

# EVALUATION OF A PROPOSED SIGNIFICANT NATURAL AREA AT MT IRON, WANAKA

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# EVALUATION OF A PROPOSED SIGNIFICANT NATURAL AREA AT MT IRON, WANAKA

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*Coprosma shrubland on the southwest faces at the Allenby Farms site, Mt Iron.*

## **Contract Report No. 3762**

March 2017 (Revised and updated)

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**Reviewed and approved for release by:**




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## 1. INTRODUCTION

Allenby Farms Ltd own a parcel of land on the southwestern side of Mt Iron, Wanaka (the “site” is denoted by the solid red polygon in Figure 1). Allenby Farms is concerned that a proposed significant natural area (SNA) on part of the property does not appropriately reflect the relevant ecological values of the site. Allenby Farms wishes to provide a more suitable outcome for future management and stewardship of the SNA and has submitted that the SNA identified on the northern slopes of Mt Iron in the proposed Queenstown Lakes District Plan should have its boundary amended in order to better protect significant indigenous vegetation and significant habitats of indigenous fauna. This boundary amendment was outlined in a previous version of this report, based on a brief field inspection of the site in September 2015. Subsequently, Allenby Farms commissioned further field assessment from Wildland Consultants of the proposed and alternate SNAs, based on more intensive assessments of the site undertaken in summer, and specifically targeting rare plant species, lizards, and invertebrates. This report comprises an updated version of the previous Wildland Consultants report (dated September 2015) based on the results of the more recent field work.

## 2. SITE CONTEXT

Mt Iron is a notable site, being a prominent landmark more or less surrounded by the Wanaka urban area, and experiencing significant public recreational use. Despite this intensive urban development and public recreation, recent investigations have shown that the site also supports significant ecological values. One issue with the proposed SNA (Figure 1), which appears to have been assessed only at a desktop level, is that it only captures kānuka woodland, and doesn't fully capture the other ecological values present at the site. Conversely, the proposed SNA contains houses, roads, water tanks, and areas of exotic-dominant grassland and herbfield at lower elevation, which may not be appropriate for inclusion within the SNA. Findings from the further investigations described in this report indicate that the less important lower elevation areas could be excluded from the proposed SNA, in favour of adding other more ecologically important areas that are currently not within the proposed SNA (Figure 1). Most of the proposed SNA would be retained within the alternate SNA. Henceforth we refer to these different areas as ‘exclude from SNA’, ‘retain within SNA’, and ‘add to SNA’.

## 3. METHODS

### Overview

A three hour site visit was previously undertaken on 17 September 2015 and this was built upon by further field work 10-14 December 2016. The aim of this more comprehensive field work was to better assess the relative values of the area so as to identify the appropriate area for SNA protection.

The full range of habitats at the Mt Iron site were traversed, including shrubland on the terrace scarp above State Highway 84, steep shrubland on the southern side of the site, extensive kānuka scrub and shrubland on the northern slopes of the site, areas of indigenous herbfield on exposed, dry ridge crests, rock outcrop vegetation, and turf vegetation in swales on the northern slopes.

Targeted searches were undertaken for rare plant species, lists of all vascular plant species present at the site were compiled, and field assessments of herpetofauna and invertebrates were undertaken. All bird species observed during the site visit were recorded.

### Vascular Plants

As predicted (Wildland Consultants 2015), vascular plant species were considerably more conspicuous during summer (December 2016) than in September 2015, resulting in a much larger list of vascular plant species. The overall list of vascular plant species was partitioned into species present in the areas denoted as: ‘exclude from SNA’, ‘retain within SNA’, and ‘add to SNA’.

### Herpetofauna

Lizard habitat values were assessed over 13-14 December 2016 during calm and sunny weather. The property was surveyed on foot, by day, including representative habitat within the proposed Mt Iron SNA C<sup>1</sup>, the alternate SNA, and other areas of potential lizard habitat on the Allenby Farms property. A GPS-tracked survey path indicated that a transect of c.6 kilometres was surveyed using a combination of visual searching of likely habitat (swale turfs, exotic grassland, rock crevices and rocky surfaces), and lifting of rocks (throughout all habitats described in Section 4.0 below). The transect targeted potential lizard habitat and the areas that linked it. Whenever possible, lizards were captured by hand, photographed, measured, and then released at the point of capture. Many skinks evaded capture, or were inaccessible, but in the case of McCann’s skink (*Oligosoma maccanni*), almost all lizards could be identified reliably without capture. Lizard capture and handling was undertaken under Wildlife Act authority 50560-FAU.

### Invertebrates

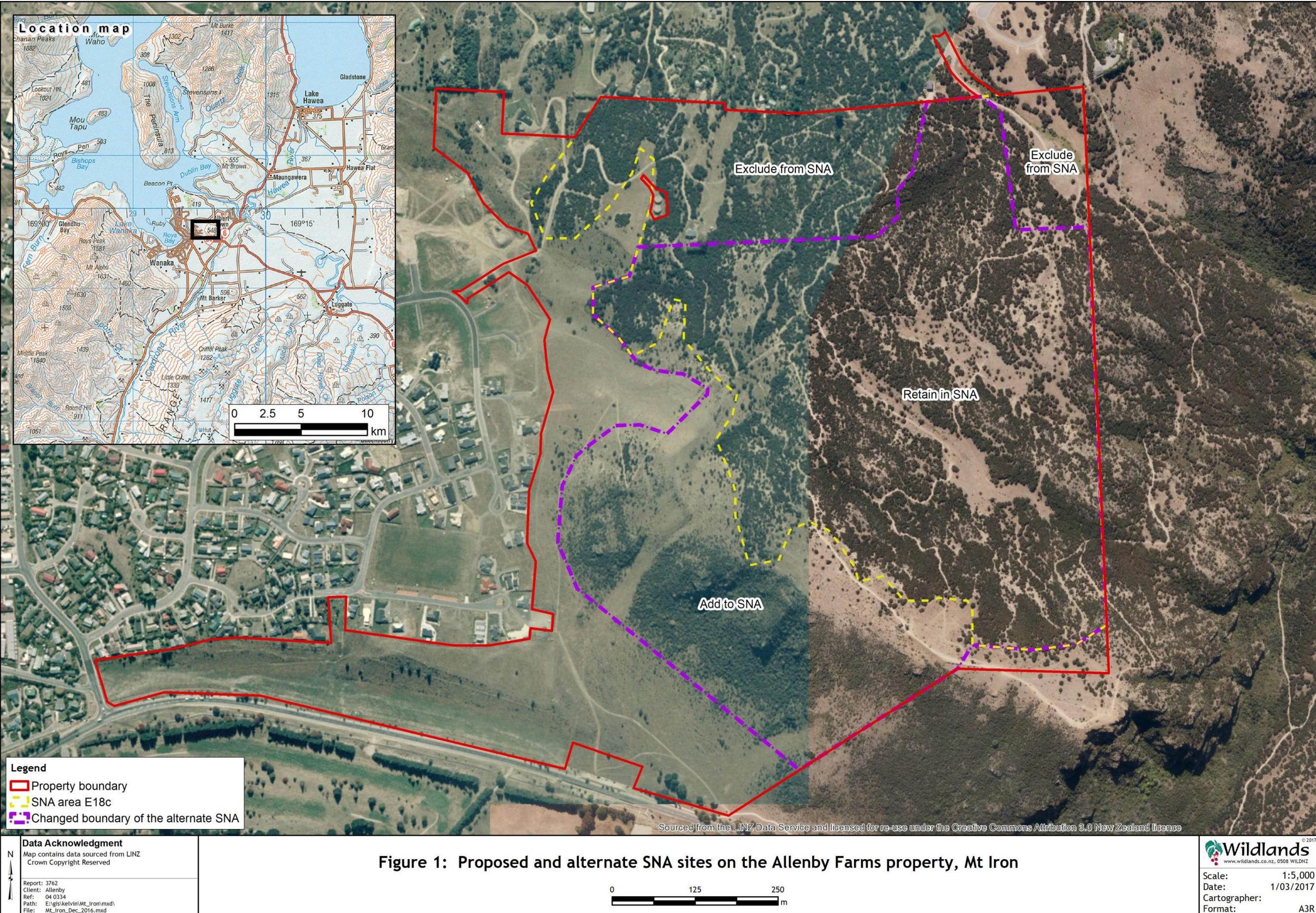
Invertebrate habitat values were assessed during a field visit 11-13 December 2016 in warm weather and calm conditions conducive for successful day and night invertebrate surveys.

Indigenous invertebrates, mainly moths and butterflies, were sampled by day and night, using hand collection and a sweep net by day, and a 240V-powered 160 watt ultraviolet light trap by night.

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<sup>1</sup> Also referred to in some documents as “SNA 18C on Mt Iron”.





Three main indigenous plant communities were targeted by the invertebrate sampling:

- Kānuka-dominant scrub and shrubland.
- Mixed *Coprosma*-dominant indigenous shrubland.
- Grassland and turf on the summit ridge of Mount Iron.

All three communities were sampled by day, and the kānuka and mixed shrubland habitats were each sampled at night.

A fully labelled dry collection was made of key invertebrate species to confirm identifications and to provide a backup to findings.

#### 4. ECOLOGICAL CONTEXT

Mount Iron comprises a ‘roche moutonnée’ landform, surrounded by glacial outwash gravels, caused by glacial ice flowing from the north, which smoothed the northeastern slopes and steepened the southwestern slopes. The site rises from approximately 320 m above sea level (a.s.l.) above State Highway 84, to approximately 540 m a.s.l. near the summit (548 m a.s.l.) of Mount Iron within the Mt Iron Scenic Reserve.

The site lies in the Pisa Ecological District, but is very close to the boundary of the Lindis Ecological District. Both of these Districts are within the Central Otago Ecological Region. Pisa Ecological District has a generally dry sub-continental climate with prevailing northwest winds, and an annual rainfall of 380-1,500 mm that varies over a strong altitudinal gradient (McEwen 1987).

The Mount Iron site can be accessed from State Highway 84 or Aubrey Road, Wanaka. Residential housing development is present in the northwestern part of the site, where residential areas are embedded in kānuka (*Kunzea serotina*) scrub and shrubland, which appears to have developed into the dominant vegetation cover following historic burning.

Mt Iron Scenic Reserve bounds the site to the south and east (Figure 1). A number of small conservation areas (administered by the Department of Conservation) occur on the margins of the Cardrona River and Clutha River near Mt Iron, and larger areas of conservation land are present on the surrounding Criffel and Pisa Ranges and in the Roys Peak area.

The site is well-used for public recreation, with a major walking track from State Highway 84 to the summit of Mt Iron passing mostly through the Allenby Farms property, and extensive use of the northern part of the site (within kānuka scrub and shrubland) for walking and mountain-biking.

## 5. INDIGENOUS VEGETATION AND HABITATS

### 5.1 Kānuka scrub and shrubland

Dense areas of kānuka form a closed-canopy scrub approximately 4-5 m tall, with bare ground and leaf litter underneath, or sometimes with bryophyte mats (Plate 1). Occasional *Coprosma crassifolia* shrubs are also present. In more open kānuka shrubland stands, matagouri (*Discaria toumatou*), *Coprosma crassifolia*, and sweet brier (*Rosa rubiginosa*) are frequent, and patches of exotic grassland and herbfield are present. Occasional schist rock outcrops occur within the kānuka scrub and shrubland, and these provide refuge for indigenous plant species such as blue tussock (*Poa colensoi*), *Asplenium flabellatum*, *Cheilanthes sieberi*, *Asplenium richardii*, and *Luzula banksii* var. *rhadina* (Plate 2).



Plate 1: Ground layer dominated by bryophytes beneath kānuka scrub.



Plate 2: Rock outcrop in kānuka scrub, providing habitat for indigenous ferns, grasses, and woodrushes.

