

# Grassland on Mt Eden – the flora

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It is normal for productive pastures to have one or two dozen plant species. Farmers promote only the most desirable grasses and clovers by management. Mt Eden swards have more than 140 species (all listed in the Appendix). The purpose of this analysis is to explain the significance of this abundant flora. The grassland combines the secondary species with the five dominant grasses – *Lolium perenne*, *Pennisetum clandestinum*, *Holcus lanatus*, *Dactylis glomerata* and *Microlaena stipoides* in spite of these turf species being unyielding bedfellows with blanketing canopy and greedy, shallow roots. When grazed, the grasses make a vigorous, self-rejuvenating community. Removal of top foliage allows light penetration to promote younger, renewal growth and exposes the ground-hugging white clover that supplies the vital nitrogen. Without this active recycling of nutrients in dung and urine the sward becomes stagnant and weed infested. Grazing pressure to excess encourages weeds of disturbed soil while light grazing favours wasteland plants including woody species.

Change is the most constant process in nature. In a dramatic biological example a farmer may watch his neglected pasture change to scrub and the beginning of forest, all within a lifetime. The species involved in the transformation indicate the nature of the subsequent vegetation i.e. content is portent.

Grassland components are in three classes directed by their requirements and tolerances.

1. Pastorals (of pasture) seem to be there of right as they can perpetuate themselves in grassy places.
2. Agrestals (of disturbed soil) grow most freely where turf has fresh gaps to occupy.
3. Ruderals (of waste places) are not specific to any habitat more than others. They seem like the rats and mice of the community but are a large part of it.

The study does not include 20 or more forest makers. These are usually weeded out. Ignored also are relics of former woody vegetation (ferns) or those promoted by shading for instance (*Iris foetidissima*, *Ehrharta erecta*).

The grassy character of 20 ha of Mt Eden is due to the predominance of *Lolium*, *Pennisetum*, *Holcus lanatus*, *Dactylis* and *Microlaena* (Esler & Esler 2010).

a. Sown: *Lolium* (early cultivar present), *Dactylis*, *Holcus*, *Agrostis capillaris*, *Schedonorus arundinaceus*,

*Bromus willdenowii*; less likely *Poa trivialis*, *Cynosurus cristatus*, *Anthoxanthum odoratum*.

b. Native relics: *Acaena novae-zelandiae*, *Microlaena*, *Oxalis exilis*.

c. For patching erosion scars: *Pennisetum*, *Stenotaphrum*.

d. Accidental.

## 1. Pastorals

The pastorals are mostly perennial, some able to spread vegetatively. Life forms include rosette (*Bellis perennis*, *Plantago lanceolata*), creeping and rooting (*Trifolium repens*, *Modiola caroliniana*), also erect (*Rumex brownii*). The few annuals tend to be on the trampled edges in the *Poa annua* sort of territory where replacement by seeding is possible (Esler & Esler 2010).

Pastoral species: *Acaena novae-zelandiae*, *Achillea millefolium*, *Agrostis capillaris*, *A. stolonifera*, *Anthoxanthum odoratum*, *Aphanes inexpectata*, *Arrhenatherum elatius*, *Bromus hordeaceus*, *B. willdenowii*, *Carduus pycnocephalus*, *C. tenuiflorus*, *Carex divulsa*, *Cirsium vulgare*, *Critesion murinum*, *Cynosurus cristatus*, *Daucus carota*, *Dichondra repens*, *Elymus scaber*, *Erodium moschatum*, *Festuca rubra*, *Gamochaeta coarctata*, *Geranium dissectum*, *G. gardneri*, *Holcus lanatus*, *Hydrocotyle moschata*, *Juncus australis*, *Leucanthemum vulgare*, *Linum bienne*, *Lolium perenne*, *Oenanthe pimpinelloides*, *Oxalis exilis*, *Paspalum dilatatum*, *Plantago lanceolata*, *P. major*, *Poa trivialis*, *Prunella vulgaris*, *Ranunculus muricatus*, *R. repens*, *R. sardous*, *Rumex pulcher*, *Rytidosperma racemosum*, *Schedonorus arundinaceus*, *Sherardia arvensis*, *Soliva sessilis*, *Sporobolus africanus*, *Stenotaphrum secundatum*, *Taraxacum officinale*, *Torilis nodosa*, *Trifolium dubium*, *T. micranthum*, *T. pratense*, *T. repens*, *T. subterraneum*, *Veronica filiformis*, *V. persica*, *V. serpyllifolia*, *Vicia disperma*, *V. hirsuta*, *V. tetrasperma*, *Viola odorata*.

