

Vascular plants seen at Waionui Inlet, Kaipara Harbour, 17 Aug 2013

* = exotic species

Pl. = planted species

Ferns	<i>Galium propinquum</i> <i>Geniostoma ligustrifolium</i> <i>Hebe stricta</i> <i>Hydrocotyle novae-zeelandiae</i> <i>Hypericum pusillum</i> <i>Kunzea ericoides</i> <i>Lagenophora stipitata</i> <i>Leptecophylla juniperina</i> <i>Leptospermum scoparium</i> <i>Leucopogon fasciculatus</i> <i>Leucopogon fraseri</i> <i>Lobelia anceps</i> <i>Lobelia aff. angulata</i> <i>Lotus pedunculatus</i> * <i>Lupinus arboreus</i> * <i>Mazus novaezeelandiae</i> subsp. <i>impolitum</i> <i>Meliclytus ramiflorus</i> <i>Mentha cunninghamii</i> <i>Muehlenbeckia complexa</i> <i>Myrsine australis</i> <i>Olearia furfuracea</i> <i>O. solandri</i> <i>Ornithopus pinnatus</i> * <i>Oxalis exilis</i> <i>Ozothamnus leptophyllus</i> <i>Paraserianthes lophantha</i> * <i>Parsonsia</i> sp. <i>Pelargonium inodorum</i> <i>Persicaria decipiens</i> <i>Physalis peruviana</i> * <i>Phytolacca octandra</i> * <i>Pimelea orthia</i> <i>Piper excelsum</i> <i>Plagianthus divaricata</i> <i>Prunella vulgaris</i> * <i>Pseudopanax lessonii</i> <i>Pseudopanax crassifolius</i> x <i>P. lessonii</i>	<i>Ranunculus amphitrichus</i> <i>Senecio bipinnatisectus</i> * <i>Solanum mauritianum</i> * <i>Solanum nigrum</i> * <i>Solanum nodiflorum</i> <i>Sophora chathamica</i>
Conifers	<i>Pinus radiata</i> * pl.	
Dicotyledons	<i>Ageratina adenophora</i> * <i>Anagallis arvensis</i> * <i>Avicennia marina</i> <i>Cardamine hirsuta</i> * <i>Carmichaelia australis</i> <i>Centaureum erythraea</i> * <i>Centella uniflora</i> <i>Coprosma crassifolia</i> <i>C. rhamnoides</i> <i>C. robusta</i> <i>Corokia cotoneaster</i> <i>Cotula australis</i> <i>Crassula decumbens</i> * <i>Drosera auriculata</i> <i>Erica lusitanica</i> * <i>Euphorbia peplus</i> * <i>Facelis retusa</i> *	
Monocotyledons		<i>Apodasmia similis</i> <i>Machaerina articulata</i> <i>M. juncea</i> <i>Bolboschoenus fluviatilis</i> <i>Carex flagellifera</i> <i>C. virgata</i> <i>Cordyline australis</i> <i>Cortaderia selloana</i> * <i>Austroderia splendens</i> <i>Cyperus ustulatus</i> <i>Eleocharis acuta</i> <i>Isachne globosa</i> <i>Isolepis distigmatica</i> <i>Ficinia nodosa</i> <i>Juncus planifolius</i> <i>Lemna disperma</i> <i>Lepidosperma laterale</i> <i>Microlaena stipoides</i> <i>Morelotia affinis</i> <i>Nematoceras triloba</i> <i>Oplismenus hirtellus</i> <i>Paspallum vaginatum</i> * <i>Phormium tenax</i> <i>Poa pusilla</i> <i>Schoenus maschalinus</i> <i>Sporobolus africanus</i> * <i>Stenotaphrum secundatum</i> * <i>Thelymitra</i> sp. <i>Typha orientalis</i> <i>Zoysia pauciflora</i>

Motukaha – the vascular flora of a small island off western Waiheke Island, Hauraki Gulf