## 5.2 *Coprosma* scrub and shrubland

The steep southwest-facing slopes above State Highway 84 are mostly covered in *Coprosma*-dominant scrub and shrubland in which *Coprosma crassifolia* and mingimingi (*C. propinqua*) are dominant (Plate 3). Large schist outcrops and boulderfields on colluvial slopes are a feature of this habitat (Plate 4). Other prominent woody species include matagouri, and the exotic species Khasia berry (*Cotoneaster simsonii*), gooseberry (*Ribes uva-crispa*), St Lucie cherry (*Prunus mahaleb*), and cherry plum (*P. cerasifera*). Scattered kānuka is emergent above the shrub canopy in places, and a few ti kouka/cabbage tree (*Cordyline australis*) and kapuka/broadleaf (*Griselinia littoralis*) trees are also emergent. Occasional saplings of Corsican pine (*Pinus nigra* subsp. *nigra*) and Douglas fir (*Pseudotsuga menziesii*) are also present, but larger trees have been controlled previously by felling. On the lower slopes, shrubland vegetation is present within a matrix of exotic grassland. Part way up the slope, bracken fernland occupies gaps between shrubs (Plate 4). One effect of this dense bracken matrix is to reduce browsing by rabbits (*Oryctolagus cuniculus*) which have closely grazed the grassland and partially ringbarked shrubs on the lower slopes. Palatable broadleaf seedlings were only seen on the steeper upper slopes where bracken is abundant, and browse damage on shrub bark was much less apparent in these areas. A range of indigenous ferns are present in the ground layer and are more prominent in the area where bracken is the main species in the vegetation matrix. These ferns include *Polystichum neozelandicum*, *Asplenium flabellatum*, and *A. richardii*, with *A. trichomanes* on rock outcrops.



Plate 3: *Coprosma* scrub and shrubland on the southwest-facing slopes of Mt Iron. Toeslopes shown here comprise useful planting sites for restoration of indigenous forest vegetation.



Plate 4: Schist rock outcrops and boulderfields are common in *Coprosma* scrub habitat.

### 5.3 Exotic grassland and herbfield

Exotic grassland and herbfield was mapped within the same unit due to its generally low ecological value, and comprises areas dominated by grassland and areas dominated by herbfield.

Exotic grassland is principally present in the western part of the site and at low elevation above State Highway 84. This grassland usually comprises scattered shrubs and tussocks of kānuka, sweet brier, *Coprosma*, and hard tussock (*Festuca novae-zelandiae*) within a matrix of closely-cropped browntop (*Agrostis capillaris*), with yarrow (*Achillea millefolium*) and nettle (*Urtica urens*) prominent at lower elevation and on western slopes. Scattered mature and regenerating kānuka and occasional sweet brier (*Rosa rubiginosa*) are present in these grassland areas (Plate 2).

Exotic herbfield predominates on sunny slopes and in lower elevation swales, and forms the dominant vegetation cover locally. The main species are scarlet pimpernel (*Anagallis arvensis*), St John's wort (*Hypericum perforatum*), Australian bidibid (*Acaena agnipila*), grassland forget-me-not (*Myosotis arvensis*), nettle, rat's tail fescue (*Vulpia myuros*), *Gypsophila australis*, and *Rytidosperma racemosum*, with scattered indigenous species including *Hypericum involutum*, *Dichondra repens*, *Carex breviculmis*, and *Oxalis exilis*, and exotic species including *Amsinckia calycina*, Californian thistle (*Cirsium arvense*), wild mignonette (*Reseda luteola*), winged thistle (*Carduus tenuiflorus*), and beaked parsley (*Anthriscus caucaulis*).

## 5.4 Swale turf

A higher elevation swale within kānuka scrub and shrubland on the northern side of the site supports an extensive, closely-grazed turf of exotic grasses and indigenous herbs and sedges (Plate 5), the indigenous species including *Carex gaudichaudiana*, *Hydrocotyle novae-zelandiae*, *Hypericum pusillum*, *Oxalis exilis*, *Epilobium komarovianum*, *Lachnagrostis striata*, *Mentha cunninghamii*, *Acaena* aff. *rorida* (OTA 059651 Poolburn), and *Acaena buchananii*. The presence of *Acaena* aff. *rorida* is significant as Mt Iron is only the third known site for this taxon, which has a high threat ranking.

Indigenous swale turf also occurs in the lower part of the site, in partially shaded, relatively damp habitat beside an ephemeral stream. *Hydrocotyle novae-zelandiae* and *Leptostigma setulosa* are the dominant indigenous species of this turf.

Both of these turf examples are within the ‘retain within SNA’ zone.

## 5.5 Cushionfield

Small areas of cushionfield vegetation (Plate 6) occur on the upper edge of the Mt Iron summit plateau, and on spurs above the walking track in the western part of the site. None of these areas are included in the proposed SNA, but all are included in the ‘add to SNA’ zone. The vegetation comprises scattered matagouri, sweet brier and kānuka above mats of *Raoulia* (*R. hookeri* subsp. *hookeri*, *R. tenuicaulis*, *R. australis* and/or *R. subsericea*), Australian bidibid, browntop, rat’s tail fescue, and scarlet pimpernel, and scattered *Pimelia sericeovillosa* subsp. *pulvinaris*, *Carex breviculmis*, patotara (*Leucopogon fraseri*), *Stackhousia minima*, *Hydrocotyle novae-zelandiae*, *Geranium retrosum*, *Colobanthus strictus*, *Oxalis exilis*, *Acaena buchananii*, *Leptinella serrulata*, St John’s wort (*Hypericum perforatum*), and *Polycarpon tetraphyllum*. In one site near the main walking track, a small population of the nationally Threatened native forget-me-not *Myosotis brevis* was observed (Plate 6; Figure 2).

# 6. FLORA

## 6.1 Species richness

A total of 175 plant species were recorded during the 2015 and 2016 site visits, of which 86 (49%) were naturally-occurring indigenous plant species, eight (4%) comprised a mixture of naturally-occurring and non-local indigenous plant species planted around houses, and 81 (47%) were exotic.

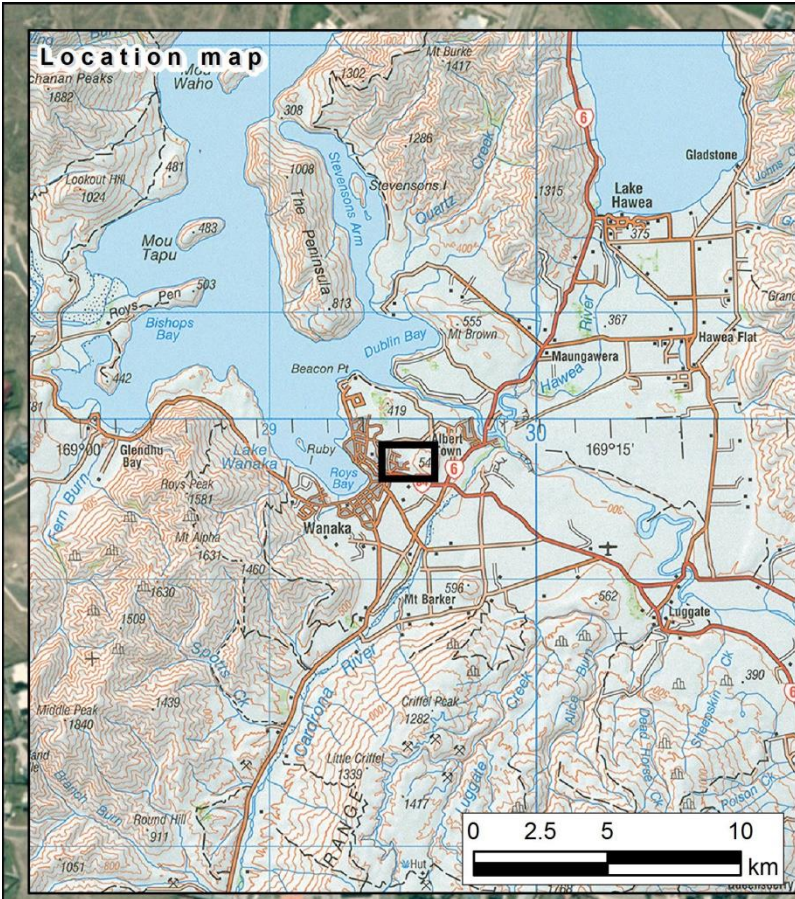
The assemblage of species (Appendix 1) gives a good illustration of the environment and range of habitats at the site, including shrubland and forest species, grassland species, and species of herbfield and cushionfield. In general, indigenous plant species richness increased with elevation within the site, while there was a greater variety of weeds at low elevation. This is reflected by the proportion of indigenous and exotic species in each of the three zones mapped in Figure 1 (Table 1).

Table 1: Proportions of naturally occurring indigenous and exotic species in each of the three zones mapped in Figure 1 at Mt Iron, Wanaka.

Zone	Number indigenous plant species	Number exotic plant species	Total number of species
Exclude from SNA	27	57	84
Retain in SNA	62	47	108
Add to SNA	50	41	91

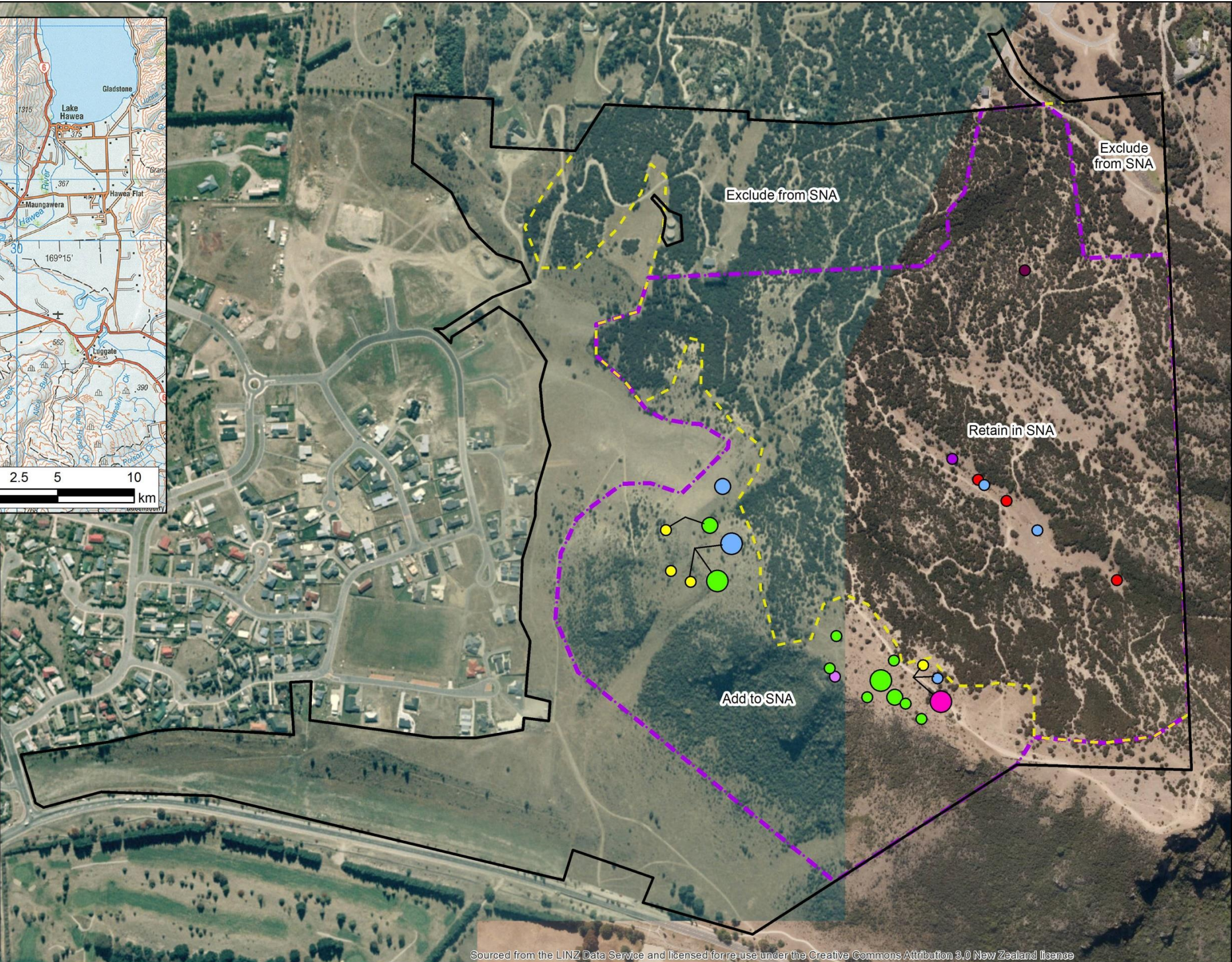


Plate 5: Top left: *Acaena* aff. *rorida* growing among rabbit-cropped grasses amongst dead thistles. Top right: *Acaena* aff. *rorida* habitat among dead thistles in the centre of the swale. Middle left: *Mentha cunninghamii* among exotic grasses. Middle right: *Mentha cunninghamii* occupies turf habitat shaded by kānuka. Lower photos: Turf in the lower swale (left) and upper part of the swale (right).