## 1. Agrestals

Think of agrestals as weeds of cultivation for this is where they evolved. They are mostly over-wintering annuals fitting in a short cycle between disturbances. To aid them many flower independent of day length and are self-pollinated, or do not need pollination. Seeds are prolific, easily dispersed and durable in seed banks in the soil. Life forms are various - rosette (*Capsella*), low sprawling and rooting (*Digitaria*) to stout and erect (*Sonchus*). By nature agrestals are opportunist invaders, and grassland is not an ideal

habitat but they take advantage of breaks in the turf. They have been accurate indicators for us of past mismanagement recorded in files of the Lands and Survey Department, responsible for the volcanic cones for a long period. When weeds were reported as troublesome the focus was on control rather than the ecological causes of the infestation, principally over-grazing. Worrying amounts of some ruderals told the same story (Esler 1974: p.25). Recently, if animal damage had been significant the agrestals would have been more prominent.

Agrestal species: *Capsella bursa-pastoris*, *Cardamine hirsuta*, *Digitaria sanguinalis*, *Euphorbia pepelis*, *Lamium purpureum*, *Lapsana communis*, *Lepidium didymum*, *Senecio vulgaris*, *Solanum nigrum*, *Sonchus oleraceus*, *Stellaria media*, *Valerianella carinata*, *Veronica arvensis*, *V. persica*,

## 2. Ruderals

Kirk (1870) called these plants viaticals (of waysides) and most are truly typical of neglected road and rail margins. Mt Eden has an army of these (about 1/3 of the flora), and mostly maintaining a presence by seeding. They include grasses, legumes, cresses, daisies, and forget-me-nots. In the 100-plot traverse those in noticeable amounts in descending order were *Geranium molle*, *Hypochaeris* and *Crepis*. The nature of many Mt Eden species as wild plants is confirmed by our unpublished, semi-quantitative surveys in 1981 and 1986 of 4 km of rail margins between Mt Albert and Kingsland where they were prominent among the 190 species (which included woody plants and vines). This is in keeping with the census of naturalised species in urban Auckland (Esler 1987), where ruderals made up 54% of more than 600 species, agrestals 24% and pastorals 15%. Most ruderals originated in Europe and nearby lands over vast areas and time periods as wildflowers. There was opportunity to develop many local forms (ecotypes) thus adding to their versatility. Many became weeds of temperate lands wherever colonists took them as contaminants in plant material, more so in New Zealand with a dearth of native annuals or turf species to resist them.

Ruderal species: *Agapanthus praecox*, *Aira caryophyllea*, *Allium triquetrum*, *Anagallis arvensis* var. *arvensis*, *A. arvensis* var. *caerulea*, *Anthemis*

*cotula*, *Arrhenatherum elatius*, *Avena barbata*, *Brassica rapa*, *Briza minor*, *Calystegia* hybrid, *Canna indica*, *Centella uniflora*, *Cerastium glomeratum*, *Conium maculatum*, *Conyza sumatrensis*, *Cortaderia jubata*, *Cotula australis*, *Crepis capillaris*, *Cynodon dactylon*, *Cyperus eragrostis*, *Dactylis glomerata*, *Elytrigia repens*, *Euchiton sphaericum*, *Foeniculum vulgare*, *Freesia refracta*, *Galium aparine*, *G. divaricatum*, *Gamochaeta coarctata*, *Geranium homeanum*, *G. molle*, *G. purpureum*, *Jacobaea vulgaris*, *Leucojum sativum*, *Lotus angustissimus*, *L. pedunculatus*, *L. sauevolens*, *Malva niceeensis*, *Medicago arabica*, *M. lupulina*, *M. nigra*, *Melilotus indicus*, *Mentha pulegium*, *Microlaena stipoides*, *Myostis arvensis*, *M. sylvatica*, *Orobanche minor*, *Oxalis corniculata*, *O. pes-caprae*, *Pennisetum clandestinum*, *Pericallis* × *hybrida*, *Persicaria capitata*, *Poa annua*, *Polycarpon tetraphyllum*, *Polygonum aviculare*, *Potentilla indica*, *Ranunculus parviflorus*, *Raphanus raphanistrum* ssp. *raphanistrum*, *Reseda luteola*, *Rumex brownii*, *R. obtusifolius*, *Sagina procumbens*, *Schenodorus arundinaceus*, *Senecio skirrhodon*, *Silene gallica*, *Sisymbrium officinale*, *Verbena litoralis*, *Verbascum creticum*, *Vicia disperma*, *V. hirsuta*, *V. sativa*, *V. tetrasperma*, *Viola odorata*, *Vulpia bromoides*.

