Christchurch District Plan
Site of Ecological Significance

Site Significance Statement

Site name: Kinloch

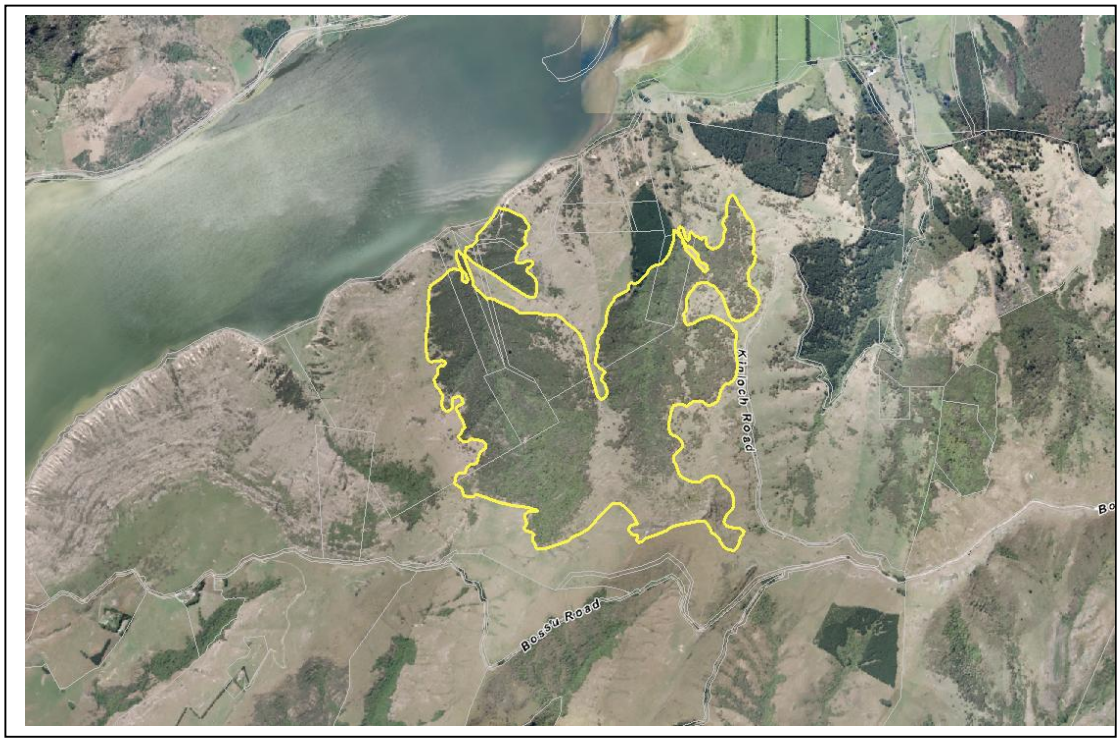
Site number: SES/A/11

Physical address of site: 184 Kinloch Road, Little River

Summary of Significance:

The site is significant because it contains large areas of rare and representative indigenous lowland forest and representative montane shrubland and short grassland. It supports a number of plant and invertebrate species that are nationally At Risk, endemic, or uncommon and plant and invertebrate species at their distributional limits. It also contains an originally rare ecosystem and an altitudinal sequence extending from near sea level to 685 m. It is well buffered by kanuka forest.

Site Map:



Additional Site Information

Ecological District: Akaroa

Area of SES (ha): 257.73

Central point (NZTM): E1581633, N5149593

Site Description

The site includes two steep, predominantly forested, north and northwest facing valleys between the eastern shore of Lake Forsyth/Wairewa, and the prominent rocky summit of Te Oka Peak. Streams in the bottom of each of the valleys drain into the lake. The altitudinal range of the site is from near sea level at the lake margin to the summit of Te Oka Peak at 685 m. The western valley and Te Oka Peak were identified by the Department of Conservation as a Recommended Area for Protection (Akaroa RAP 2 – Kinloch) (Wilson 1992).

Wilson (1992) and Wildland Consultants unpubl. data (2014a) describe the main vegetation communities at the site. They are:

- (Matai-lowland totara)/secondary growth hardwood forest on steep lowland hill slopes in the upper part of the western valley.
- Mixed secondary growth hardwood forest in the eastern valley.
- Secondary growth kanuka forest and treeland on north-facing lowland hill slopes.
- A mosaic of montane shrubland and open short tussock grassland.
- Silver tussockland on lowland and montane hill slopes

These communities are described in more detail below (from Wildland Consultants unpubl. data 2014a).