**Legend**

- Property boundary
- Threatened Species
- Threatened-Nationally Critical
  - *Acaena aff. rorida*
- Threatened-Nationally Vulnerable
  - *Carmichaelia kirkii*
  - *Myosotis brevis*
  - *Rytidosperma merum*
- At Risk-Declining
  - *Acaena buchananii*
  - *Mentha cunninghamii*
  - *Pimelea sericeovillosa* subsp. *pulvinaris*
- At Risk-Naturally Uncommon
  - *Leptinella serrulata*
- Abundance
  - 1 - 2
  - 3 - 5
  - 6 - 10
- SNA area E18c
- Changed boundary of the alternate SNA

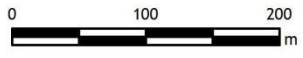


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**Figure 2: Threatened Plant Locations within the Proposed and alternate SNA sites on the Allenby Farms property, Mt Iron**



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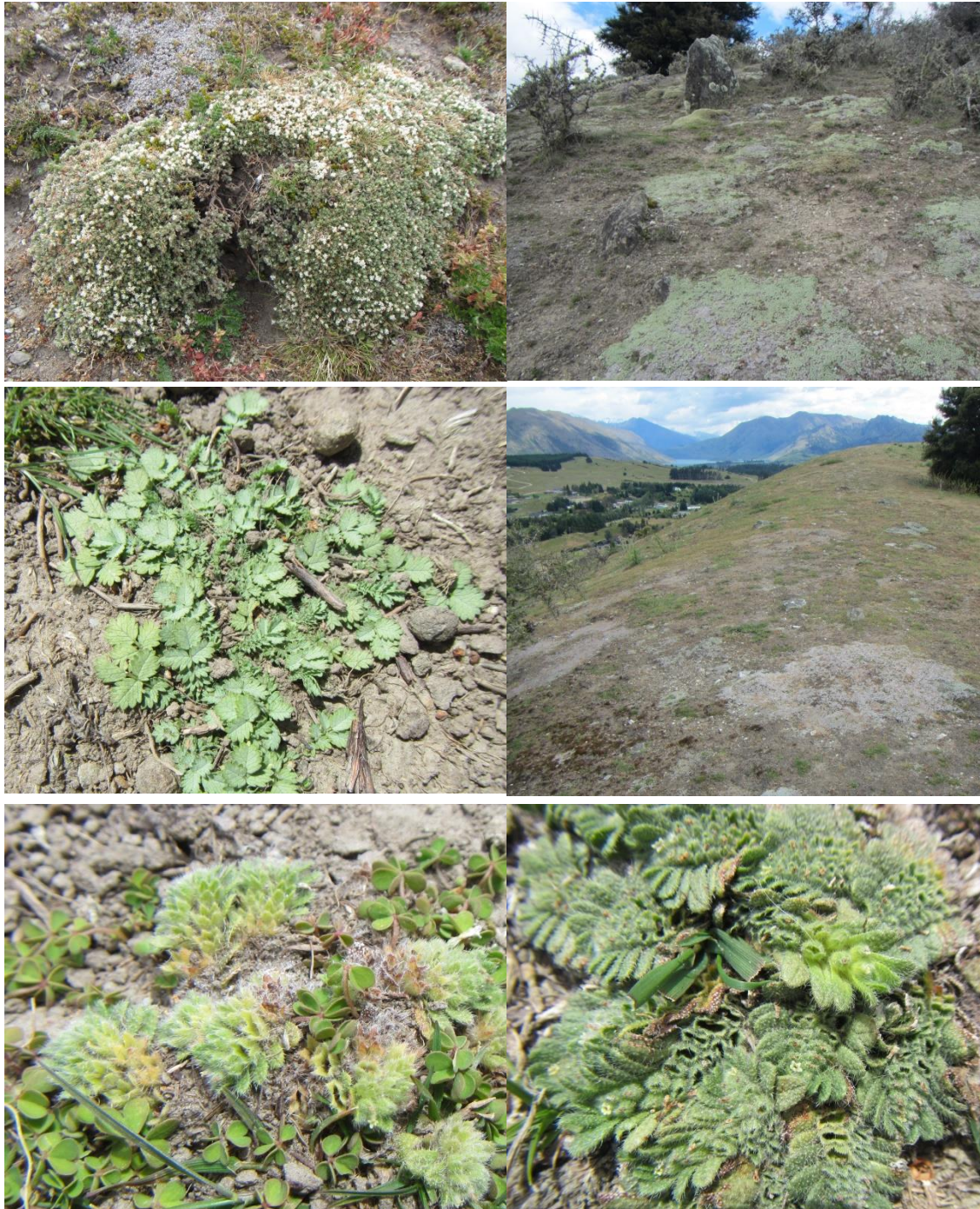


Plate 6: Top left: *Pimelea sericeovillosa* subsp. *pulvinaris* in flower. Top right: *Raoulia hookeri* and *Pimelea sericeovillosa* subsp. *pulvinaris* in cushionfield habitat above the main walking track. Middle left: *Acaena buchananii*. Middle right: Dry ridge habitat of *Acaena buchananii* and *Leptinella serrulata*. Lower photos: *Myosotis brevis* within *Oxalis exilis* (left) and close up to show minute flowers (right).

The 'retain in SNA' and 'add to SNA' areas combined contain 83 indigenous species and 61 exotic species. Only two indigenous species, plume grass (*Dichelachne crinita*) and kōhūhū (*Pittosporum tenuifolium*), were observed only in the 'discard from SNA' area. These species were both rarely recorded within the 'discard from SNA' area, and may occur at low abundance in the 'retain in SNA' and 'add to SNA' zones.

## 6.2 Threatened and At Risk plant species

The December 2016 field survey revealed significant additions to the list of Threatened and At Risk plant species on the Mt Iron site (de Lange *et al.* 2013). *Acaena* aff. *rorida* (OTA 059651 Poolburn; Threatened-Nationally Critical) and *Pimelea sericeovillosa* subsp. *pulvinaris* (At Risk-Declining) had previously been recorded, and additional individuals of both of these species were recorded in December 2016.

The 2016 survey revealed the presence at the site of three additional Threatened species (*Rytidosperma merum*, *Carmichaelia kirkii*, and *Myosotis brevis*), all classified as Threatened-Nationally Vulnerable, and three additional At Risk species, these being *Acaena buchananii* (At Risk-Declining), *Mentha cunninghamii* (At Risk-Declining), and *Leptinella serrulata* (At Risk-Naturally Uncommon) (Table 2). This assemblage of nationally Threatened and At Risk plant species at Mt Iron is a very important feature of the site, and the protection and management requirements of these species should be considered in future management of the site.

Table 2: Threatened and At Risk plant species known to occur at the Mt Iron site.

Species	Threat Classification	Number of Sites
<i>Acaena</i> aff. <i>rorida</i>	Threatened-Nationally Critical	3
<i>Carmichaelia kirkii</i>	Threatened-Nationally Vulnerable	1
<i>Myosotis brevis</i>	Threatened-Nationally Vulnerable	1
<i>Rytidosperma merum</i>	Threatened-Nationally Vulnerable	1
<i>Acaena buchananii</i>	At Risk-Declining	6
<i>Mentha cunninghamii</i>	At Risk-Declining	1
<i>Pimelea sericeovillosa</i> subsp. <i>pulvinaris</i>	At Risk-Declining	10
<i>Leptinella serrulata</i>	At Risk-Naturally Uncommon	4

All of the Threatened and At Risk plant species were found in turf and grassland habitats or associated with rock outcrops (Figure 2). *Carmichaelia kirkii*, *Myosotis brevis*, *Pimelea sericeovillosa* subsp. *pulvinaris*, and *Leptinella serrulata* were recorded only in the 'add to SNA' zone, while *Acaena* aff. *rorida*, *Rytidosperma merum*, and *Mentha cunninghamii* were recorded only in the 'retain as SNA' zone. *Acaena buchananii* was recorded most commonly in the 'add to SNA' zone, but also in the 'retain as SNA' zone. No Threatened or At Risk plant species were observed within the 'remove from SNA' zone.

## 6.3 Pest plants

Woody weeds, especially wilding conifers, are one of the major threats to the site. Saplings and small trees of wilding conifers, including Douglas fir (*Pseudotsuga menziesii*), Corsican pine (*Pinus nigra*), and radiata pine (*Pinus radiata*), were scattered throughout the site. Previously-felled wilding conifers were also evident in many areas.

Several trees of hawthorn (*Crataegus monogyna*) were observed in gully on the lower northern faces of the site, and should be controlled using techniques such as

application of herbicide to basal bark, or painting of cut stumps with herbicide, to prevent resprouting after control.

Saplings of sycamore (*Acer pseudoplatanus*) were associated with a house in the ‘exclude from SNA’ zone, and should be similarly controlled to prevent resprouting.

A mature eucalypt tree (*Eucalyptus* sp.) beside the other house is associated with regenerating seedlings and saplings, and these regenerating individuals should be controlled on an ongoing basis if the parent tree is retained.

St Lucie cherry occurs mostly in *Coprosma* shrubland on the south-facing slopes, but individuals of this species were also seen in kānuka scrub and shrubland on the north-facing slopes. It should also be controlled.

## 7. BIRDS

Twelve bird species were observed during the site visit, including five indigenous forest birds and seven exotic species (Table 3). The indigenous species were grey warbler/riroriro (*Gerygone igata*), brown creeper/pipipi (*Mohoua novaeseelandiae*), fantail/piwakawaka (*Rhipidura fuliginosa*), and silvereye/tauhou (*Zosterops lateralis*), all of which are classified as ‘Not Threatened’, and New Zealand falcon (*Falco novaeseelandiae* ‘eastern’; At Risk-Recovering). Of these indigenous species, riroriro, piwakawaka, and tauhou are widespread and common and all were recorded in Wanaka in the most recent census of New Zealand birds (Robertson *et al.* 2007).

The census records New Zealand falcon on the outskirts of Wanaka (Robertson *et al.* 2007) but they have large home ranges. It is possible that the individual seen at Mt Iron is one of the pair of New Zealand falcon that have recently returned to nest in the Albert Town Recreation Reserve ([www.thenews.co.nz/news/falcons-return-to-nest-at-albert-town/](http://www.thenews.co.nz/news/falcons-return-to-nest-at-albert-town/)).