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Introduction

Motukaha is a small island (0.4 ha, Taylor 1989) between Church and Fossil Bays on the western side of Waiheke Island, inner Hauraki Gulf, Auckland (lat. 36° 47' 47" S, long. 174° 59' 9" E, 16 m asl) (Figs. 1–3). There is a good introduction to the island covering landform, geology, flora, fauna and archaeology by Mike Lee (1999) as part of his survey of the biota of seven islets off Waiheke Island during 1996–97. The ownership is "uninvestigated", probably customary Maori land (Lee 1999). The

name Motukaha ("strong island") suggests that the island was once a fortified strongpoint in Maori times (Lee 1999) and its flat-top was probably levelled by Maori during those times. Midden shells are locally common eroding out of the cliffs in several places (pers. ob.).

The Motukaha cliffs are composed of eroded Waitemata sediments on the south and east sides, eroded greywacke rock forms the west (Fig. 4) and north sides, and a younger zone of basal Waitemata



Fig. 1. Motukaha I., off Waiheke I., with shingle spit visible (near low tide). Image: Auckland Council GIS Viewer (adapted by Joshua Salter).



Fig. 2. Eastern side of Motukaha viewed from tip of the gravel spit, 21 Dec 2010. All photos by EKC.



Fig. 3. Oblique aerial view of Motukaha off Church Bay, western Waiheke Island, looking southeast, near high tide, 20 Nov 2009.

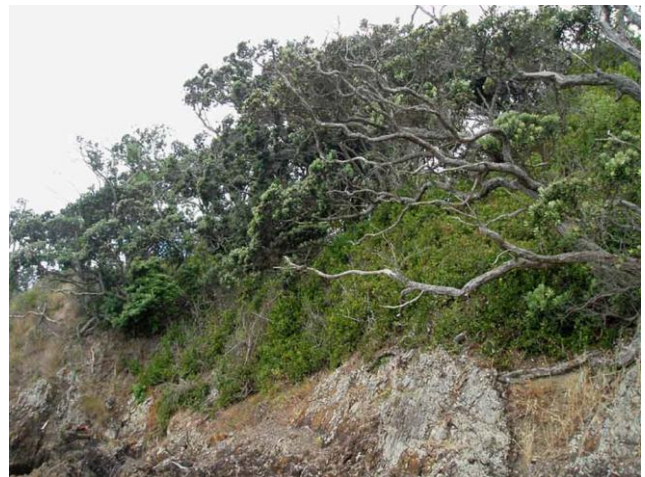


Fig. 4. Weedy rhamnus, prostrate on the western greywacke cliffs, with spreading pohutukawa above, 17 Jan 2010.



Fig. 5. Eastern side of Motukaha with karo shrubs (lower down), pohutukawa above, and dried-off grass cover. Note the basal Waitemata conglomerate at the foot of the cliff, 17 Jan 2010.



Fig. 6. Clusters of male rhamnus flowers of the prostrate plant(s) in Fig. 4, 20 Aug 2009.



Fig. 7. Mile-a-minute getting away between weeding visits; scrambling over a pile of felled rhamnus, good mapou and karo regeneration behind and pohutukawa above, 17 Jan 2010.



Fig. 8. Motukaha, looking south from the public walkway at north side of Church Bay, 17 Jan 2010.



Fig. 9. Dense mapou and karo regeneration where the rhamnus once grew, 21 Dec 2010.



Fig. 10. Mostly mapou and karo regeneration with tall pohutukawa behind, and felled rhamnus stacked in the foreground, 21 Dec 2010.



Fig. 11. A lush winter sward of Italian ryegrass and stacked rhamnus stems at the north end of the plateau (E-facing), 20 Aug 2009.



Fig. 14. Presumed to be a ship rat karo husking station, at the base of a karo on Rakitu (Arid) Island, 2 Jan 1981.

conglomerate is evident low down on the north-eastern side (Fig. 5). A rocky intertidal reef surrounds the island (wider at the north and south ends), and a gravel spit 240 m long joins the island to Waiheke Island (Fig. 1). It is possible to wade across this spit from about one hour either side of low tide (for long-legged people). Briefly during low spring tides it is uncovered. A rich fossil sequence of predominantly marine molluscs occurs at the adjacent Fossil Bay, in early Miocene sedimentary mudstone rocks exposed in the bay's cliffs and intertidally beneath the fine gravels of the beach (Eagle et al. 1995).