## Issues

1. Auckland's prime scenic view-point deserves a setting more like the neat grazed pasture that New Zealand is famous for. There will be no improvement without a master plan with balanced objectives and a devoted manager.
2. After the first destocking debacle in 1973 grazing had to resume to cope with excessive weed growth. Stocking with sheep was not an option then but it is now, and needs to be fairly intensive.
3. If soil disturbance has been judged from scarplets visible from the road, then erosion could have been exaggerated. Some compaction by treading is probably beneficial. Sheep and cattle habitually graze along contour stock paths and reach above and below without much trampling (Rumball & Esler 1968). This resulting rippled surface would be an engineer's model to minimise soil wash and slumping. There is minor soil displacement from trampling, compared with soil heave as large tree roots make space for themselves, and damage is even more serious if the tree topples. Trees are the enemy of earthworks.

## Acknowledgements

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## Appendix: Catalogue of the Mt Eden grassland species - compiled from 1970s to present day. pas = pastoral; agr = agrestal; rud = ruderal

Botanical name	Family	Common name	Class
<i>Acaena novae-zelandiae</i>	ROS	piripiri	pas
<i>Achillea millefolium</i>	AST	yarrow	pas
<i>Agapanthus praecox</i>	AGA	agapanthus	rud
<i>Agrostis capillaris</i>	POA	browntop	pas
<i>A. stolonifera</i>	POA	creeping bent	pas
<i>Aira caryophylla</i>	POA	silvery hairgrass	rud
<i>Allium triquetrum</i>	ALL	three-cornered garlic	rud
<i>Anagallis arvensis</i> var. <i>arvensis</i>	PRI	scarlet pimpernel	rud
<i>Anagallis arvensis</i> var. <i>caerulea</i>	PRI	blue pimpernel	rud
<i>Anthemis cotula</i>	AST	stinking mayweed	rud
<i>Anthoxanthum odoratum</i>	POA	sweet vernal	pas
<i>Aphanes inexpectata</i>	ROS	parsley piert	pas
<i>Arrhenatherum elatius</i>	POA	tall oatgrass	rud
<i>Avena barbata</i>	POA	wild oat	rud
<i>Bellis perennis</i>	AST	lawn daisy	pas
<i>Briza minor</i>	POA	shivery grass	rud
<i>Brassica rapa</i>	BRA	wild turnip	rud
<i>Bromus diandrus</i>	POA	ripgut brome	rud
<i>B. hordeaceus</i>	POA	soft brome	pas
<i>B. lithobius</i>	POA	Chilean brome	pas
<i>B. willdenowii</i>	POA	prairie grass	pas
<i>Calystegia ?soldanella</i> × <i>C. tuguriorum</i>	CON	convolvulus	rud
<i>Canna indica</i>	CAN	Indian shot	rud
<i>Capsella bursa-pastoris</i>	BRA	shepherd's purse	agr
<i>Cardamine hirsuta</i>	BRA	bittercress	agr
<i>Carduus pycnocephalus</i>	AST	slender winged thistle	pas
<i>C. tenuiflorus</i>	AST	winged thistle	pas
<i>Carex divulsa</i>	CYP	grey sedge	pas
<i>Centella uniflora</i>	API		rud
<i>Cerastium glomeratum</i>	CAR	annual mouse-eared chickweed	rud
<i>Cirsium vulgare</i>	AST	scotch thistle	pas
<i>Conium maculatum</i>	API	hemlock	rud
<i>Conyza sumatrensis</i>	AST	broad-leaved fleabane	rud
<i>Cortaderia jubata</i>	AST	purple pampas grass	rud
<i>Cotula australis</i>	AST	soldier's button	rud
<i>Crepis capillaris</i>	AST	hawksbeard	rud
<i>Critesion murinum</i>	POA	barley grass	pas
<i>Cynodon dactylon</i>	POA	Indian doab	rud