Table 3: Bird species recorded at Mt Iron during the site visits.

Species	Common Name	Status
<i>Callipepla californica</i>	Californian quail	Introduced and naturalised
<i>Carduelis chloris</i>	Greenfinch	Introduced and naturalised
<i>Carduelis flammea</i>	Redpoll	Introduced and naturalised
<i>Emberiza citrinella</i>	Yellowhammer	Introduced and naturalised
<i>Fringilla coelebs</i>	Chaffinch	Introduced and naturalised
<i>Gerygone igata</i>	Grey warbler/riroriro	Not Threatened
<i>Falco novaeseelandiae</i> ‘eastern’	New Zealand falcon	At Risk-Recovering
<i>Mohoua novaeseelandiae</i>	Brown creeper/pipipi	Not Threatened
<i>Prunella modularis</i>	Dunnock	Introduced and naturalised
<i>Rhipidura fuliginosa</i>	Fantail/pikwakawaka	Not Threatened
<i>Turdus merula</i>	Blackbird	Introduced and naturalised
<i>Zosterops lateralis</i>	Silvereye/tauhou	Not Threatened

Brown creeper/pipipi, have more substantial gaps in their distribution and are generally only present in areas with extensive indigenous or exotic forest and scrub. They were not recorded on Mt Iron in 1975 (Allen 1978), and were not recorded from

the 10 km<sup>2</sup> grid square in which Mt Iron is located during the most recent national bird census (Robertson *et al.* 2007) thus may have colonised the site since then. Brown creeper/pipipi are more or less absent from the drier parts of Central Otago but are present in exotic forest at Queenstown and Naseby, and on both sides of Lake Hawea where there are extensive areas of indigenous forest and scrub (Robertson *et al.* 2007). Brown creeper/pipipi were observed in both the *Coprosma* scrub and shrubland and in kānuka scrub and shrubland.

The exotic birds recorded - Californian quail (*Callipepla californica*), blackbird (*Turdus merula*), greenfinch (*Carduelis chloris*), redpoll (*C. flammea*), chaffinch (*Fringilla coelebs*), yellowhammer (*Emberiza citrinella*), and dunnock (*Prunella modularis*) - are all typical of mixed indigenous and exotic habitat in Central Otago.

## 8. LIZARDS

### 8.1 Overview

Three lizard species were recorded at Mt Iron during the December 2016 field visit, one more species than was previously known for the site. McCann's skink (*Oligosoma maccanni*) and the Kawarau gecko (*Woodworthia* 'Cromwell') were very common and present wherever there was rocky habitat. They were found utilising groundcover including rank grass, rock-field and rocky outcrop habitats, including areas under a partial kānuka canopy (Plate 7). Less common was a new species for the site: the southern grass skink (*Oligosoma* aff. *polychroma* Clade 5; as per Liggins *et al.* 2008). Southern grass skink was only found at two locations; both individuals were found within an exotic grassland habitat just outside of the proposed Mt Iron SNA C (see Plate 8 and Figure 3). McCann's skink (Plate 9) is classified as Not Threatened, and Kawarau gecko (Plate 10) and southern grass skink are both classified as At Risk-Declining (Hitchmough *et al.* 2016).

### 8.2 "Remove from SNA" zone

The At Risk-Declining Kawarau gecko was located at a single site within the area sought to be excluded from the proposed Mt Iron SNA C (the 'exclude from SNA' zone (see the purple dotted lines in Figures 1 and 3). The area sought to be excluded contains less rocky habitat - only scattered occasional rocks were noted - than the rest of the proposed SNA, which contained rock tors and good quality lizard habitat. McCann's skink (Not threatened) were ubiquitous across the site, including some individuals seen under logs/wood inside the 'exclude from SNA' zone (see Figure 3). Kawarau gecko was only found in association with rocky habitat: either tor habitat, boulder fields or under rocks/slabs or boulders, habitats absent from the large majority of the 'exclude from SNA' zone. Similarly, suitable habitat for the Southern grass skink was not found within this area.



Plate 7: Typical rocky habitat at Mt Iron which occurs under a partial kānuka canopy within and outside the proposed Mt Iron SNA C.



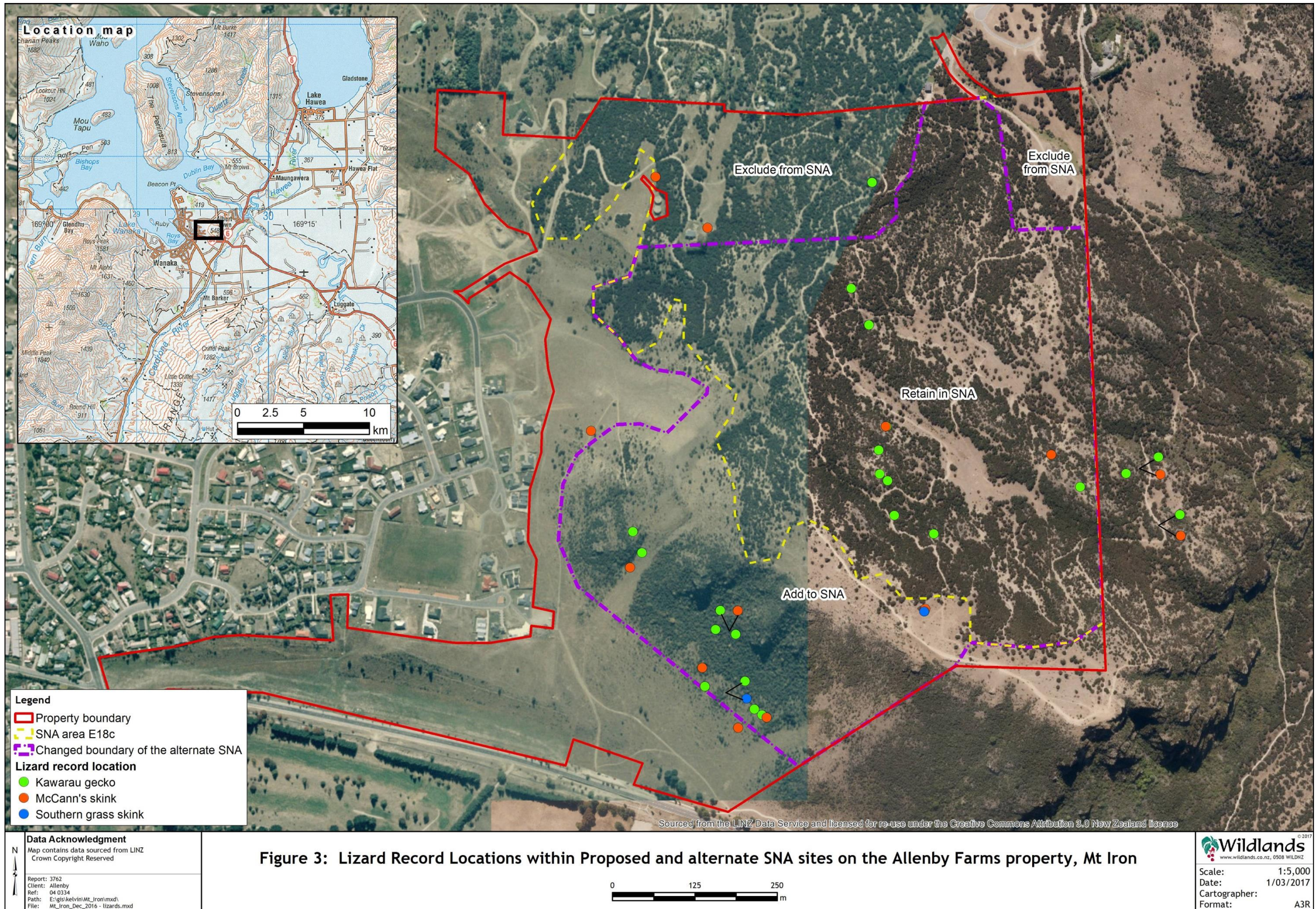
Plate 8: Southern grass skink (*Oligosoma* aff. *polychroma* Clade 5) from exotic grassland habitat outside the proposed Mt Iron SNA C.



Plate 9: McCann's skink (*Oligosoma maccanni*) from exotic grassland inside the proposed Mt Iron SNA C.



Plate 10: Kowarau gecko (*Woodworthia* "Cromwell") from rock tor habitat within the proposed Mt Iron SNA C.



In terms of Section 6(c) of the RMA (1991), the 'exclude from SNA' zone, should it be developed in the future, will not result in adverse effects on significant habitat for indigenous lizards (based on QLDC PDP Policy 33.2.1.9). Disturbance of McCann's skink and Kowarau gecko and their habitats in this area, however, would require approval from the Department of Conservation under the Wildlife Act (1953) which provides absolute protection for all indigenous lizard species, including not threatened species.

### 8.3 Alternate SNA

As noted in Section 7.1 above, the At Risk Southern grass skink was only found at two locations and both sites were within the 'add to SNA' zone (Figures 1 and 3). In addition, large numbers of McCann's skink and Kowarau gecko were located both within the 'retain as SNA' zone and the 'add to SNA' zone, the areas that, in combination, make up the proposed alternate SNA (Figure 3).

## 9. INVERTEBRATES

### 9.1 Overview

Fifty-six insect species were recorded at Mount Iron over the period 11-13 December 2016 (Appendix 2). Of this total, 51 are butterflies and moths (Order Lepidoptera) reflecting the author's expertise and focus of this survey. One of the moths, *Meterana exquisita*, has a national threat classification of At Risk-Relict (Stringer *et al.* 2012). An additional five indigenous insect species were recorded as adults, including one grasshopper (Order Orthoptera), one cicada, one bug (Order Hemiptera), and two beetles (Order Coleoptera). Of these, 53 species are indigenous species that are natural to the range of plant communities present on Mount Iron, with the other three being introduced species. Eleven families of moth and butterfly were found with the larger sized geometrid and noctuid moths, and indigenous butterflies being well represented, both by day and night.

Considering the seasonality of the New Zealand insect fauna and the brevity of this survey, this list (Appendix 2) represents a significant dryland fauna and reflects the range of natural and semi-natural communities that are present.

Lepidoptera features of each of the main habitats at the site are described in more detail below.

### 9.2 Mixed *Coprosma*-dominant shrubland

The mixed shrubland with its higher diversity of shrubs, lianes, grasses, mosses, and herbs was found to host considerably more (46) insect species than the kākara dominated areas or the semi-natural open grassland and turf areas. Key indigenous plant species in this mixed shrubland are in the genera *Olearia*, *Carmichaelia*, *Coprosma*, *Melicactus*, and *Muehlenbeckia*, which all host many species of indigenous Lepidoptera. The aptly-named noctuid moth *Meterana exquisita* (At Risk-Relict) with its green, black and white forewings was present, along with the much smaller *Thiotricha oleariae* whose case-bearing larvae were also found on the foliage of *Olearia odorata*. The mix of *Coprosma* shrubs were found to host three moths in the



genus *Austrocidaria* with *A. parora* being an uncommon species in Central Otago, along with the small *Isochasta paradesma*. Cabbage tree is a host for the cabbage tree moth *Epiphryne verriculata*, porcupine shrub hosts the fine noctuid *Graphania lithias*, and matagouri hosts the grey noctuid moth *G. phricias*. These moths are all specialists to these particular host plant genera.

### 9.3 Kānuka scrub and shrubland

Kānuka scrub and shrubland at the site was found to host just two specialist moth species: the geometrids *Poecilasthena schistaria* and *Pseudocoremia lupinata*. Kānuka leaf litter is consumed by several non-specialist small moths in the genera *Tingena*, *Trachypepla*, and *Capua*. Bryophyte mats under the kānuka canopy support the moth *Eudonia philerga*. A total of 18 insect species were recorded in kānuka scrub and shrubland, and were mostly a subset of those found within the mixed *Coprosma*-dominant shrubland.