The earliest plant collections in the Auckland Museum herbarium (AK) from the Motukaha area were collected by Lucy Cranwell, who visited the island spit at least twice collecting seaweeds (1933, 1937), and the adjacent bay once (1932) where she collected variegated thistle (*Silybum marianum*). The spit is the type locality for a small brown epiphytic alga, *Nemacystus novae-zelandiae*, collected there ("Squadron Bay Reef") in 1933 by Cranwell (AK 146254). Mike Wilcox also collected seaweeds here during my first visit on 20 August 2009.

Two previous botanical surveys of the island were carried out, one by Graeme Taylor on 18 April 1989 and another by Mike Lee during six visits in 1996. The combined results were presented by Lee (1999). Since December 2005 the most aggressive environmental weeds present have been controlled by the Auckland Regional Council (now Auckland Council). These include: rhamnus (*Rhamnus alaternus*) (Figs. 4, 6), the worst weed on the island; mile-a-minute (*Dipogon lignosus*) (Fig. 7) and smaller amounts of woolly nightshade (*Solanum mauritianum*); brush wattle (*Paraserianthes lophantha*) and pampas grass (*Cortaderia selloana*). Adult rhamnus on the plateau was targeted in the first few years of their weed control.

My observations are based on three visits, each of about 2 hour's duration: 20 August 2009 (access by boat); 17 January 2010 (waded); and 21 December 2010 (waded). Since my last visit 'Weed Free Waiheke' (contracted by Auckland Council) has spent virtually four control days (control done quarterly) a year on the island targeting rhamnus, mile-a-minute and any other main environmental weed species. Evidently some abseiling work is still required for rhamnus and mile-a-minute control on the cliffs.

Vegetation

The vegetation is highly modified. When visited by Taylor in 1989 and Lee in 1996 the island was heavily wooded with emergent pohutukawa (*Metrosideros excelsa*), dense stands of rhamnus with some karo (*Pittosporum crassifolium*) and houpara (*Pseudopanax lessonii*), and locally an understorey of mapou (*Myrsine australis*) (Lee 1999).

Taylor recorded rhamnus as "abundant, dominant sapling, shrub, trees". The size and density of the rhamnus in 1989–1996 indicates that it had been established on the island for a long time. Fromont (1997), based on herbarium specimens, reported the earliest records of rhamnus in the Hauraki Gulf as c.1930 on Motuihe and Rangitoto Islands. Perhaps Motuihe, <3 km distant from Motukaha, was the origin of this bird-dispersed weed to Motukaha? Since 2005 the rhamnus forest has been felled leaving a standing broken woody canopy of mainly pohutukawa (Fig. 8). However, locally a thicket of mapou and karo 1.5–3.0 m tall has flourished on the plateau (Figs. 9, 10) presumably mainly in the gaps where rhamnus once occupied. Perhaps the mapou is also root-suckering as it is reported to do elsewhere by Esler (2004).

At the northern end of the plateau and on the upper eastern flanks, grassland is present with virtually no shrub layer. This grassland is lush in the winter (Fig. 11), drying out in the summer, and several herb species reach 2 m tall here, including: fireweed (*Senecio esleri*), acrid lettuce (*Lactuca virosa*) and slender oat (*Avena barbata*). This indicates that the summit soil is very fertile and Lee (1999) referred to it as "...a thick layer of fine black soil enriched by shell material and the ashes of Maori cooking fires." Apart from past Maori activities increasing the fertility, including gardening, it is also possibly a signature of past seabird colonies affecting current soil nutrients (Hawke 2001).

The cliffs are rather bare; grasses are common with scattered shrubs of karo and rhamnus with larger pohutukawa on the upper slopes (Figs. 2, 4, 5).