(Matai-lowland totara)/secondary growth hardwood forest occupies the steep upper part of the western valley, and consists of secondary growth hardwood forest with large emergent remnant podocarp trees (matai (*Prumnopitys taxifolia*) and lowland totara (*Podocarpus totara*)). All age classes of matai and totara are present, and juvenile matai are abundant. Mahoe (*Melicytus ramiflorus*) and narrow-leaved lacebark (*Hoheria angustifolia*) are the most common canopy species, followed by broadleaf *(Griselinia littoralis*), pigeonwood (*Hedycarya arborea*), kohuhu (*Pittosporum tenuifolium*), lemonwood (*Pittosporum eugenioides*), titoki (*Alectryon excelsus*), lowland ribbonwood (*Plagianthus regius*), and akiraho (*Olearia paniculata*). Many very large remnant broadleaf trees are present at the head of the valley, and fierce lancewood (*Pseudopanax ferox*) is also very common there. Akeake is common on the warmer true-left side of the valley, where the forest canopy is lower and patchier. Vines are frequent, particularly native jasmine (*Parsonsia capsularis* and *P. heterophylla*), large-leaved pohuehue (*Muehlenbeckia australis*), and *Clematis paniculata*. The understorey at the head of the valley is heavily browsed (goats are common) and quite bare, with relatively few palatable plant species. Most palatable seedlings (e.g. mahoe, broadleaf, pigeonwood, pate (*Schefflera digitata*)) are small and browsed. The most common understorey species

are unpalatable species such as *Coprosma virescens, C. crassifolia, C. rhamnoides, C. rotundifolia*, ongaonga (*Urtica ferox*), and the ferns round-leaved fern (*Pellaea rotundifolia*) and shield fern (*Polystichum oculatum*).

Mixed secondary growth hardwood forest grows in the eastern valley. Hardwood forest descends to a lower altitude in the eastern valley compared to the western valley. Narrow-leaved lacebark, mahoe and broadleaf are the most common canopy species, followed by ribbonwood, kohuhu, and titoki. Native vines, particularly large-leaved pohuehue and native jasmine are abundant, along with a dense understorey of *Coprosma* species in places. The most common understorey species are *Coprosma rhamnoides, C. crassifolia, C. rotundifolia*, ongaonga, and the ferns *Pellaea rotundifolia* and *Polystichum oculatum*. A permanent stream with a very shaded, natural streambed habitat rich in bryophytes and ferns is present. Two groves of silver tree fern (*Cyathea dealbata*) occur here and gully fern (*Pneumatopteris pennigera*) is also locally common.

Both valleys contain extensive areas of secondary growth kanuka (*Kunzea robusta*) forest, with occasional young hardwood trees such as mahoe. Kanuka forest mainly occurs towards the bottom of the western valley and it grows from the top to the bottom of the eastern valley, extending up to Te Oka Peak. The canopy is generally patchier in the eastern valley, suggesting a more recent expansion into exotic pasture grassland. The understorey is dominated by small-leaved coprosma/mikimiki species (*C. crassifolia, C. rhamnoides and C. virescens*), ongaonga, and ferns such as round-leaved fern, shield fern, and necklace fern (*Asplenium flabellifolium*). There are patches of dead (sprayed) kanuka trees at the bottom of both valleys. Occasional wilding radiata pines *(Pinus radiata*) are present in both valleys.

The two forested valleys are separated by a spur with a narrow strip of open grassland; dense silver tussock (*Poa cita*) grassland adjoins the forest on the western side of the fence, while the eastern side of the fence has closely grazed exotic pasture. Patchy silver tussock also occurs in amongst the kanuka on the eastern side of the eastern valley.

The steep north-facing slopes around the summit of Te Oka Peak support a mosaic of montane shrubland and short grassland dominated by silver tussock. A small patch of narrow-leaved snow tussock (*Chionochloa rigida*) persists on the summit. Woody vegetation is expanding out from the rocky areas, which are extensive. Matagouri (*Discaria toumatou*), korokio (*Corokia cotoneaster*), and mikimiki (*Coprosma propinqua*) are the most abundant shrub species. Bracken (*Pteridium esculentum*) is quite common. A variety of typical Banks Peninsula herbs (e.g. yellow rock daisy (*Brachyglottis lagopus*), slender everlasting daisy (*Helichrysum filicaule*) occur on the summit bluffs. Golden spaniard (*Aciphylla aurea*) is also present.