### 9.4 Rock outcrop habitats

The kānuka-dominated and mixed shrubland areas both contain rock outcrops which support a cover of lichens and mosses with in turn support specialist indigenous moths such as *Gadira acerella* and *Eudonia philerga*.

### 9.5 Open grassland and turf

A feature of the open grassland and turf on the Mt Iron ridge was the presence of three day-flying moths: the orange, black and white striped *Notoreas elegans* whose larvae feed on *Pimelea*, the delicate plume moth *Aciptilia innotatalis* whose larvae mine the small leaves of *Dichondra brevifolia*, and *Oxythecta austrina* whose larvae feed on the prickly *Leucopogon fraseri*. These plant genera were only found in these open grassland and turf sites. All three moths are now very local in their occurrence in Central Otago, reflecting the scarcity of undisturbed low-growing herb, grass and cushion plant communities in valley floors as development of such areas continues. Another feature of these open areas was the presence of five indigenous butterfly species: southern blue butterfly's natural food plant is low-growing brooms (*Carmichaelia*) but has fortunately adapted to feeding on clovers in the same plant family. Three copper butterflies (boulder, glade and common coppers) were commonly found here with all feeding as caterpillars on various pohuehue species (*Muehlenbeckia*), and both the red and yellow admiral butterflies were seen sunbasking on the summit (their caterpillars feed on various nettles).

While relatively few (16) insect species were recorded in the open grassland and turf, no light-trapping was carried out to sample these habitats. However, six of the insect species were recorded only in this habitat, indicating its distinctiveness as invertebrate habitat.

## 10. PEST ANIMALS

Possum (*Trichosurus vulpecula*) sign was observed in *Coprosma* scrub and shrubland. Rabbit (*Oryctolagus cuniculus*) sign was abundant in most parts of the site, the exception being areas on the steep south-facing slopes where bracken was abundant. Hares (*Lepus europaeus*) will also be present. A hedgehog (*Erinaceus europaeus*) was found active by day and cat (*Felis catus*) sign was noted near the proposed Mt Iron SNA C boundary with existing residential development (within the “remove from SNA” zone). Mustelids (*Mustela* spp.), rats (*Rattus rattus*), and mice (*Mus musculus*) will also be present at the site.

## 11. ECOLOGICAL VALUES

Ecological values within the alternate SNA (‘retain as SNA’ plus ‘add to SNA’) were assessed against the ecological significance criteria in Appendix 5 of the Queenstown Lakes District Plan (2009). The criteria are grouped into four primary criteria, three ‘other criteria’, and a final appraisal must also have regard to eight further matters. These criteria are listed below, and site values were assessed against each criterion, as set out below.

Pursuant to Section 86(b)(3) of the RMA, the rules applicable to Significant Natural Areas in the QLDC notified District Plan (as set out in Chapter 33 of that Plan) have immediate legal effect, and as such, we also assessed the site against criteria listed in Policy 33.2.1.9 of the Proposed (and notified) Queenstown Lakes District Plan.

### 11.1 District Plan (2009) - Section 6c Significance

#### Primary Criteria

##### A. *The Ecological Values of the Area - the values of the place itself*

- (i) *Representativeness - Whether the area contains one of the best examples of an indigenous vegetation type, habitat or ecological process which is typical of its Ecological District.*

There are relatively few ‘roche moutonnée’ landforms within the Pisa Ecological District, and the Mt Iron site, while modified from its original condition, has representative ‘roche moutonnée’ habitats that are some of the best examples of ‘roche moutonnée’ habitats within Pisa Ecological District.

- (ii) *Rarity - Whether the area supports or is important for the recovery of, an indigenous species, habitat or community of species which is rare or threatened within the Ecological District or is threatened nationally.*

The alternate SNA contains four Threatened and four At Risk indigenous plant species, two At Risk lizard species, and an At Risk invertebrate species. In addition, pipipi/brown creeper are likely to be rare or

uncommon within the Pisa Ecological District. The alternate SNA has very high value for rarity.

- (iii) *Diversity and Pattern - the degree of diversity exhibited by the area in vegetation habitat types, ecotones, species, ecological processes.*

The alternate SNA has a moderate diversity of habitats, with a gradient from relatively moist and shady south-facing habitats across a dry, stony ridge supporting cushion plants, into dry, north-facing habitats. Species richness is reasonably high for plants and invertebrates, and moderate for birds and for lizards.

- (iv) *Distinctiveness/Special ecological character - the type and range of unusual features of the area itself and the role of the area in relationship to other areas locally, regionally and nationally, including:*
- *presence of indigenous species at their distribution limit,*
  - *levels of endemism, e.g. the presence of endemic species,*
  - *supporting protected indigenous fauna for some part of their life cycle (e.g. breeding, feeding, moulting, roosting), whether on a regular or infrequent basis,*
  - *Playing a role in the life cycle of migratory indigenous fauna,*
  - *containing one of the best examples of an intact sequence, or substantial part of an intact sequence of ecological features or gradients,*
  - *supporting predominantly intact habitats with evidence of healthy natural ecosystem functioning*

The alternate SNA is distinctive as a ‘roche moutonnée’ landform that is largely covered with indigenous vegetation and habitats. Indigenous forest birds and lizards are protected indigenous fauna which are supported by habitats at the site. The presence of the Southern grass skink is notable as this species is not common in arid parts of Otago.

#### Other Criteria

#### B. The Ecological Context of the Area including its relationship with its surroundings

- (v) *Size and Shape - the degree to which the size and shape of an existing area is conducive to it being, or becoming ecologically self sustaining.*

The alternate SNA is relatively large and compact and thus is conducive to ecological values being self-sustained.

- (vi) *Connectivity - the extent to which the area has ecological value due to its location and functioning in relation to its surroundings. An area may be ecologically significant because of its connections to a neighbouring area, or as part of a network of areas of fauna habitat. For example an area may act as a corridor or stepping stone for movement/migration of species between or to areas of important habitat.*

The alternate SNA is an important component of a network of sites in the vicinity of the upper Clutha River that support indigenous scrub and shrubland habitat, indigenous lizards, birds and invertebrates.

C. *The Future Ecological Value of the Area*

- (vii) *Long Term Sustainability - the degree to which an area is likely to maintain itself, taking into consideration:*
- *extent to which criteria in paragraphs A and B above are met*
  - *degree of historic modification to the area and its surroundings which affects its future*
  - *degree of resilience of species and habitats present*
  - *the effects of current management on identified ecological values*
  - *the extent to which the area has achievable potential, with management input, for restoration of ecological values which are significant in the Ecological District.*

The alternate SNA is likely to maintain itself subject to current weed control management being continued. *Coprosma* scrub and shrubland on the shady south-facing slopes of the site has excellent potential for ecological restoration into indigenous forest.

11.2 Proposed District Plan - Section 6c Significance from Policy 33.2.1.9

- a. *Representativeness - whether the area is an example of an indigenous vegetation type or habitat that is representative of that which formerly covered the Ecological District.*

As described above, the alternate SNA has representative ‘roche moutonnée’ habitats that are some of the best examples of ‘roche moutonnée’ habitats within Pisa Ecological District.

- b. *Rarity - whether the area supports:*
- *indigenous vegetation and habitats within originally rare ecosystems;*
  - *indigenous species that are threatened, at risk, uncommon, nationally or within the ecological district;*
  - *indigenous vegetation or habitats of indigenous fauna that has been reduced to less than 20% of its former extent, regionally or within a relevant Land Environment or Ecological District.*

Ecological values within the ‘retain as SNA’ and ‘add to SNA’ areas easily meet this criterion. Populations of Threatened and At Risk plants, lizards, and invertebrates are present within these areas, and indigenous vegetation and habitats within the site occur on land environments that have been identified as having less than 20% of their original extent remaining.

- c. *Diversity - whether the area supports a highly diverse assemblage of indigenous vegetation and habitat types, and whether these have a high indigenous biodiversity value.*

As described above, the alternate SNA has a moderate diversity of habitats, with a gradient from relatively moist and shady south-facing habitats across a dry, stony ridge supporting cushion plants, into dry, north-facing habitats. Species richness is reasonably high for plants and invertebrates, and moderate for birds, and for lizards.

- d. *Distinctiveness - whether the area supports or provides habitats for indigenous species:*

- *at their distributional limit within Otago or nationally;*
- *are endemic to the Otago region,*
- *are distinctive, of restricted occurrence or have developed as a result of unique environmental factors.*

The alternate SNA is distinctive as a ‘roche moutonnée’ landform that is largely covered with indigenous vegetation and habitats. Currently confirmed sites for *Acaena* aff. *rorida* are all within Otago Region, suggesting that this taxon is endemic to the Region. The presence of the Southern grass skink is notable as this species is uncommon in arid parts of Otago.

- e. *Ecological Context - the relationship of the area with its surroundings, including whether the area proposed to be cleared:*

- *has important connectivity value allowing dispersal of indigenous fauna between different areas;*
- *has an important buffering function to protect values of an adjacent area of feature;*
- *is important for indigenous fauna during some part of their life cycle.*

The alternate SNA is an important component of a network of sites in the vicinity of the upper Clutha River that support indigenous scrub and shrubland habitat, and indigenous lizards, birds, and invertebrates. The ‘retain as SNA’ and ‘add to SNA’ areas provide important shelter, refuge, feeding, and breeding habitat for indigenous lizards.

### 11.3 Significance summary

Overall, the alternate SNA (‘retain as SNA’ plus ‘add to SNA’ areas) supports significant indigenous vegetation and significant habitats of indigenous fauna (under Section 6(c) of the Resource Management Act (1991)), based on evaluations of both the ecological significance criteria in the Queenstown Lakes District Plan (2009) and those within Policy 33.2.1.9 of the notified District Plan.

Key attributes of the alternate SNA include the gradient of indigenous woody vegetation from relatively moist, shady, habitat on south-facing slopes to dry, sunny habitat on north-facing slopes, populations of Threatened and At Risk plant species,

habitat and populations of two At Risk lizard species, an At Risk invertebrate species, a bird species that is uncommon in Pisa Ecological District, and the site is an important component of a wider network of indigenous forest and scrub sites in the upper Clutha River.

## 12. DELINEATION OF THE SIGNIFICANT AREA

### 12.1 Proposed SNA

A major limitation of the proposed Mt Iron SNA C (Maps 8 and 18 of notified District Plan; Figures 1-3 of this report) is that it only includes kānuka scrub and shrubland on the sunny north-facing slopes. The proposed SNA appears to have been assessed on a desktop basis, as the assessment report includes no GPS waypoints or photographs, lists no threatened species for the site, describes the vegetation only as 'kānuka woodland', and provides notes on indigenous fauna that the site is 'expected' to provide habitat for. The conclusion for significance notes that the vegetation is degraded, but assesses it as being significant due to its relatively large area within a Level IV land environment that has been estimated to have less than 20% of its original vegetation cover remaining (<http://www.qldc.govt.nz/assets/Uploads/Planning/District-Plan/Significant-Natural-Areas/Group-E/E18C.pdf>).

Ecological assessments of the proposed Mt Iron SNA D (Sites 1 to 2) and Mt Iron SNA H (all on Maps 8 and 18 of the notified District Plan) on the neighbouring Little Mt Iron contain almost exactly the same text as for the proposed Mt Iron SNA C, reinforcing the conclusion that all of these sites have been assessed using a desktop approach without the benefit of information from field assessments.

In contrast, the assessments for proposed Congreve SNA A and Coopers SNA B on the upper Clutha outwash plains near Mt Iron contain vegetation descriptions and photographs and identify At Risk plant and bird species, and were clearly based on field inspections.