<i>Cynosurus cristatus</i>	POA	crested dogstail	pas
<i>Cyperus eragrostis</i>	CYP	umbrella sedge	rud
<i>Dactylis glomerata</i>	POA	cocksfoot	rud
<i>Daucus carota</i>	API	wild carrot	pas
<i>Dichondra repens</i>	CON	Mercury Bay weed	pas
<i>Digitaria sanguinalis</i>	POA	summer grass	agr
<i>Elymus scaber</i>	POA		pas
<i>Elytrigia repens</i>	POA	couch	rud
<i>Erodium moschatum</i>	GER	musky storksbill	pas
<i>Euchiton sphaericum</i>	AST	Japanese cudweed	rud
<i>Euphorbia peplis</i>	EUP	milkweed	agr
<i>Festuca rubra</i>	POA	fescue	pas
<i>Foeniculum vulgare</i>	API	fennel	rud
<i>Freesia refracta</i>	IRI	freesia	rud
<i>Galium aparine</i>	RUB	cleavers	rud
<i>G. divaricatum</i>	RUB	slender bedstraw	rud
<i>Gamochaeta coarctata</i>	AST	purple cudweed	rud
<i>Geranium dissectum</i>	GER	cut-leaved geranium	pas
<i>G. gardneri</i>	GER	Gardner geranium	pas
<i>G. homeanum</i>	GER		rud
<i>G. molle</i>	GER	dovesfoot	rud
<i>G. purpureum</i>	GER	lesser herb Robert	rud
<i>Helminthotheca echioides</i>	AST	oxtongue	rud
<i>Holcus lanatus</i>	POA	Yorkshire fog	pas
<i>Hydrocotyle moschata</i>	API		rud
<i>Hypericum humifusum</i>	HYP		rud
<i>Hypochaeris radicata</i>	AST	catsear	rud
<i>Jacobea vulgaris</i>	AST	ragwort	rud
<i>Juncus australis</i>	JUN	rush	pas
<i>Lamium purpureum</i>	LAM	red dead nettle	agr
<i>Lapsana communis</i>	AST	nipplewort	agr
<i>Lepidium didymium</i>	BRA	twin cress	agr
<i>Leucanthemum vulgare</i>	AST	oxeye daisy	pas
<i>Leucojum aestivum</i>	AMA	snowflake	rud
<i>Linum bienne</i>	LIN	purple flax	pas
<i>Lolium perenne</i>	POA	perennial ryegrass	pas
<i>Lotus angustissimus</i>	FAB	slender birdsfoot trefoil	rud
<i>L. pedunculatus</i>	FAB	lotus	rud
<i>L. sauevolens</i>	FAB	hairy birdsfoot trefoil	rud
<i>Malva nicaeensis</i>	MAL	French mallow	rud
<i>Medicago arabica</i>	FAB	spotted bur medick	rud
<i>M. lupulina</i>	FAB	black medick	rud
<i>M. nigra</i>	FAB	bur medick	rud
<i>Melilotus indicus</i>	FAB	King Island melilot	rud
<i>Mentha pulegium</i>	LAB	pennyroyal	rud