Indigenous birds recorded at the site are bellbird (*Anthornis melanura melanura*), grey warbler (*Gerygone igata*), South Island fantail (*Rhipidura fuliginosa fuliginosa*), Australasian harrier (*Circus approximans*), New Zealand pipit (*Anthus novaeseelandiae novaeseelandiae*) (At Risk – Declining) (Robertson et al. 2012) and New Zealand pigeon (*Hemiphaga novaeseelandiae novaeseelandiae*) (Wilson 1992, Wildland Consultants unpubl. data 2014a).

Extent of Site of Ecological Significance

The site includes the matai-lowland totara/secondary growth hardwood forest, mixed secondary growth hardwood forest, secondary growth kanuka forest and treeland, montane shrubland, short tussock grassland and rock scarps and outcrops of Te Oka Peak and the indigenous silver tussock grassland on the upper slopes connecting the eastern and western valleys. Areas of isolated young kanuka treeland in exotic pasture grassland have been excluded as they do not provide an important buffering function. Areas of exotic grassland and kanuka treeland surrounded by kanuka forest have been included to maintain the integrity of the site.

Assessment Summary

The Kinloch Site has been evaluated against the criteria for determining significant indigenous vegetation and significant habitats of indigenous fauna listed in Appendix 3 of the Canterbury Regional Policy Statement (Environment Canterbury, 2013) (see below). Under these criteria the site is ecologically significant because it meets the representativeness (criteria 1 and 2), rarity/distinctiveness (criteria 3, 4, 5 and 6), diversity and pattern (criterion 7) and ecological context criteria (criteria 8 and 10).

Assessment against Significance Criteria

Representativeness

1. ***Indigenous vegetation or habitat of indigenous fauna that is representative, typical or characteristic of the natural diversity of the relevant ecological district. This can include degraded examples where they are some of the best remaining examples of their type, or represent all that remains of indigenous biodiversity in some areas.***

   The site is significant under this criterion.

   Although the structure of the forest has been modified by browsing the (matai-lowland totara)/secondary growth hardwood forest in the steep upper part of the western valley and the mixed secondary growth hardwood forest grows in the eastern valley are otherwise representative and typical of these forest communities in the ecological district. All age classes of matai and totara are present in the forest in the western valley the hardwood canopy in both valleys is diverse and characteristic.

   Areas with more mature secondary kanuka forest in both valleys are moderately representative, but still meet this criterion. The canopy is almost entirely dominated by kanuka, but occasional hardwood trees such as mahoe, narrow-leaved lacebark, lowland ribbonwood, kohuhu and kowhai are now regenerating through it in places, and the understorey is dominated by indigenous shrubs, ferns and herbs. Younger kanuka on the eastern side of the eastern valley does not meet this criterion. It is generally patchier suggesting a more recent expansion into exotic pasture grassland.

The steep north-facing slopes around the summit of Te Oka Peak are representative of montane grassland, shrubland and rock bluff ecosystems. They support a mosaic of extensive indigenous shrublands and short tussock grassland and a typical range of indigenous herbs.

The site also supports a characteristic assemblage of indigenous invertebrates for the ecological district. A list of the invertebrate species recorded at the site is provided in Appendix 2.

2. Indigenous vegetation or habitat of indigenous fauna that is a relatively large example of its type within the relevant ecological district.

The site is significant under this criterion.

Both valleys contain large areas dominated by indigenous forest. The eastern valley is a relatively large example of mixed secondary growth hardwood and kanuka forest. The western valley contains a large example of (matai-lowland totara)/secondary growth hardwood forest and kanuka forest.

Rarity/Distinctiveness

3. Indigenous vegetation or habitat of indigenous fauna that has been reduced to less than 20% of its former extent in the Region, or relevant land environment, ecological district, or freshwater environment.

The (matai-lowland totara)/secondary growth hardwood forest and mixed secondary growth hardwood forest are significant under this criterion. The forest within the site is also significant under this criterion because it has been reduced to less than 20% of its former extent in the ecological district. Banks Peninsula, including the Akaroa Ecological District, was almost entirely forested prior to the arrival of humans (Harding 2009, Wilson 2013). The present extent of all indigenous forest (excluding manuka and kanuka) in the ED is estimated to be 10% (17.8% including manuka and kanuka) (New Zealand Landcover Database (Version 4)).