Desktop assessments using aerial imagery and other information are commonly used to help identify potentially significant sites and while this is a valid and useful approach, such assessments should not be relied on as the sole basis for delineating significant sites. Many ecological values (e.g. many fauna values) can only be assessed in the field, and it is not possible to fully assess the condition of indigenous vegetation and faunal habitats using aerial imagery. Similarly, desktop assessment may be insufficient to exclude areas that do not warrant protection.

The limitations of the desktop assessment for the subject site were revealed by our field assessments of land owned by Allenby Farms on Mt Iron. The brief field assessment in early spring 2015 recorded Threatened and At Risk plant species not previously known from the site, and the more detailed inspection in December 2016 revealed additional Threatened and At Risk taxa. Kānuka woodland - the only vegetation feature identified in the Council assessment of Mt Iron SNA C - does not provide habitat (except where sizeable rocky areas occur) for any of the Threatened or At Risk plant species found within the site, and is of lower value for lizards and invertebrates. Areas of turf, cushionfield, and rock outcrop habitat are the main

habitats that support Threatened and At Risk plant and lizard species. Furthermore, the proposed Mt Iron SNA C does not capture any of the grassland, rock outcrops, and cushionfield vegetation that provides habitat for the nationally Threatened *Carmichaelia kirkii* and *Myosotis brevis*, and nationally At Risk *Pimelea sericeovillosa* subsp. *pulvinaris*, and *Leptinella serrulata*. Nor does the site capture the habitat diversity and indigenous fauna habitat provided by the *Coprosma* scrub and shrubland on the south-facing slopes, which has notably higher insect species richness and the only known populations at the site of the At Risk Southern grass skink. In terms of areas that clearly do not warrant protection, proposed Mt Iron SNA C contains two houses and two water supply tanks, which should be excluded from SNA status, and areas of kānuka woodland, exotic grassland and herbfield, and buildings and tracks of relatively low ecological value. The exclusion of these areas would not affect the integrity or ecological functioning of the alternate SNA.

## 12.2 Alternate SNA

The alternate SNA (Figures 1-3) captures the ecological gradient across the site, including all major indigenous vegetation types, flora and fauna habitat types, and all known significant habitats of Threatened and At Risk plants, lizards, and invertebrate species. The *Coprosma* scrub and shrubland habitat provides excellent habitat for indigenous fauna and complements the relatively dry kānuka woodland on the sunny northern faces of the site. These additional habitats (within the “add to SNA” zone) are proposed for inclusion at the expense of losing some kānuka woodland from the proposed SNA. Kānuka scrub and shrubland will remain the most extensive habitat type within the SNA and the loss of some kānuka scrub and shrubland would be more than offset by the inclusion of habitats of relatively higher ecological value. Kānuka scrub and shrubland is the most common woody vegetation type elsewhere on Mt Iron and on terraces beside the Clutha and Hawea Rivers in the local area. The alternate SNA will also have greater diversity of habitats, landforms, and species than the proposed SNA and contain populations of the At Risk Southern grass skink, a species not found elsewhere on Mt Iron. While 12.6 ha would be removed from the proposed Mt Iron SNA C, 17.5 ha would be added to the alternate SNA, more than addressing this loss in area. It is noted that these figures have changed from those specified in the Allenby Farms Ltd submission, following changes to the suggested SNA boundary after further ecological survey work undertaken in December 2016.

## 12.3 Summary

The SNA as identified in the proposed District Plan:

- Includes a limited range of vegetation types (kānuka scrub, kānuka shrubland, indigenous turf, rock outcrops).
- Does not include populations of two nationally Threatened and three nationally At Risk plant species.
- Does not include cushionfield and *Coprosma* shrubland habitats, which are important for rare plant species, the At Risk Southern grass skink and invertebrates.

- Does not capture the ecological gradient across the site, from sunny to shady slopes.
- Contains kānuka scrub and shrubland, a relatively low quality habitat for some indigenous fauna.
- Contains highly modified areas, including houses, water supply tanks, formed gravel roads, and mature exotic eucalypt and larch (*Larix decidua*) trees.

The alternate SNA would:

- Capture all the known populations of Threatened and At Risk taxa on the Allenby Farms land, apart from one location for Kawarau gecko.
- Be about five hectares greater in size than the proposed Mt Iron SNA C.
- Contain all the major indigenous vegetation types on the Allenby Farms Ltd land: kānuka scrub, kānuka shrubland, indigenous turf, significant rock outcrops and bluffs, cushionfield, and *Coprosma* shrubland.
- Contain *Coprosma* shrubland, which is good quality indigenous fauna habitat.
- Exclude areas of kānuka woodland and some areas of exotic grassland and herbfield that have lower ecological value.
- Exclude highly modified areas, including houses and water supply tanks, formed gravel roads, and mature exotic eucalypt and larch trees.

Inclusion of the alternate SNA in the second generation Queenstown Lakes District Plan would allow the Council to protect a greater range of ecological values, compared to inclusion of the proposed Mt Iron SNA C.

## 13. MANAGEMENT OPTIONS FOR MT IRON SNA C

### 13.1 Weed control

It will be important to maintain control of wilding conifers that have invaded the site, mostly on south-facing slopes, but also scattered through the kānuka scrub and shrubland on sunny slopes. Hawthorn in the gully on the north-facing slopes should also be controlled, and sycamore and eucalyptus regeneration around the houses. The infestation of St Lucie cherry, predominantly on the south-facing slopes, also warrants control effort.

### 13.2 Rabbit browse - positive and negative effects

Rabbits at the site are having both positive and negative effects. Positive effects include browsing exotic grasses to create low swards in which indigenous turf and cushion plants can persist. If this browse pressure was significantly reduced, taller grass swards would develop and would adversely affect these indigenous turf and cushion plants. As several of these turf species are classified as Threatened or At



Risk, this could constitute a significant adverse effect. Maintenance of closely-cropped grass swards is also useful to reduce the amount of fire fuel at ground level. Dry grass swards are very combustible and easily (and rapidly) transmit fire to areas with greater amounts of fuel. Negative effects of rabbits includes mortality and browse damage on seedlings and saplings of palatable woody plant species, and newly-planted trees. As rabbit browse is important for its positive effects at the site, their negative browse effects on planted trees could be managed by establishing shelters around palatable trees.

### 13.3 Pest animal control

Currently there is limited knowledge of mammalian predators at the site. As described in Section 10 of this report, there is evidence that some mammalian predators are present, for example possum, hedgehog, and cat, and other pest animals, including rodents and mustelids, are likely to be present. We understand that Allenby Farms Ltd is considering implementing monitoring for pest animals at the site. This is important to determine pest animal control requirements, to establish baseline pest animal densities, and to monitor pest animal abundance should pest animal control be implemented. A mix of tracking tunnels, wax tags or chew cards, live traps, and kill traps would be suitable for monitoring the broad suite of mammalian predators that are likely to be present. Mammalian predators at the site will be affecting indigenous lizards, birds, and invertebrates, but the magnitude of these effects are not currently known.

### 13.4 Planting to increase biodiversity across the wider site

Current indigenous vegetation across the site is clearly secondary in origin, and does not represent the original vegetation of the site. A range of other indigenous tree and shrub species could therefore also be planted. The focus of any planting should be on toeslopes and in low elevation swales (which do not support indigenous turf species) where soil depth and soil moisture will be greater. Indigenous trees and shrubs that would have potentially occurred at the site, and which could be planted, include kowhai (*Sophora microphylla*), cabbage tree (*Cordyline australis*), kohuhu (*Pittosporum tenuifolium*), lowland ribbonwood (*Plagianthus regius*), matai (*Prumnopitys taxifolia*), Hall's totara (*Podocarpus laetus*), fierce lancewood (*Pseudopanax ferox*), broadleaf (*Griselinia littoralis*), *Olearia lineata*, *Olearia odorata*, and corokia (*Corokia cotoneaster*) (Table 5). Kowhai, *Olearia lineata*, *Olearia odorata*, corokia, cabbage tree, Hall's totara, kohuhu, and broadleaf are naturally present elsewhere in the area, but lowland ribbonwood, matai, and fierce lancewood are species that would very likely have been present historically in appropriate habitats. The Mt Iron site would therefore provide an opportunity to reintroduce these species to a semi-natural inland Otago environment. Planted lowland ribbonwood are growing well adjacent to one of the houses. The advantage of including a range of different species is that if some perform poorly at the site, this can be compensated for by the better performance of other species. In addition, a diverse range of plant species will increase invertebrate diversity, as many Lepidoptera in particular have specialist host plant relationships.

Table 5: Indigenous tree and shrub species suitable for planting at the Mount Iron site.

Species	Common Name	Notes
<i>Cordyline australis</i>	Cabbage tree	Fast initial height growth, food source for indigenous birds, will grow in most locations within the site.
<i>Corokia cotoneaster</i>	Corokia	Shrub of dry sites, important for invertebrates
<i>Griselinia littoralis</i>	Broadleaf	Hardy, exposure tolerant, will grow in most locations within the site
<i>Kunzea serotina</i>	Kānuka	Can establish in the presence of rabbit browse, tolerant of dry conditions
<i>Olearia lineata</i>		Prefers deep soils, often in riparian habitats, important for invertebrates
<i>Olearia odorata</i>		Prefers fertile soils, important for invertebrates
<i>Pittosporum tenuifolium</i>	Kohuhu	Moderate growth rate, hardy, will grow in most locations within the site.
<i>Plagianthus regius</i>	Lowland ribbonwood	Fast growth on fertile soils, better planted in deeper soils.
<i>Podocarpus laetus</i>	Hall's totara	Slow growing but hardy, fruit source for indigenous birds when mature, will grow in most locations within the site.
<i>Prumnopitys taxifolia</i>	Matai	Slow-growing, long-lived, fruit source for indigenous birds when mature. Best planted in sheltered microhabitat in deeper soils.
<i>Pseudopanax ferox</i>	Fierce lancewood	Moderate growth rate, fruit source for indigenous birds when mature. Best planted on deeper soils.
<i>Sophora microphylla</i>	Kowhai	Slow growth, can grow on stony sites, important food source for indigenous birds.

### 13.5 Removal of rocks

It became evident during the site visit that smaller rock slabs are routinely moved from rock tor habitat onto bike tracks to make jumps. Slabs and moveable rocks provide important habitat for various indigenous lizard species by allowing for a greater population level and a greater range of habitats for the lizards to utilise where more than one species co-exist. It would be helpful for the resident lizard population if visitors to the SNA were encouraged leave rock habitat *in situ*, which would be facilitated by clearer management of track construction, or possibly by excluding mountain biking from the site.

## 14. FUTURE MANAGEMENT

Holistic future management for most of the indigenous ecosystems on Mt Iron is now possible as Allenby Farms Ltd have purchased neighbouring land at Little Mt Iron, which contains Mt Iron SNA D, and have also entered into discussions with the Department of Conservation, who administer land within Mt Iron Scenic Reserve at the south-east corner of Mt Iron. With respect to the two parcels of private land both being under Allenby Farms Ltd control, there is potential to:

- Undertake a more detailed ecological assessment of the Little Mt Iron property to better determine its ecological values. The site was only assessed at a desktop level for SNA identification purposes.
- Formalise legal protection of a larger part of the Mt Iron ecosystem.
- Expedite the control of wilding conifers, which threaten both Mt Iron SNA D and Mt Iron SNA C. Mature wilding conifers are present on the Little Mt Iron property, and are seed sources for spread onto the Mt Iron site.
- Ensure that farm stock are not grazed on either property.
- Consider additional sites for the restoration of high value indigenous vegetation. In particular, the Little Mt Iron site contains shady slopes which are likely to support different vegetation to the kānuka woodland on the sunny Mt Iron slopes.
- Reduce the fragmentation of indigenous habitat on Little Mt Iron by planting ecologically appropriate indigenous vegetation in gaps.
- Identify potential sites where additional populations of Threatened or At Risk plant species could be established.
- Formalise management of walking and mountain biking trails, so that the ecological effects of trail development can be considered, and informal trail use can be discouraged.
- Undertake pest animal monitoring and control across the whole site if warranted.