<i>Microlaena stipoides</i>	POA	microlaena	rud
<i>Modiola caroliniana</i>	MAL	creeping mallow	pas
<i>Myostis arvensis</i>	BOR	field forget-me-not	rud
<i>Myosotis sylvatica</i>	BOR	garden forget-me-not	rud
<i>Oenanthe pimeleoides</i>	API	parsley dropwort	pas
<i>Orobanche minor</i>	ORO	broomrape	rud
<i>Oxalis corniculata</i>	OXA	horned oxalis	rud
<i>O. exilis</i>	OXA	native creeping oxalis	pas
<i>O. pes-caprae</i>	OXA	Bermuda buttercup	rud
<i>Paspalum dilatatum</i>	POA	paspalum	pas
<i>Pennisetum clandestinum</i>	POA	kikuyu grass	rud
<i>Pericallis × hybrida</i>	AST	cineraria	rud
<i>Persicaria capitata</i>	POL	pink-headed knotweed	rud
<i>Plantago lanceolata</i>	PLA	narrow-leaved plantain	pas
<i>Plantago major</i>	PLA	broad-leaved plantain	pas
<i>Poa annua</i>	POA		rud
<i>Poa trivialis</i>	POA		pas
<i>Polycarpon tetraphyllum</i>	CAR	allseed	rud
<i>Polygonum aviculare</i>	POL	wireweed	rud
<i>Potentilla indica</i>	ROS	alpine strawberry	rud
<i>Prunella vulgaris</i>	LAM	selfheal	pas
<i>Ranunculus muricatus</i>	RAN	spiny buttercup	pas
<i>R. parviflorus</i>	RAN	small-flowered buttercup	rud
<i>R. repens</i>	RAN	creeping buttercup	pas
<i>R. sardous</i>	RAN	hairy buttercup	pas
<i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>	BRA	wild radish	rud
<i>Reseda luteola</i>	RES	wild mignonette	rud
<i>Rumex brownii</i>	POL	hooked dock	rud
<i>R. obtusifolius</i>	POL	broad-leaved dock	rud
<i>R. pulcher</i>	POL	fiddle dock	pas
<i>Rytidosperma racemosum</i>	POA	danthonia	pas
<i>Sagina procumbens</i>	CAR	procumbent pearlwort	rud
<i>Schedonorus arundinaceus</i>	POA	tall fescue	rud
<i>Senecio skirrhodon</i>	AST	gravel groundsel	rud
<i>S. vulgaris</i>	AST	groundsel	agr
<i>Sherardia arvensis</i>	RUB	field madder	pas
<i>Silene gallica</i>	CAR	catchfly	rud
<i>Silybum marianum</i>	AST	variegated thistle	pas
<i>Sisymbrium officinale</i>	BRA	hedge mustard	rud
<i>Solanum nigrum</i>	SOL	black nightshade	agr
<i>Soliva sessilis</i>	AST	Onhunga weed	pas
<i>Sonchus oleraceus</i>	AST	sow thistle	agr
<i>Sporobolus africanus</i>	POA	ratstail	pas
<i>Stellaria media</i>	CAR	chickweed	agr
<i>Stenotaphrum secundatum</i>	POA	buffalo grass	pas
<i>Taraxacum officinale</i>	AST	dandelion	pas
<i>Torilis nodosa</i>	API	hedgohog parsley	pas

<i>Trifolium dubium</i>	FAB	suckling clover	pas
<i>T. micranthum</i>	FAB	lesser suckling clover	pas
<i>T. pratense</i>	FAB	red clover	pas
<i>T. repens</i>	FAB	white clover	pas
<i>T. subterraneum</i>	FAB	subterranean clover	pas
<i>Valerianella carinata</i>	VAL	corn salad	agr
<i>Verbena litoralis</i>	VER	blue vervain	rud
<i>Verbascum creticum</i>	SCR	Cretan mullein	rud
<i>Veronica arvensis</i>	PLA	field speedwell	agr
<i>V. filiformis</i>	PLA	creeping speedwell	pas
<i>V. persica</i>	PLA	scrambling speedwell	agr
<i>V. serpyllifolia</i>	PLA	turf speedwell	pas
<i>Vicia disperma</i>	FAB	French tare	rud
<i>V. hirsuta</i>	FAB	hairy vetch	rud
<i>V. sativa</i>	FAB	vetch	rud
<i>V. tetrasperma</i>	FAB	smooth vetch	rud
<i>Viola odora</i>	VIO	garden violet	rud
<i>Vulpia bromoides</i>	POA	vulpia hairgrass	rud

## A trip to the Kermadecs Cyclone damage, tragedy and frustration

**Maureen Young**  
**Photographs by Kevin Mills & Lyn Wade**

In November 1994 a party of 13 members of Auckland Botanical Society chartered the navy ship *Acheron* and sailed for Raoul Island in the Kermadec group. They spent six days ashore and camped in the staff quarters. Unfortunately there was no trip report produced for this expedition. I was working at the time and could not join the group, so when a chance came to sail with Heritage Expeditions on a ten day trip to the Kermadecs, I decided to make up for this lack.

From 7 – 17 April 2011 the 72 m Russian-registered icebreaker, *Spirit of Enderby*, was home for 58 people, nine of whom were Heritage Expedition staff (Fig. 1). The Russian crew added to the complement. The programme for the trip was as follows:

### Day 1

Sailed from Tauranga Harbour at 12.30 pm.

### Day 2

Sailed northwards.

### Day 3

At 10 am we came to the most southerly of the Kermadec Islands, L'Esperance Rock (French Rock).



**Fig. 1. The DoC team with some staff & passengers from the Spirit of Enderby, on Raoul Island. Photo: M L Wade. 13 Apr 2011.**

This is a rugged volcanic rock that soars 30 m up out of the sea. Clinging to the rocks is low vegetation that appeared to be the ice plant, *Disphyma australe* subsp. *stricticaule*. A pod of bottle-nosed dolphins played in our bow wave for some time, and flying fish and tiny flying squid put on a dazzling display.