The areas of kanuka dominated forest within the site are not significant under this criterion. This seral vegetation community has increased in extent following forest clearance and subsequent regeneration. Harding (2009) estimates that the original extent of kanuka scrub and forest in the ED (as a % of the ED) is estimated to have been <1%. Harding (2009) estimates the present combined extent of kanuka scrub/forest and inaka scrub in the ED is 23% and the combined extent of manuka and kanuka is estimated to be 7.6% (New Zealand Landcover Database (Version 4)).

4. Indigenous vegetation or habitat of indigenous fauna that supports an indigenous species that is threatened, at risk, or uncommon, nationally or within the relevant ecological district.

The site is significant under this criterion.

A number of plant and invertebrate species have been recorded from the site that are either nationally At Risk, endemic, or uncommon either within the ecological district or region.

Plants

Nationally At Risk plant species (de Lange et al. 2013) recorded from the site (Wildland Consultants unpubl. data 2014a) are:

- *Coprosma virescens* (At Risk - Declining) (eastern and western valleys)
- Banks Peninsula hebe (*Hebe strictissima*) (At Risk - Naturally Uncommon and endemic to Banks Peninsula) (eastern and western valleys and Te Oka Peak)
- Banks Peninsula button daisy (*Leptinella minor*) (At Risk - Naturally Uncommon and endemic to Banks Peninsula) (western valley and Te Oka Peak)
- Fierce lancewood (*Pseudopanax ferox*) (At Risk - Naturally Uncommon) (eastern and western valleys)

Plant species recorded from the site (Wildland Consultants unpubl. data 2014a) that are "uncommon to rare or very local" on Banks Peninsula (Wilson 2013) are:

- Willow herb (*Epilobium pedunculare*) (western valley)
- Trembling brake (*Pteris tremula*) (western valley)
- Hook grass (*Uncinia scabra*) (eastern and western valleys)
- Colenso's hard fern (*Blechnum colensoi*) (eastern valley)
- Golden Spaniard (*Aciphylla aurea*) (Te Oka Peak)
- Lily of the valley shrub (*Gaultheria crassa*) (Te Oka Peak)

Wilson (1992) recorded a number of additional plant species within the site that are either At Risk nationally, or uncommon within the ecological region or ecological district.

Invertebrates

Invertebrate species recorded from the site (Wildland Consultants unpubl. data 2014b) that are nationally Threatened or At Risk are:

- Mistletoe-mining moth (*Zelleria sphenota*) (At Risk - Declining)
- *Circoxena ditrocha* (At Risk - Naturally Uncommon)
- *Gadira petraula* (At Risk - Naturally Uncommon)
- Grass-mining moth (*Cosmiotes helonoma*) (At Risk - Relict)

Invertebrate species recorded from the site (Wildland Consultants unpubl. data 2014b) that are endemic to Banks Peninsula are:

- A ground beetle (*Megadromus guerinii*)
- Green cicada (*Kikihia* 'new species')
- A moth (*Asterivora* 'new species')
- A cockroach (*Celatoblatta peninsularis*)
- Ward's stonefly (*Zelandobius wardi*)

Invertebrate species recorded from the site (Wildland Consultants unpubl. data 2014b) that are uncommon within the ecological district are:

- *Reductoderces* new species – on the summit of Te Oka Peak

5. ***The site contains indigenous vegetation or an indigenous species at its distribution limit within Canterbury Region or nationally.***

   The site is significant under this criterion.

   There are four plant species at their southern national limit on Banks Peninsula, one at its southern regional limit and one at its northern regional limit (Wildland Consultants unpubl. data 2014b). There is also an invertebrate species at its southern national limit (Wildland Consultants unpubl. data 2014b).

   The species' at their southern national limit are:

   - Titoki (*Alectryon excelsus*) (eastern and western valleys)
   - Kawakawa (*Piper excelsum*) (eastern and western valleys)
   - Akeake (*Dodonaea viscosa*) (relatively abundant in eastern valley (Wilson 1992), also in western valley)
   - Trembling brake (*Pteris tremula*) (western valley)

   Wilson (1992) also recorded native passion vine in the western valley.

   The species at its southern regional limit is:

   - Pigeonwood (*Hedycarya arborea*) (eastern and western valleys)

   The species at its northern regional limit is:

   - Narrow-leaved snow tussock (*Chionochloa rigida*) (Te Oka summit)

   The invertebrate species at its southern national limit on Banks Peninsula is:

   - *Gadira petraula* (Te Oka summit)

6. ***Indigenous vegetation or an association of indigenous species that is distinctive, of restricted occurrence, occurs within an originally rare ecosystem, or has developed as a result of an unusual environmental factor or combinations of factors.***

   The site is significant under this criterion.