Vascular flora updated

The original records from Taylor (from his field notebook) and Lee (1999) are presented in separate columns in Table 1. This added four Taylor records previously omitted by Lee (1999): *Hebe pubescens*, *Rytidosperma*, *Sagina procumbens* and *Senecio hispidulus*. The results from the recent three surveys add 57 new records (72% naturalised) (Table 1) to the published vascular flora by Lee (1999) – a doubling of the flora, bringing the total recorded vascular flora for Motukaha to 112 taxa (43% native). Eight previous species were not confirmed by the current surveys. Thirty percent of the records are vouchered in the Auckland Museum herbarium (AK) and these are cited in Table 1. Most vouchers were collected during the current surveys. A large number of new records require high light levels and their establishment will be mainly related to the clearing of what was once a dense canopy of rhamnus over the islands summit. The barren understorey created by rhamnus is well illustrated on Motutapu Island in the Hauraki Gulf by Fromont (1997: fig. 4).



Fig. 12. Herbarium specimen of bristly hawksbeard (*Crepis setosa*) from Motukaha – an unusual annual for the Hauraki Gulf islands. Image of AK 320054, collected 21 Dec 2010. Scale 0-10 cm.



Fig. 13. Fruiting heads from specimen (AK 320054) in Fig. 12. Scalebar = 1 cm.

There is a single threatened species present: *Geranium solanderi* (illustrated in Cameron 2013: fig. 12) which is ranked 'Nationally, At Risk' (de Lange et al. 2013). Some ten adult plants occur mainly on the grassy bank of the northeastern cliff top. This perennial herb has large turnip-shaped tap roots up to 2.5 cm across (Gardner 1984), which enable it to survive the summer droughts. The presence of this geranium is rather at conflict with rabbits once being common on the island (see below) because they are likely to have eaten them out. Perhaps the rabbit incursion was short-lived?

An apparently harmless naturalised species native to Europe and SW Asia, bristly hawksbeard (*Crepis setosa*) up to 70 cm tall, occurs on the island. Although it has been collected a few times on Auckland's mainland, including early undated specimens by Thomas Kirk (WELT SP61367, [1863-73]) and Thomas Cheeseman (AK 89881-86), [1874-1923]), the specimen from Motukaha (AK 320054) appears to be the first collection for the Hauraki Gulf (Fig. 12). Being a short-lived annual and looking rather similar to its cousin, the ubiquitous hawksbeard (*C. capillaris*), is it possibly just being missed or overlooked? However, the bristly hairs on the peduncles and involucre bract midribs (Fig. 13) readily distinguish it from *C. capillaris*. Another rather similar annual European daisy naturalised around Auckland, *Tolpis barbata*, is distinguished by teeth on the margins of the involucre bracts and cobwebby tomentum on the bracts.

Fauna

Birds

Lee (1999) recorded variable oystercatcher (breeding), pied shag (nesting), a pair of black-backed gulls, grey warbler, silvereye, dunnock, blackbird, and chaffinch. He also included additional bird observations by Alan Tennyson who accompanied Graeme Taylor on 18 April 1989: little shag, red-billed gull, kingfisher and goldfinch. Birds recorded during my three visits: variable oystercatcher 1,2,3 (numbers refer to each of my three visits) (a breeding pair 2,3); pied shag 1; grey warbler 1,3; silvereye 3; blackbird 1,2,3; kingfisher 1,2,3 (nesting holes in S cliffs?); black-backed gull 1; red-billed gull 1; goldfinch 2,3 (on thistle heads); chaffinch 3; mallard duck 1 (a pair in the plateau bush); starling 1; and tui 1 (the latter three species are additional to previous records). Seabirds that were frequently seen flying past included: black-backed gull, red-billed gull, white-fronted tern and Australasian gannet.