If the alternate SNA is accepted in the Queenstown Lakes District Plan, the ‘exclude from SNA’ areas of kānuka woodland would still be covered by the general indigenous vegetation clearance rule: Rules 33.5.2 and 33.5.3 in the proposed Queenstown Lakes District Plan. Should discretionary consents be sought under these rules for clearance of kānuka woodland, there would be considerable scope on the Little Mt Iron property, or across the combined two properties, for positive action to enhance indigenous biodiversity.

## 15. CONCLUSIONS

The Allenby Farms site on Mt Iron supports significant indigenous vegetation and significant habitats of indigenous fauna. Site values include four Threatened and four At Risk plant species, two At Risk lizards and a diverse range of indigenous invertebrates. The alternate SNA boundaries would enable better protection of significant ecological values than does the proposed SNA, because it captures the ecological gradient across the site, and provides habitat for two nationally Threatened plant species, two At Risk plant species and an At Risk lizard that were not recorded in the proposed SNA. The mixed shrubland and open ridge vegetation within the alternate SNA provide better habitat for indigenous invertebrates than does the kānuka scrub and shrubland within the proposed SNA, as the key indigenous plant genera that are important for invertebrates in Central Otago are frequent in the mixed shrubland and open ridge habitats, but sparse or absent in the kānuka scrub and shrubland. Management options to improve the site include enhancement planting,

woody weed control, animal pest monitoring and control, and restrictions on the movement of rock habitat. As the Little Mt Iron site now falls under Allenby Farms control, this provides an opportunity for holistic management of most of the Mt Iron ecosystem, and the opportunity to generate positive ecological outcomes.

## ACKNOWLEDGMENTS

Robin Patterson and Duncan White of Patterson Pitts Group provided project liaison. Lynden and Zita Cleugh (Allenby Farms Ltd) provided helpful information on the past history of the site, and guidance around it.

## REFERENCES

- Allen R.B. 1978: Scenic Reserves of Otago Land District. Department of Lands and Survey, Wellington.
- de Lange P., Rolfe J., Champion P., Courtney S., Heenan P., Barkla J., Cameron E., Norton D., and Hitchmough R. 2013: Conservation status of New Zealand indigenous vascular plants, 2012. *New Zealand Threat Classification Series 3*. Department of Conservation, Wellington. 70 pp.
- Hitchmough R., Barr B., Lettink M., Monks J., Reardon J., Tocher M., van Winkel D., and Rolfe J. 2016: Conservation status of New Zealand reptiles, 2015. *New Zealand Threat Classification Series 17*. 14 pp.
- McEwen M. 1987: Ecological regions and districts of New Zealand. Booklet to accompany Sheet 4. *New Zealand Biological Resource Centre Publication No. 5*. Department of Conservation, Wellington.
- Robertson C.J.R., Hyvonen P., Fraser M.J., and Pickard C.R. 2007: Atlas of Bird Distribution in New Zealand, 1999-2004. Ornithological Society of New Zealand, Wellington.
- Stringer I.A.N., Hitchmough R.A., Dugdale J.S., Edwards E., Hoare R.J.B. and Patrick B.H. 2012: The conservation status of New Zealand Lepidoptera. *New Zealand Entomologist 35*: 120-127.

## VASCULAR PLANTS RECORDED DURING THE 2015 AND 2016 FIELD SURVEYS

Exotic species are denoted by asterisks. Abundances relate to distribution within the site.

Species	Common Name	Plant Type	Zone		
			Discard from SNA	Retain in SNA	Add to SNA
<i>Acaena</i> aff. <i>rorida</i> (OTA 059561; Poolburn)	Bidibidi	Dicot herb		Rare	
<i>Acaena agnipila</i> *	Australian sheeps bur	Dicot herb	Frequent	Frequent	Frequent
<i>Acaena buechananii</i>	Bidibidi	Dicot herb		Rare	Occasional
<i>Acaena caesiiglauca</i>	Bidibidi	Dicot herb		Rare	Occasional
<i>Acaena novae-zelandiae</i>	Bidibidi	Dicot herb		Rare	Occasional
<i>Acer pseudoplatanus</i> *	Sycamore	Tree	Planted		
<i>Agrostis capillaris</i> *	Browntop	Grass	Occasional	Occasional	Occasional
<i>Aira caryophyllea</i> *	Silvery hair grass	Grass	Frequent	Occasional	Occasional
<i>Amsinckia calycina</i> *	Yellow gromwell	Dicot herb	Occasional	Rare	Occasional
<i>Anagallis arvensis</i> *	Scarlet pimpernel	Dicot herb	Frequent	Frequent	Frequent
<i>Anthosachne solandri</i>		Grass	Occasional	Occasional	Occasional
<i>Anthoxanthum odoratum</i> *	Sweet vernal	Grass	Occasional	Occasional	Occasional
<i>Anthriscus caucalis</i> *	Beaked parsley	Dicot herb	Occasional	Occasional	Occasional
<i>Aphanes arvensis</i> *	Parsley piert	Dicot herb	Frequent	Frequent	Frequent
<i>Aristotelia fruticosa</i>	Shrubby wineberry	Shrub			Rare
<i>Asplenium flabellifolium</i>	Necklace fern	Fern		Occasional	Occasional
<i>Asplenium richardii</i>	Richard's spleenwort	Fern		Rare	Occasional
<i>Asplenium trichomanes</i>	Spleenwort	Fern			Occasional
<i>Berberis vulgaris</i> *	European barberry	Shrub		Rare	
<i>Blechnum novae-zelandiae</i>	Kiokio	Fern		Rare	
<i>Blechnum penna-marina</i>		Fern		Rare	
<i>Brachyglottis haastii</i>		Dicot herb			Rare
<i>Bromus diandrus</i> *		Grass		Rare	Occasional
<i>Buddleja davidii</i> *	Buddleia	Shrub	Planted		
<i>Cardamine hirsuta</i> *	Bitter cress	Dicot herb			Rare
<i>Carduus tenuiflorus</i> *	Winged thistle	Dicot herb	Occasional		Occasional
<i>Carex breviculmis</i>		Sedge	Occasional	Occasional	Occasional
<i>Carex coriacea</i>	Rautahi	Sedge		Rare	
<i>Carex gaudichaudiana</i>		Sedge		Occasional	Rare
<i>Carex secta</i>	Pukio	Sedge		Rare	
<i>Carex</i> sp.		Sedge		Rare	
<i>Carmichaelia kirkii</i>	Climbing broom	Shrub			Rare
<i>Carmichaelia muritai</i>	Coastal tree broom	Tree	Planted		
<i>Carmichaelia petriei</i>	Desert broom	Shrub			Frequent
<i>Celmisia gracilentia</i>	Pekapeka	Dicot herb			Rare
<i>Centaurium erythraea</i> *	Centaury	Dicot herb		Occasional	Occasional
<i>Cerastium fontanum</i> *	Mouse-ear chickweed	Dicot herb			Occasional
<i>Cerastium glomeratum</i> *	Chickweed	Dicot herb	Occasional	Occasional	
<i>Cheilanthes sieberi</i>	Rock fern	Fern		Occasional	
<i>Chenopodium album</i> *	Fathen	Dicot herb	Rare		
<i>Cirsium arvense</i> *	Californian thistle	Dicot herb	Occasional	Occasional	Occasional
<i>Cirsium vulgare</i> *	Scotch thistle	Dicot herb	Occasional	Occasional	
<i>Colobanthus strictus</i>		Dicot herb			Occasional
<i>Coprosma crassifolia</i>		Shrub	Occasional	Occasional	Occasional

Species	Common Name	Plant Type	Zone		
			Discard from SNA	Retain in SNA	Add to SNA
<i>Coprosma dumosa</i>		Shrub		Rare	Occasional
<i>Coprosma propinqua</i>	Mingimingi	Shrub	Occasional	Occasional	Frequent
<i>Coprosma repens</i>	Taupata	Shrub	Planted		
<i>Coprosma virescens</i>		Shrub	Planted		
<i>Cordyline australis</i>	Ti kouka	Tree			Rare
<i>Cotoneaster microphyllus</i> *	Cotoneaster	Shrub	Planted		
<i>Cotoneaster simonsii</i> *	Khasia berry	Shrub			Occasional
<i>Crataegus monogyna</i> *	Hawthorn	Tree	Occasional		
<i>Cytisus scoparius</i> *	Scotch broom	Shrub			Occasional
<i>Dichelachne crinita</i>	Plume grass	Grass	Rare		
<i>Dichondra brevifolia</i>	Dichondra	Dicot herb	Rare	Rare	
<i>Discaria toumatou</i>	Matagouri	Tree	Occasional	Frequent	Occasional
<i>Echium vulgare</i> *	Vipers bugloss	Dicot herb	Occasional	Occasional	Occasional
<i>Epilobium alsinoides</i>	Willow herb	Dicot herb		Rare	
<i>Epilobium ciliatum</i> *	Tall willowherb	Dicot herb			Occasional
<i>Epilobium komarovianum</i>	Creeping willow herb	Dicot herb		Rare	
<i>Erophila verna</i> *		Dicot herb			Occasional
<i>Euchiton audax</i>	Native cudweed	Dicot herb	Occasional	Occasional	Occasional
<i>Euchiton sphaericus</i>		Dicot herb		Occasional	Occasional
<i>Euchiton traversii</i>	Native cudweed	Dicot herb		Rare	
<i>Festuca novae-zelandiae</i>	Hard tussock	Grass		Rare	Occasional
<i>Festuca rubra</i> *	Red fescue	Grass		Occasional	Occasional
<i>Galium aparine</i> *	Cleavers	Dicot herb	Rare		
<i>Galium perpusillum</i>	Dwarf bedstraw	Dicot herb		Rare	
<i>Galium trilobum</i>	Native bedstraw	Dicot herb	Rare		Rare
<i>Geranium microphyllum</i>	Geranium	Dicot herb			Occasional
<i>Geranium molle</i> *	Dovesfoot cranesbill	Dicot herb	Rare		
<i>Geranium brevicaulis</i>	Geranium	Dicot herb		Rare	Occasional
<i>Griselinia littoralis</i>	Broadleaf	Tree			Occasional
<i>Gypsophila australis</i> *		Dicot herb	Occasional		
<i>Hebe buchananii</i>		Shrub	Planted		
<i>Helichrysum filicaule</i>	Slender everlasting daisy	Dicot herb		Rare	
<i>Hieracium lepidulum</i> *	Tussock hawkweed	Dicot herb	Frequent	Frequent	
<i>Holcus lanatus</i> *	Yorkshire fog	Grass		Rare	
<i>Hydrocotyle novae-zelandiae</i>		Dicot herb		Occasional	Occasional
<i>Hypericum involutum</i>	Grassland hypericum	Dicot herb	Occasional	Occasional	
<i>Hypericum perforatum</i> *	St Johns wort	Dicot herb	Frequent	Frequent	Frequent
<i>Hypericum pusillum</i>	Swamp hypericum	Dicot herb		Rare	
<i>Hypochaeris radicata</i> *	Catsear	Dicot herb	Rare	Rare	
<i>Isolepis aucklandica</i>		Sedge		Rare	
<i>Juncus bufonius</i> *	Toad rush	Rush		Rare	
<i>Juncus edgariae</i>	Edgar's rush	Rush		Rare	
<i>Kunzea serotina</i>		Tree	Abundant	Abundant	Occasional
<i>Lachnagrostis striata</i>	Wind grass	Grass		Rare	
<i>Lagenophora strangulata</i>		Dicot herb		Rare	
<i>Larix decidua</i> *	Larch	Tree	Rare		
<i>Leontodon taraxacoides</i> *	Hawkbit	Dicot herb	Occasional	Occasional	
<i>Leptinella serrulata</i>	Dryland button daisy	Dicot herb			Occasional
<i>Leptostigma setulosa</i>		Dicot herb		Rare	
<i>Leucopogon fraseri</i>	Patotara	Shrub	Rare	Occasional	Occasional
<i>Lolium perenne</i> *	Perennial ryegrass	Grass			Rare
<i>Lotus pedunculatus</i> *	Lotus	Dicot herb	Rare	Rare	
<i>Lupinus arboreus</i> *	Tree lupin	Shrub	Planted		