   There are igneous scarps and rock outcrops below the summit of Te Oka Peak that were formed by the Akaroa Volcano. This igneous rock formation is comprised of basic hawaiite and benmoreite lava flows and tuff-agglomerate of the Te Oka Formation (Sewell et al. 1992). At a national scale, basic cliffs, scarps and tors are an originally rare ecosystem (Williams et al. 2007). The indigenous vegetation associated with this feature is significant under this criterion.

Diversity and Pattern

7. Indigenous vegetation or habitat of indigenous fauna that contains a high diversity of indigenous ecosystem or habitat types, indigenous taxa, or has changes in species composition reflecting the existence of diverse natural features or ecological gradients.

The site is significant under this criterion.

The site contains an altitudinal sequence extending from near sea level to the summit of Te Oka Peak (685 m). It ranges from warm lowland (podocarp)/hardwood and hardwood forest on hill slopes, with species such as pigeonwood and kawakawa, to montane tussock grassland, shrubland and rock bluff ecosystems with species including snow tussock and regenerating thin barked totara (*Podocarpus cunninghamii*) (Wilson 1992, Wildland Consultants unpubl. data 2014a). The (podocarp)/hardwood, secondary hardwood forest and montane grassland, shrubland and rock bluff ecosystems are all relatively intact (although the kanuka forest is more modified).

The site also contains a high diversity of indigenous invertebrates reflecting its sunny aspect, relatively intact altitudinal sequence and range of vegetation types from snow tussock and rockland at the summit of Te Oka Peak, through dense old growth forest to kanuka forest and shrublands at Lake Forsyth. A recent survey (Wildland Consultants unpubl. data 2014b) (which targeted moths and butterflies) found 115 species, of which 90 were moths and butterflies. A list of the invertebrate species recorded at the site is provided in Appendix 2.

Ecological Context

8. Vegetation or habitat of indigenous fauna that provides or contributes to an important ecological linkage or network, or provides an important buffering function.

The large forested gullies within the site provide an important buffering function to Lake Forsyth/Waiwera. This lake is in highly eutrophic state and reducing nutrient and sediment inputs is a high priority (Gray 2013). Maintaining forest cover on these slopes reduces these local inputs from these gullies, but management within the wider catchment is also essential to address water quality issues.

Kanuka forest provides an important buffering function to the more intact forest communities. Kanuka forest also plays in important role as an ecological corridor linking high value areas, for example the margins of Lake Forsyth/Waiwera and the (matai-lowland totara)/secondary growth hardwood forest in the upper part of the western valley. It also increases the connectivity between the eastern and western valley (although the two areas are not physically connected by kanuka forest).

9. A wetland which plays an important hydrological, biological or ecological role in the natural functioning of a river or coastal system.

The site is not significant under this criterion. There are no wetlands within the site.

10. ***Indigenous vegetation or habitat of indigenous fauna that provides important habitat (including refuges from predation, or key habitat for feeding, breeding, or resting) for indigenous species, either seasonally or permanently.***

    The site is significant under this criterion.

    It provides important habitat for a diverse range of indigenous invertebrates including species that are nationally At Risk, endemic to Banks Peninsula and uncommon in the ecological district (Wildland Consultants unpubl. data 2014b).

Site Management

Existing Protection Status

Unprotected private land.

Threats and risks	Management recommendations	Support package options
• There are very few biodiversity plants within the site. However, wilding pines (*Pinus radiata*) are present in both valleys. The source is probably a plantation adjacent to the site at the lower end of the eastern valley (Wildland Consultants unpubl. data 2014a). • Ongoing invasion of pest plants via dispersal of seeds both by birds and wind.	• Consider removing the existing wilding pines to prevent further spread. • Consider ongoing surveillance for, and control if detected, of biodiversity pest plants such as wilding pines (*Pinus species*), sycamore (*Acer pseudoplatanus*), banana passionfruit (*Passiflora mixta*), and old mans beard (*Clematis vitalba*) that are known to occur in the vicinity of the site.	• Discussion with landowner / land manager about the benefits to biodiversity of pest plant control. • Discussion about options, including any assistance available where appropriate.
• Stock. The understorey at the head of the western valley is heavily browsed and quite bare, with relatively few palatable plant species) (Wildland Consultants unpubl. data 2014a)	• Consider fencing the forested areas in the eastern and western valleys.	• Discussion with landowner / land manager about the benefits to biodiversity of managing stock away from certain areas. • Discuss options and any available assistance.
• Animal pests (goats, possums and rabbits) (Wildland Consultants unpubl. data 2014a). Goats are common in parts of the site.	• Consider removing goats from the site. Goats are a serious threat to the ecological values of the site. They also have the potential to spread onto neighbouring properties and into other areas with high ecological values. Not removing goats poses a significant threat to the success of the multi-agency Banks Peninsula Feral Goat Eradication Programme. • Consider monitoring possum and rabbit densities and undertaking control when required.	• Discussion with landowner / land manager about the benefits to biodiversity of goat control. Provide advice and guidance. • In collaboration with agencies, offer assistance where available. • Provide advice and guidance to landowner / land manager about benefits to biodiversity of controlling possum and rabbit populations. • Assistance available where appropriate.