Mammals and lizards

Taylor (1989) concluded that there were probably Norway rats (*Rattus norvegicus*) present, recording in his notebook: "Rat sign abundant on island. Fresh droppings found ... some small size, others huge

Norway rat size. Numerous rat-holes dug in ground over summit of island.”. Lee (1999) trapped ship rats (*R. rattus*) in low numbers on the island in 1996 and laid rat poison in the same year. It therefore appears likely that two species of rats have been present on the island during the 1980s-1990s. Norway rats are vulnerable to stoat predation. Therefore it seems likely that Norway rats invade the island periodically and these incursions are removed by visiting stoats; ship rats can survive stoat incursions as they are more arboreal and better cliff climbers (G.A. Taylor, pers. comm.). Lee failed to catch any lizards in his pit-fall traps. From a neighbouring farmer, Lee (1999) reported that the island was once infested with rabbits (which would also have been vulnerable to visiting stoats) and that the rabbits were no longer present. Although no evidence of rats was seen during my visits, because of the proximity to Waiheke Island and the connecting intertidal spit they are likely to have reinvaded the island. No lizards or rabbits were seen by me.

Conclusions

Karo was occasional on Motukaha in 1989, but now many young and healthy plants are present (Table 1). This regeneration is possibly related to the poisoning of the rats in 1996 by Lee (1999). Campbell and Atkinson (1999, 2002) have shown that the Pacific rat (*Rattus exulans*) causes recruitment depression of karo on islands. Ship rats also eat fruit (Shiels & Drake 2011), including karo fruit (Fig. 14), which presumably affects its regeneration on islands like Motukaha where resources are limited.

Within 1.5 km of Motukaha to the east on Waiheke Island, there is mainly a mix of native forest regeneration and pastoral farmland (from Auckland Council GIS Viewer). The native bush here could be

an important seed source for the regenerating island. Although the island currently lacks broadleaf species which would attract the seed-dispersing native pigeon, tui already visit the island and blackbirds are present there. However, frugivorous birds may also bring aggressive weed seeds to the island. On the Waiheke headland adjacent to Motukaha in 2010: rhamnus (common), bone-seed (locally common), woolly nightshade (occasional) were present. Weeds without fleshy fruit were also present: brush wattle (occasional), gorse (*Ulex europaeus*) (locally common) and pampas grass (uncommon).

It is fantastic that Auckland Council has taken the initiative of controlling the environmental weeds which once dominated the island, and that dense mapou and karo regeneration has now replaced the rhamnus forest. It is reassuring that there is now a management plan for rhamnus for the western side of Waiheke Island and since September the control work is being carried out by Weedfree Waiheke. Turning back the clock on this weed invasion is heartening – congratulations to all involved. Now to get the seabirds back!

Acknowledgements

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Table 1: Annotated Vascular Flora of Motukaha for three time periods

Key: a = abundant; c = common; l = local;
o = occasional; s = scarce (<5 individuals present); x = recorded as present in 1996 (Lee 1999)

[] = identification most likely from original record which was a different species or as genus only;
TWM = target for weed management on Motukaha by Auckland Council from Dec 2005 to present.

Species	1989	1996	2009-10	Comments (all related to 2009-10 visits unless stated otherwise) and herbarium voucher numbers
Ferns (6 + 0) (= native + naturalised)				
<i>Adiantum hispidulum</i>	l	x	s	rosy maidenhair. Single clump, plateau (E side)
<i>Asplenium haurakiense</i>	o		o	coastal spleenwort. Mainly on steep coastal rocky slopes
<i>Cheilanthes distans</i>	[l]		lc	woolly cloak fern. NE open coastal slope [recorded as <i>C. sieberi</i> by Taylor in Lee 1999]
<i>Doodia australis</i>	o		o-lc	rasp fern. On plateau
<i>Pteridium esculentum</i>	o		l	bracken. E cliff tops
<i>Pyrrhosia eleagnifolia</i>	o		o-lc	leather fern. Patches on rocky coastal slopes, and epiphytic on lower pohutukawa trunks
Conifers (1+ 0)				
<i>Podocarpus totara</i>			s	totara. Single sapling 1m tall, upper W cliffs
Dicots (29 + 43)				
<i>Acacia longifolia</i> *			s	Sydney golden wattle. Single shrub 2 x 4m, northern cliff, in Aug 2009, felled by 2010 (TWM)?. AK 305906
<i>Anagallis arvensis</i> s.str. *	s		c	scarlet pimpernel. Open sites throughout
<i>Atriplex prostrata</i> *	o	x	s	orache. Single plant, upper base of pebble spit, E side of island
<i>Cardamine hirsuta</i> *			l	bitter cress. Single lush clump N end of plateau. AK 305917
<i>Centaureum erythraea</i> *	o		s	centaury. 3 plants on bare soil W side, S end. AK 320176
<i>Cerastium glomeratum</i> *			o	annual mouse-ear chickweed. Open sites
<i>Chrysanthemoides monilifera</i> *	la	x	lc	bone-seed. Adult shrubs and seedlings on steep rocky coastal slopes

