyllum**	s		
*Sagina procumbens** †	l		
Sarcocornia quinqueflora	l	o, B	
Senecio lautus †	o	o	
Solanum americanum	o		
*Sonchus oleraceus** †	o	lc	
Spergularia media †		o	235537
Tetragonia implexicoma	l		
*Trifolium repens**	l		
Wahlenbergia littoricola	s		233658

Monocots	**9 + 12**	**2 + 1**	
*Anthoxanthum odoratum**	c		
Astelia banksii	s(1)		
*Bromus diandrus** †	o		
*Bromus willdenowii**	o	l	232842
Carex testacea	S(1)		
Cordyline australis	s(1)		
*Cynodon dactylon**	a		
*Dactylis glomerata**	c		
Ficinia nodosa	a		
*Holcus lanatus**	o		
Isolepis cernua	lc	l	
Lachnagrostis billardierei	o		
Lachnagrostis littoralis †		o	
*Lagurus ovatus**	o		
*Lolium perenne**	l		
Microlaena stipoides	o		

	Motuhaua	Hikunui	AK herbarium vouchers
*Parapholis incurva** †	lc		237245
*Paspalum dilatatum**	a		
Poa anceps	la		
*Polypogon fugax** †	lc		
*Sporobolus africanus**	c		
Zoysia pauciflora	l		
Vascular plant totals:	**33 + 36**	**11 + 3**	
Bryophytes			
Bryum clavatum	c		231712
Chiloscyphus semiteres	lc		231963
Didymodon australasiae	o		292210
*Lunularia cruciata**	lc		231964
Thuidium furfurosum	c		231711
Tortella flavovirens (= T. rubripes)	o		231710
Lichens			
Pannaria immixta	l		231767
Parmotrema ? reticulatum	c		231717
Ramalina australiensis	lc		231766
Ramalina celastri	lc		

Vascular flora of Rakitu (Arid Island): additions and comments

E K Cameron and P J Bellingham

Rakitu (Arid Island) is the only sizeable island on the eastern side of Great Barrier Island in the outer Hauraki Gulf and at 328ha (Taylor 1989) it is the third largest island of the Great Barrier Island group. During an Offshore Islands Research Group (OIRG) trip to Rakitu, 30 December 1980 – 8 January 1981, the vascular flora and vegetation was studied and herbarium specimens collected by EKC and Anthony Wright and in an annotated species list they recorded 321 taxa of wild plants with 75% being indigenous (Cameron & Wright 1982). At that time the island was privately owned by the Rope family, the central valley was mainly improved pasture with shrublands on the steeper slopes and tall forest in the protected side valleys – as it still is today.

In 1993 the Crown purchased the island from the Rope family and it is now managed as a Scenic Reserve by Department of Conservation (DOC) and the Ropes have a lease to farm the pastoral areas of the island until 2013. They still farm cattle and sheep, the last goats (c.20) were killed by DOC c.5 years ago (Bryce Rope pers. comm.). In the early 1980s there were around 300 cattle and 1000 sheep on the island, but since the early 1990s aerial topdressing was no longer financially viable and the farm stock was reduced to about 120 cattle and 600 sheep (Bryce Rope pers. comm.). Kikuyu grass (*Pennisetum clandestinum*) is still the dominant pasture species.

We were part of a group of five people on 26 February 2005 which landed on Rakitu for 2 hours and then again two days later we were ashore for 6 hours. The main purpose of the visit was to monitor two forest plots set up in the previous summer as part of a Marsden Fund project "Impacts of alien organisms on ecosystem function", but one of us (EKC) had the freedom to search for new plant records. EKC was also briefly ashore on 19 January 1994 guiding a trip from the *Te Aroha* when two plant specimens were collected which are also cited here. Apart from a DOC collection of *Colensoa physaloides* in 1998, these and the present specimens are the only herbarium specimens collected on the island that we are aware of since the OIRG survey in the summer of 1980-81.

Apart from measuring two existing 2004 forest plots and setting up two new plots there was only time during this present visit to investigate along the main stream (Abbott's Stream) up to the wetland at the head of the stream, and the lower sections of the two main valleys off to the northeast side (Reserve & Maori Creek valleys). Note – most place names are informal and follow those used by Cameron and Wright (1982: fig. 1). Because the original was printed too faintly the vegetation map of Cameron and Wright (1982: fig. 4) is reproduced here as Fig. 1. The comments below are mainly based on our visit to the island in February 2005, but also on the two specimens collected in January 1994, re-identifications of existing herbarium specimens, comments from Bryce Rope who holds the farm lease, and comments from DOC staff who have visited the island since 1993.