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Assessment completed by: Scott Hooson
Date: 22 September 2014

Statement completed by: Scott Hooson
Date: 22 September 2014

Statement updated by: XXX
Date: XXX

PLEASE NOTE THIS STATEMENT IS BASED ON INFORMATION AVAILABLE AT THE TIME OF WRITING. DUE TO THE DYNAMIC NATURE OF ECOSYSTEMS, FUTURE REASSESSMENT OF THE SITE MAY BE NECESSARY TO REFLECT ANY CHANGES IN KNOWLEDGE OF ITS ECOLOGICAL SIGNIFICANCE.

Appendix 1: Plant Species List

Sourced from Wildland Consultants unpubl. data (2014a).

Scientific Name	**Common Name(s)**
Indigenous species	
Acaena juvenca	bidibidi, piripiri
Aciphylla aurea	golden spaniard
Alectryon excelsus	titoki
Arthropodium candidum	grass lily, repehinapapa
Asplenium appendiculatum	ground spleenwort
Asplenium flaccidum	hanging spleenwort, raukatauri
Asplenium flabellifolium	necklace fern
Asplenium gracillimum	
Asplenium hookerianum	Hooker's spleenwort
Blechnum chambersii	lance fern
Blechnum colensoi	Colenso's hard fern, peretao
Brachyglottis lagopus	groundsel
Calystegia tuguriorum	NZ bindweed
Carmichaelia australis	native broom, common broom
Cardamine debilis	NZ bitter cress
Carex species	cutty grass
Carpodetus serratus	marbleleaf, putaputaweta
Chionochloa rigida	narrow-leaved snow tussock
Clematis afoliata	leafless clematis
Clematis foetida	yellow clematis
Clematis paniculata	puawananga
Coprosma areolata	mingimingi, mikimiki
Coprosma crassifolia	thick-leaved coprosma, mikimiki
Coprosma dumosa	mikimiki
Coprosma linariifolia	yellow-wood
Coprosma lucida	karamu
Coprosma propinqua	mingimingi, mikimiki
Coprosma rhamnoides	mingimingi, mikimiki
Coprosma rigida	stiff coprosma
Coprosma robusta	karamu
Coprosma rotundifolia	round-leaved coprosma, mikimiki
Coprosma virescens	mikimiki
Cordyline australis	cabbage tree, ti kouka
Corokia cotoneaster	korokio
Cyathea dealbata	silver fern, ponga
Dichelachne crinita	plume grass
Dichondra repens	Mercury Bay weed, dichondra
Discaria toumatou	matagouri, wild irishman
Dodonaea viscosa	akeake
Epilobium pedunculare	willow herb
Euchiton audax	native cudweed
Gaultheria crassa	lily of the valley shrub
Geranium aff. microphyllum	native geranium
Griselinia littoralis	broadleaf, kapuka