<i>Cirsium vulgare</i> *	s		o	Scotch thistle. Open sites throughout
<i>Conyza sumatrensis</i> *			l	fleabane. Rocky coastal slopes
<i>Coprosma macrocarpa</i>	o	x	l	coastal karamu. Shrubs on plateau and upper coastal slopes
<i>Coprosma macrocarpa</i> × <i>C. robusta</i>			o	Shrubs on plateau
<i>Coprosma repens</i>		x	s	taupata. Single small shrub on E side of plateau
<i>Coprosma rhamnoides</i>	s			Single shrub in 1989; not recorded since
<i>Coprosma robusta</i>			o	karamu. Plateau
<i>Crassula sieberiana</i>			lc	Open rocky coastal slopes
<i>Crepis capillaris</i> *			s	hawksbeard. Partly-open area on plateau. AK 320178
<i>Crepis setosa</i> *			lc	bristly hawksbeard. In open on E coastal slope and N plateau. AK 320054
<i>Dichondra repens</i>	o		o	Mercury Bay weed. Coastal rocks in splash zone
<i>Dipogon lignosus</i> *	[l]	x	c	mile-a-minute. Throughout, mainly as regrowth plants (TWM). AK 237378 & 320149
<i>Disphyma australe</i>			l	NZ iceplant. Small patches on solid coastal rock (greywacke) on W side
<i>Euchiton audax</i>	l			Local patch on connected stack in 1989; not recorded since
<i>Euchiton sphaericus</i>	[o]		s	Top of coastal slope, E side. AK 229777
<i>Euphorbia peplus</i> *			lc	milkweed. Coastal slopes and plateau
<i>Galium aparine</i> *			l	cleavers. Open areas on plateau
<i>Galium divaricatum</i> *			o	slender bedstraw. In open, N end of plateau. AK 307270
<i>Geranium solanderi</i>			l	About ten adult plants on upper coastal grassy danthonia slopes (NE side) and plateau edge. AK 305914
<i>Haloragis erecta</i>			lc	Plateau and E cliffs
<i>Hebe pubescens</i> s.str.	[s]			koromiko. Pubescence of leaf margin and leaf bud sinus of the 1989 voucher fit this species. AK 229778
<i>Hebe pubescens</i> × <i>H. stricta</i>			l	koromiko. At least 5 youthful plants (≤80cm), none fertile; pubescence of leaf margin and leaf bud sinus intermediate of the two suspected parents. AK 320288
<i>Helminthotheca echioides</i> *			o	oxtongue. Coastal slope, E side and plateau
<i>Hypochaeris radicata</i> *	s		o	catsear. Open areas
<i>Lactuca virosa</i> *			l	acrid lettuce. Plateau, plants to 2m tall in grassland at N end. AK 320151
<i>Leptospermum scoparium</i>	s			manuka. Single tree in 1989; not recorded since
<i>Leucopogon fasciculatus</i>	o		l	mingimingi. Upper E cliffs and plateau