Species	Common Name	Plant Type	Zone		
			Discard from SNA	Retain in SNA	Add to SNA
<i>Luzula banksiana</i>	Woodrush	Rush		Occasional	Occasional
<i>Luzula species</i>	Woodrush	Rush		Rare	
<i>Marrubium vulgare</i> *	Horehound	Dicot herb		Rare	Rare
<i>Melicytus alpinus</i>	Porcupine shrub	Shrub	Rare	Rare	Occasional
<i>Mentha cunninghamii</i>		Dicot herb		Rare	
<i>Mimulus moschatus</i> *	Musk	Dicot herb		Rare	
<i>Muehlenbeckia astonii</i>	Shrubby tororaro, wiggywig	Shrub	Planted		
<i>Muehlenbeckia australis</i>	Pohuehue	Vine			Occasional
<i>Muehlenbeckia axillaris</i>	Creeping muehlenbeckia	Vine			Rare
<i>Muehlenbeckia complexa</i>	Shrubby pohuehue	Vine		Occasional	
<i>Mycelis muralis</i> *	Wall lettuce	Dicot herb	Rare		
<i>Myosotis arvensis</i> *	Field forget-me-not	Dicot herb	Frequent	Frequent	
<i>Myosotis brevis</i>		Dicot herb			Rare
<i>Myosotis discolor</i> *	Grassland forget-me-not	Dicot herb		Occasional	
<i>Navarretia squarrosa</i> *	Californian stinkweed	Dicot herb	Occasional	Occasional	Occasional
<i>Olearia arborescens</i>	Common tree daisy	Tree			Rare
<i>Olearia odorata</i>	Scented tree daisy	Shrub			Rare
<i>Oxalis exilis</i>	Yellow oxalis	Dicot herb	Occasional	Occasional	Occasional
<i>Pellaea caliduripium</i>		Fern		Rare	
<i>Phormium cookianum</i>	Wharariki	Monocot herb	Planted		
<i>Pilosella officinarum</i> *	Mouse-ear hawkweed	Dicot herb	Rare		
<i>Pimelea prostrata</i>	Pinatoro	Shrub			Rare
<i>Pimelea sericeovillosa</i>	Pillow pimelea	Shrub		Rare	Occasional
<i>Pinus nigra</i> *	Black pine	Tree			Rare
<i>Pinus radiata</i> *	Radiata pine	Tree	Occasional		
<i>Pittosporum tenuifolium</i>	Kohuhu	Tree	Rare		
<i>Plagianthus regius</i>	Lowland ribbonwood	Tree	Planted		
<i>Poa colensoi</i>	Blue tussock	Grass		Occasional	Occasional
<i>Poa imbecilla</i>	Weak poa	Grass		Rare	
<i>Poa pratensis</i> *	Kentucky blue grass	Grass	Occasional	Rare	Occasional
<i>Polycarpon tetraphyllum</i> *	Allseed	Dicot herb	Occasional	Occasional	Occasional
<i>Polystichum neozelandicum</i>	Shield fern	Fern			Occasional
<i>Polystichum vestitum</i>	Shield fern / puniu	Fern		Rare	Occasional
<i>Prunella vulgaris</i> *	Selfheal	Dicot herb		Rare	
<i>Prunus cerasifera</i> *	Cherry plum	Tree			Rare
<i>Prunus mahaleb</i> *	St Lucie cherry	Tree		Rare	
<i>Pseudognaphalium luteoalbum</i>	Jersey cudweed	Dicot herb		Rare	
<i>Pseudotsuga menziesii</i> *	Douglas fir	Tree	Occasional		
<i>Pteridium esculentum</i>	Bracken	Fern	Occasional	Occasional	
<i>Ranunculus foliosus</i>		Dicot herb		Rare	
<i>Ranunculus glabrifolius</i>	Waioriki	Dicot herb		Occasional	
<i>Raoulia australis</i>	Common mat daisy	Dicot herb		Occasional	Occasional
<i>Raoulia hookeri</i>	Scabweed	Dicot herb		Occasional	Occasional
<i>Raoulia subsericea</i>	Turf mat daisy	Dicot herb			Rare
<i>Raoulia tenuicaulis</i>	Scabweed	Dicot herb	Rare	Occasional	Occasional
<i>Reseda luteola</i> *	Wild mignonette	Dicot herb	Occasional		Occasional
<i>Ribes uva-crispa</i> *	Gooseberry	Shrub	Occasional	Rare	Occasional
<i>Rosa rubiginosa</i> *	Sweet briar	Shrub	Frequent	Frequent	Frequent
<i>Rubus schmidelioides</i>	Lawyer	Vine		Occasional	Occasional
<i>Rumex acetosella</i> *	Sheep's sorrel	Dicot herb	Occasional	Occasional	Occasional

Species	Common Name	Plant Type	Zone		
			Discard from SNA	Retain in SNA	Add to SNA
<i>Rumex crispus</i> *	Curled dock	Dicot herb		Rare	
<i>Rytidosperma racemosum</i> *	Danthonia	Grass	Frequent	Frequent	Frequent
<i>Rytidosperma thomsonii</i>	Danthonia	Grass		Rare	
<i>Sagina procumbens</i> *	Procumbent pearlwort	Dicot herb		Rare	
<i>Senecio glomeratus</i>	Groundsel, fireweed	Dicot herb			Rare
<i>Senecio jacobaea</i> *	Ragwort	Dicot herb	Rare		
<i>Senecio quadridentatus</i>	Cotton fireweed	Dicot herb	Occasional	Rare	
<i>Solanum nigrum</i> *	Black nightshade	Dicot herb	Occasional	Rare	
<i>Sonchus asper</i> *	Prickly sow thistle	Dicot herb	Occasional	Rare	
<i>Sonchus oleraceus</i> *	Puha	Dicot herb	Occasional		
<i>Sophora microphylla</i>	Kowhai	Tree	Planted		
<i>Spergula arvensis</i> *	Spurrey	Dicot herb	Occasional		
<i>Stackhousia minima</i>		Dicot herb		Rare	Occasional
<i>Stellaria gracilentia</i>	Chickweed	Dicot herb		Rare	
<i>Stellaria media</i> *	Chickweed	Dicot herb	Rare	Rare	
<i>Taraxacum officinale</i> *	Dandelion	Dicot herb	Rare		Occasional
<i>Trifolium arvense</i> *	Haresfoot trefoil	Dicot herb	Occasional	Occasional	Occasional
<i>Trifolium dubium</i> *	Suckling clover	Dicot herb	Rare		Rare
<i>Trifolium glomeratum</i> *	Clustered clover	Dicot herb	Rare		
<i>Trifolium repens</i> *	White clover	Dicot herb		Rare	Occasional
<i>Urtica urens</i> *	Nettle	Dicot herb	Occasional	Occasional	Occasional
<i>Verbascum thapsus</i> *	Woolly mullein	Dicot herb			Rare
<i>Verbascum virgatum</i> *	Moth mullein	Dicot herb	Occasional	Rare	Occasional
<i>Veronica arvensis</i> *	Field speedwell	Dicot herb	Frequent	Frequent	
<i>Veronica serpyllifolia</i> *		Dicot herb	Occasional		
<i>Vulpia myuros</i> *	Rats tail fescue	Grass	Frequent	Frequent	Frequent
<i>Wahlenbergia gracilis</i>	NZ harebell	Dicot herb	Rare	Rare	



## INVERTEBRATES RECORDED DURING THE 2016 FIELD SURVEY

Order	Family	Species	Habitat			
			Kānuka Shrubland	Mixed Shrubland	Open Areas	
Lepidoptera	Hepialidae	<i>Wiseana copularis</i>	•	•		
		<i>Wiseana umbraculata</i>		•		
	Oecophoridae	<i>Trachypepla euryleucota</i>	•			
		<i>Tingena maranta</i>	•			
		<i>Oxythecta austrina</i>			•	
	Pterphoridae	<i>Aciptilia innotatalis</i>			•	
	Tortricidae	<i>Capua semiferana</i>	•	•		
		<i>Epiphyas postvittana</i>		•		
		<i>Harmologa scoliastes</i>		•		
		<i>Ctenopseustis obliquana</i>	•	•		
	Depressariidae	<i>Eutorna phaulocosma</i>		•		
	Gelechiidae	<i>Thiotricha oleariae</i>		•		
		<i>Isochasta paradesma</i>		•		
	Crambidae	<i>Gadira acerella</i>	•	•		
		<i>Orocrambus flexuosellus</i>	•	•	•	
		<i>Orocrambus ramosellus</i>		•		
		<i>Achyra affinitalis</i>		•		
		<i>Eudonia leptalea</i>	•	•		
		<i>Eudonia philerga</i>	•	•		
		<i>Eudonia cataxesta</i>		•		
		<i>Eudonia sabulosella</i>	•	•	•	
		<i>Udea flavidalis</i>		•		
		Geometridae	<i>Epiphryne verriculata</i>		•	
			<i>Poecilasthena schistaria</i>	•		
	<i>Helastia cymozeucta</i>			•		
	<i>Helastia corcularia</i>			•	•	
	<i>Austrocidaria similata</i>			•		
	<i>Austrocidaria parora</i>			•		
	<i>Austrocidaria gobiata</i>			•		
	<i>Homodotis megaspilata</i>			•		
	<i>Epyaxa rosearia</i>			•		
	<i>Declana leptomera</i>		•	•	•	
	<i>Notoreas elegans</i>				•	
	<i>Pseudocoremia lupinata</i>		•			
	Noctuidae		<i>Euxoa admirationis</i>	•	•	
		<i>Proteuxoa comma</i>	•	•		
		<i>Aletia moderata</i>		•		
		<i>Meterana ochthistis</i>		•		
		<i>Meterana exquisita</i>		•		
		<i>Graphania disjungens</i>		•		
<i>Graphania insignis</i>		•	•			
<i>Graphania lithias</i>			•			
<i>Graphania mutans</i>		•	•			
<i>Graphania omoplaca</i>			•	•		
<i>Graphania phricias</i>		•				
Nymphalidae	<i>Vanessa itea</i> (yellow)			•		

Order	Family	Species	Habitat		
			Kānuka Shrubland	Mixed Shrubland	Open Areas
		admiral) <i>Vanessa gonerilla</i> (red admiral)		•	•
	Lycaenidae (butterfly)	<i>Zizina oxleyi</i> (blue butterfly)			•
		<i>Lycaena feredayi</i> (glade copper)		•	
		<i>Lycaena</i> nsp (common copper)		•	•
		<i>Lycaena boldenarum</i> (boulder)		•	•
<b>Orthoptera</b>	Acrididae (grasshopper)	<i>Phaulacridium marginale</i>		•	•
<b>Hemiptera (bugs)</b>	Lygaeidae	<i>Nysius huttoni</i>			•
	Cicadidae (cicada)	<i>Kikihia angusta</i>		•	•
<b>Coleoptera (beetles)</b>	Scarabaeidae (chafers)	<i>Odontria striata</i>		•	
		<i>Costelytra zelandica</i>	•	•	



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