Hebe strictissima	Banks Peninsula hebe
Hedycarya arborea	pigeonwood, porokaiwhiri
Helichrysum filicaule	slender everlasting daisy
Helichrysum lanceolatum	niniao
Hierochloe redolens	holy grass, karetu
Hoheria angustifolia	narrow-leaved lacebark, houhere
Hydrocotyle heteromeria	pennywort
Hydrocotyle moschata	pennywort
Ileostylus micranthus	green mistletoe
Juncus distegus	wiwi
Juncus edgariae	leafless rush, wi
Kunzea ericoides	kanuka
Lagenophora strangulata	parani
Leptinella dioica	button daisy
Leptinella minor	Banks Peninsula button daisy
Lophomyrtus obcordata	rohutu, NZ myrtle
Melicytus alpinus	porcupine shrub
Melicytus ramiflorus	mahoe, whiteywood
Melicope simplex	poataniwha
Microsorum pustulatum	hounds tongue, kowaowao
Muehlenbeckia australis	large-leaved pohuehue
Muehlenbeckia complexa	scrub pohuehue, wire vine
Myoporum laetum	ngaio
Myrsine australis	red mapou, red matipo
Myrsine divaricata	weeping matipo, weeping mapou
Olearia paniculata	akiraho
Oxalis exilis	native oxalis
Parsonsia capsularis	native jasmine, akakaikiore
Parietaria debilis	NZ pellitory
Parsonsia heterophylla	native jasmine, akakaikiore
Pellaea rotundifolia	round-leaved fern, tarawera
Pennantia corymbosa	kaikomako, ducks foot
Phormium cookianum	mountain flax, whararikì
Phormium tenax	flax, harakeke
Piper excelsum	kawakawa
Pittosporum eugenioides	lemonwood, tarata
Pittosporum tenuifolium	kohuhu, black matipo
Plagianthus regius	lowland ribbonwood, manatu
Pneumatopteris pennigera	gully fern, pakau
Poa cita	silver tussock
Poa matthewsii	Matthew's poa
Podocarpus cunninghamii	thin-barked totara
Podocarpus totara	lowland totara
Polystichum oculatum	shield fern
Prumnopitys taxifolia	matai, black pine
Pseudopanax crassifolius	lancewood, horoeka
Pseudopanax ferox	fierce lancewood
Pteridium esculentum	bracken
Pteris tremula	trembling brake
Ranunculus reflexus	hairy buttercup, maruru
Ripogonum scandens	supplejack, kareao
Rubus schmidelioides	bush lawyer, tataramoa
Rubus squarrosus	leafless bush lawyer, tataramoa

Rytidosperma unarede	danthonia
Schefflera digitata	pate, seven-finger
Sophora microphylla	kowhai, small-leaved kowhai
Streblus heterophyllus	small-leaved milk tree, turepo
Uncinia scabra	hook grass
Urtica ferox	ongaonga, tree nettle
Vittadinia australis	white fuzzweed
Exotic Species	
Agrostis capillaris	brown top
Aira caryophyllea	silvery hair grass
Anthoxanthum odoratum	sweet vernal
Anthosachne scabra	blue wheatgrass
Aphanes arvensis	parsley piert
Arenaria serpyllifolia	sandwort
Carduus tenuiflorus	winged thistle
Cerastium glomeratum	chickweed
Cirsium arvense	Californian thistle
Cirsium vulgare	Scotch thistle
Critesion murinum	barley grass
Cynosurus echinatus	rough dogstail
Dactylis glomerata	cocksfoot
Digitalis purpurea	foxglove
Echium vulgare	vipers bugloss
Galium aparine	cleavers
Geranium molle	dovesfoot cranesbill
Holcus lanatus	Yorkshire fog
Hypochoeris radicata	catsear
Lolium perenne	ryegrass
Marrubium vulgare	horehound
Mycelis muralis	wall lettuce
Orobanche minor	broomrape
Pinus radiata	radiata pine, Monterey pine
Polycarpon tetraphyllum	allseed
Ranunculus sceleratus	celery-leaved buttercup
Rumex acetosella	sheeps sorrel
Sambucus nigra	elderberry
Silybum marianum	variegated thistle
Solanum chenopodioides	velvety nightshade
Solanum nigrum	black nightshade
Stellaria media	chickweed
Trifolium repens	white clover
Urtica urens	nettle
Verbascum thapsus	woolly mullein
Vicia sativa	vetch

Appendix 2: Invertebrate Species List

Sourced from Wildland Consultants unpubl. data (2014b)