<i>Lotus pedunculatus</i> *	[o]		o	lotus. Open sites [recorded as <i>L. suaveolens</i> by Taylor in Lee 1999]
<i>Melicytus ramiflorus</i>	s			mahoe. Several trees in 1989; not recorded since
<i>Melilotus indicus</i> *	[lc]		lc	King Island melilot. Coastal slopes and plateau. AK 307943
<i>Metrosideros excelsa</i>	o	x	o	pohutukawa. Tallest trees on the island (to 10m tall) - scattered trees on plateau and upper cliff tops
<i>Muehlenbeckia complexa</i>	o	x	o	pohuehue. Scattered small tangles - mainly upper cliff tops
<i>Myrsine australis</i>	lc	x	la	mapou. Abundant on the plateau (to 6m tall); scarce on the cliff faces
<i>Orobanche minor</i> *			l	broomrape. E cliff tops and plateau, semi-shade
<i>Oxalis exilis</i>			lc	creeping oxalis. Open eroding slopes, NE corner
<i>Paraserianthes lophantha</i> *	[s]		lc	brush wattle. Plateau and scarce on cliffs, mainly young plants. TWM. AK 305907
<i>Phytolacca octandra</i> *			o	inkweed. Coastal slopes and plateau
<i>Pittosporum crassifolium</i>	o	x	lc	karo. Coastal slopes and plateau, ≤6m tall, many young and healthy plants
<i>Plantago lanceolata</i> *	lc	x	o	narrow-leaved plantain. Throughout in open sites
<i>Polycarpon tetraphyllum</i> *	o		o	allseed. Open sites
<i>Pseudopanax lessonii</i>	o-lc	x	o	houpara. Mid-upper cliffs and on plateau, to 5m tall
<i>Ranunculus parviflorus</i> *			s	small-flowered buttercup. In open, N end of plateau. AK 307133
<i>Raphanus raphanistrum</i> *			s	wild radish. Plateau in open
<i>Rhamnus alaternus</i> *	a	x	a	rhamnus. Throughout - but mainly as low (≤1m) spreading cover on the steep slopes (TWM). AK 226088
<i>Rubus procerus</i> *			s	blackberry. 2 small plants on plateau and 1 small plant at base of E cliffs. AK 320055
<i>Sagina procumbens</i> *	o		lc	procumbent pearlwort. Coastal rocky slopes
<i>Sarcocornia quinqueflora</i>	o	x	o	glasswort. Coastal rock, mainly on the greywacke
<i>Senecio esleri</i> *			o	fireweed. Open sites, coastal slopes and plateau; plants to 2m tall. AK 320154
<i>Senecio hispidulus</i>	o		o	fireweed. Open sites, coastal slopes and plateau; 1 specimen may be a hybrid with <i>S. scaberulus</i> - AK 305904
<i>Senecio lautus</i>	s		lc	shore groundsel. Coastal slopes
<i>Silene gallica</i> *			l	catchfly. Coastal slopes
<i>Silybum marianum</i> *			s	variegated thistle. In open, N end of plateau; fertile plants to c.1.6m tall
<i>Solanum mauritianum</i> *	s		o	woolly nightshade. Single tree in 1989; shrubs on coastal slopes and plateau in 2009-10 (TWM)
<i>Solanum nigrum</i> *	s	x	o	black nightshade. Coastal slopes and plateau. AK 320148
<i>Solanum nodiflorum</i>			o	small-flowered nightshade. Coastal slopes and plateau. AK 305918

<i>Sonchus asper</i> *			s	prickly puha. Coastal slope, E side
<i>Sonchus oleraceus</i> *	s		o-lc	puha. Coastal slopes and on plateau where very lush and >0.8m tall
<i>Taraxacum officinale</i> *			s	dandelion. Single plant, plateau in open
<i>Torilis arvensis</i> *			l	spreading hedge-parsley. N plateau, open grassland. AK 309885 & 320147
<i>Trifolium dubium</i> *			l	suckling clover. Cliff top
<i>Ulex europaeus</i> *	o	x	o-lc	gorse. Mainly low plants on upper coastal slopes
<i>Veronica arvensis</i> *			o-lc	field speedwell. Throughout. AK 305915
<i>Veronica plebeia</i>			s	Australian speedwell. Plateau in open. AK 306916
<i>Vicia tetrasperma</i> *			lc	four-seeded vetch. Coastal slopes and plateau. AK 307942
<i>Wahlenbergia vernicosa</i>			s	harebell. Single large clump among annual grasses on steep coastal slope (E side)