* = exotic species

ORDER/Family/genus/species	Common Name
MECOPTERA	scorpionfly
Nannochoristidae	
Nannochorista philpotti	
MEGALOPTERA	dobsonfly
Corydalidae	
Archichauliodes diversus	
NEUROPTERA	lacewings
Hemerobiidae	
Drepanacra binocula	
HEMIPTERA	
Tibicinidae	cicada
Amphipsalta zelandica	clapping cicada
Kikihia new species	
ORTHOPTERA	
Gryllidae	cricket
Pteronemobius bigelowi	
Acrididae	grasshoppers
Phaulacridium marginale	
Anastostomatidae	ground weta
Hemiandrus new species	
COLEOPTERA	
Carabidae	ground beetles
Megadromus guerinii	
Neocicindella latecincta	tiger beetle
Cerambycidae	
Prionoplus reticularis	huhu
Scarabaeidae	chafers
Costelytra zealandica	grass grub
Odontria striata	striped chafer
Tenebrionidae	darkling beetle
Artystona wakefieldi	
HYMENOPTERA	
Formicidae	ant
Monomorium antarcticum	
Ichneumonidae	
Netelia producta	
Pompilidae	spider wasp
Priocnemis crawi	
Vespulidae	
Vespula vulgaris	common wasp
LEPIDOPTERA	
Psychidae	

Reductoderces species	
Liothula omnivora	
Blastodacnidae	
Circoxena ditrocha	
Glyphipterigidae	
Glyphipterix alchyoessa	
Glyphipterix triselena	
Glyphipterix codonias	
Glyphipterix cionophora	
Elachistidae	
Cosmiotes helonoma	
Cosmiotes ombrodoca	
Yponomeutidae	
Zelleria spenota	
Depressariidae	
**Agonopterix umbellana*	
Eutorna symmorpha	
Oecophoridae	
Barea exarcha	
Hierodoris atychioides	
Pterophoridae	plumemoth
Pterophorus innotatalis	
Choreutidae	jets
Asterivora new species	
**Tebenna micalis*	
Tortricidae	leaf rollers
Apoctena flavescens	
Capua semiferana	
**Capua intractana*	
Catamacta gavisana	
Cryptaplasma querula	
Ctenopseustis obliquana	
**Cydia succedana*	
**Epiphyas postvittana*	
Harmologa amplexana	
Harmologa oblongana	
Harmologa new species	
Merophyas leucaniana	
Thyrididae	
Morova subfasciata	
Crambidae	
Antiscopa epicomia	
Antiscopa elaphra	
Deana hybreasalis	
Eudonia cymatias	
Eudonia philerga	
Eudonia leptalea	
Eudonia octophora	
Eudonia steropaea	
Eudonia sabulosella	
Eudonia submarginalis	
Gadira petraula	
Orocrambus cyclopicus	

Orocrambus enchophorus	
Orocrambus flexuosellus	
Orocrambus ramosellus	
Orocrambus vittellus	
Orocrambus vulgaris	
Udea flavidalis	
Udea marmarina	
GEOMETRIDAE	
Austrocidaria gobiata	
Austrocidaria similata	
**Chloroclystis filata*	
Chloroclystis inductata	
Chloroclystis sphragitis	
Declana floccosa	
Declana junctilinea	
Epiphyrne undosata	
Gellonia dejectaria	
Homodotis megaspilata	
Helastia cinerearia	
Ischalis fortinata	
Pasiphila muscosata	
Pasiphila malachita	
Pasiphila new species	
Pasiphila urticae	
Poecilasthena schistaria	
Pseudocoremia leucelaea	
Pseudocoremia ochrea	
Scopula rubraria	
Xyridacma veronicae	
Noctuidae	
Agrotis ipsilon	
Bityla defigurata	
Cosmodes elegans	
Feredayia graminosa	
Graphania insignis	
Graphania lignana	
Graphania morosa	
Graphania mutans	
Graphania phricias	
Graphania plena	
Graphania scutata	
Graphania ustistriga	
Meterana decorata	
Meterana levis	
Meterana ochthistis	
Meterana tartarea	
Persectania aversa	
Proteuxoa comma	
Tmetolophota atristriga	
Tmetolophota propria	
Tmetolophota sulcana	
Erebidae	
Rhapsa scotoscialis	

Lycaenidae	coppers/ blues
Lycaena "common copper" complex	
Zizina oxleyi	
Nymphalidae	admirals
Vanessa gonerilla	red admiral
Vanessa itea	yellow admiral
Pieridae	white butterfly
**Pieris rapae*	
PLECOPTERA	stonefly
Gripopterygidae	
Zelandobius wardi	
ODONATA	
Coenagrionidae	damselfly
Xanthocnemis zelandica	
Corduliidae	
Procordulia smithii	
MANTODEA	praying mantis
Orthodera novaezelandiae	
PHASMIDA	stick insects
Clitarchus hookeri	
BLATTODEA	cockroach
Blattidae	
Celatoblatta peninsularis	
DERMATERA	earwig
Forficulidae	
**Forficula auricularia*	European earwig