Monocots (12 + 21)

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<i>Agrostis capillaris</i> *			s	browntop. Single clump, north end of plateau, in open. AK 320179
<i>Anthoxanthum odoratum</i> *			l	sweet vernal. Plateau, in open
<i>Asparagus asparagoides</i> *	o-lc	x	o	smilax. All plants infected with self-introduced biocontrol rust (<i>Puccinia myrsiphyllii</i>). AK 305905
<i>Asparagus scandens</i> *	l	x		climbing asparagus. Not seen in 2009-10
<i>Austrostipa stipoides</i>	l		l	needle tussock. SW corner, coastal rocks, >40 plants, many quite small
<i>Avena barbata</i> *			la	slender oat. Cliffs and plateau, plants to 2m tall. AK 320171
<i>Briza minor</i> *			o-lc	shivery grass. Cliff faces. AK 307035
<i>Bromus diandrus</i> *			l	ripgut brome. E cliffs
<i>Bromus hordeaceus</i> *			lc	soft brome. Cliffs and plateau; plants to 80cm tall. AK 320145
<i>Carex flagellifera</i>	o		l	Glen Murray tussock. Plateau margins
<i>Carex inversa</i>			s	creeping lawn sedge. Semi-open areas on plateau
<i>Carex testacea</i>			s	speckled sedge. Single plant on plateau, leaves with characteristic orange hue
<i>Catapodium rigidum</i> *			l	hard grass. Cliff top and plateau. AK 307132
<i>Cortaderia selloana</i> *			s	pampas grass. Four young tussocks, all uprooted except the largest one (TWM)
<i>Dactylis glomerata</i> *			o	cocksfoot. Plateau
<i>Dichelachne crinita</i>			lc	plume grass. Plateau and S coastal slopes; tall robust plants

<i>Ficinia nodosa</i>	o	x	o	knobby sedge. Coastal slopes
<i>Gahnia lacera</i>	s	x	o	bamboo sedge. Plateau, near margins
<i>Gastridium ventricosum</i> *			s	nit grass. Plateau. AK 320139
<i>Holcus lanatus</i> *			o	Yorkshire fog. Throughout
<i>Juncus edgariae</i>			s	Single clump at top of E cliffs. AK 309886
<i>Lachnagrostis billardierei</i>	[lc]		o	Coastal slopes. AK 307941
<i>Lachnagrostis filiformis</i>	s			Rare, exposed slopes in 1989; not recorded since
<i>Lolium multiflorum</i> *			la	Italian ryegrass. Lush sward N end of plateau. AK 306099 & 307271
<i>Lolium perenne</i> *			o	ryegrass. N end of plateau. AK 320142
<i>Oplismenus hirtellus</i>	s			Single patch in 1989; not recorded since
<i>Parapholis incurva</i> *			lc	sickle grass. Coastal rocks (greywacke) in splash zone. W side. AK 307940
<i>Paspalum dilatatum</i> *			l	paspalum. Open plateau bush and E coastal slope
<i>Phalaris aquatica</i> *			lc	phalaris. Cliffs and plateau. AK 320146
<i>Poa anceps</i>	la	x	lc	coastal poa. Partially shaded coastal slopes, often as 'mats'
<i>Rytidosperma racemosum</i> *	[la]		o-la	danthonia. Small tussocks in open on coastal slopes and cliff tops, especially E side
<i>Sporobolus africanus</i> *	o		lc	ratstail. Rocky coastal slopes, especially NE corner
<i>Vulpia bromoides</i> *	o		la	vulpia hair grass. Coastal slopes and cliff tops