

**NATIVE HABITATS TASMAN**  
**ECOLOGICAL ASSESSMENT REPORT**  
**SITE RO152**



*June 2022*

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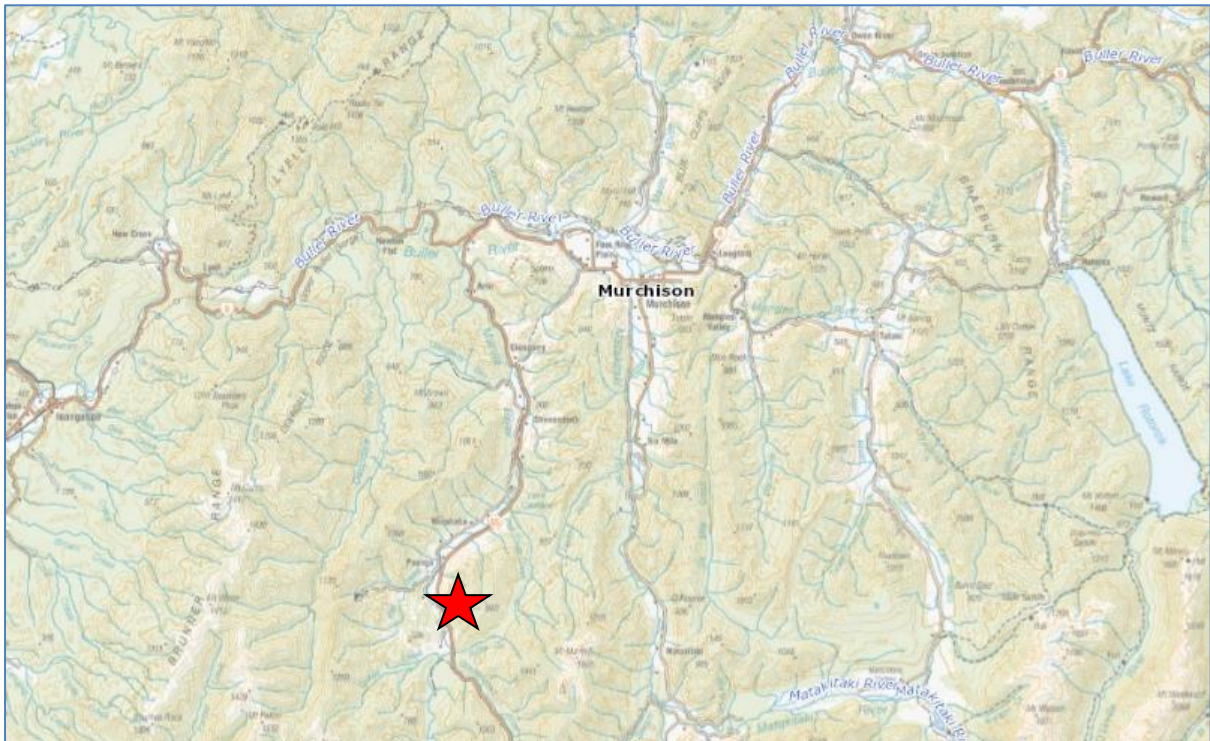
**PROPERTY INFORMATION:**

**Landowner:** .....Lasse and Cristina Holopainen (Maruia River Retreat)  
**Valuation Assessment No.:** .....19150-12402  
**Tenure:** .....Freehold  
**Land Use:** .....Tourism/Conservation

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**LOCATION:**

The property is located on west-facing hill slopes just downstream from the confluence of the Maruia and Shenandoah rivers, in the Maruia valley, Tasman District. It is approximately 40km south of Murchison on the Shenandoah Highway (State Highway 65). The property directly adjoins an extensive area of public conservation land (Victoria Forest Park) at its upper (eastern) boundary.



*Location of Property*

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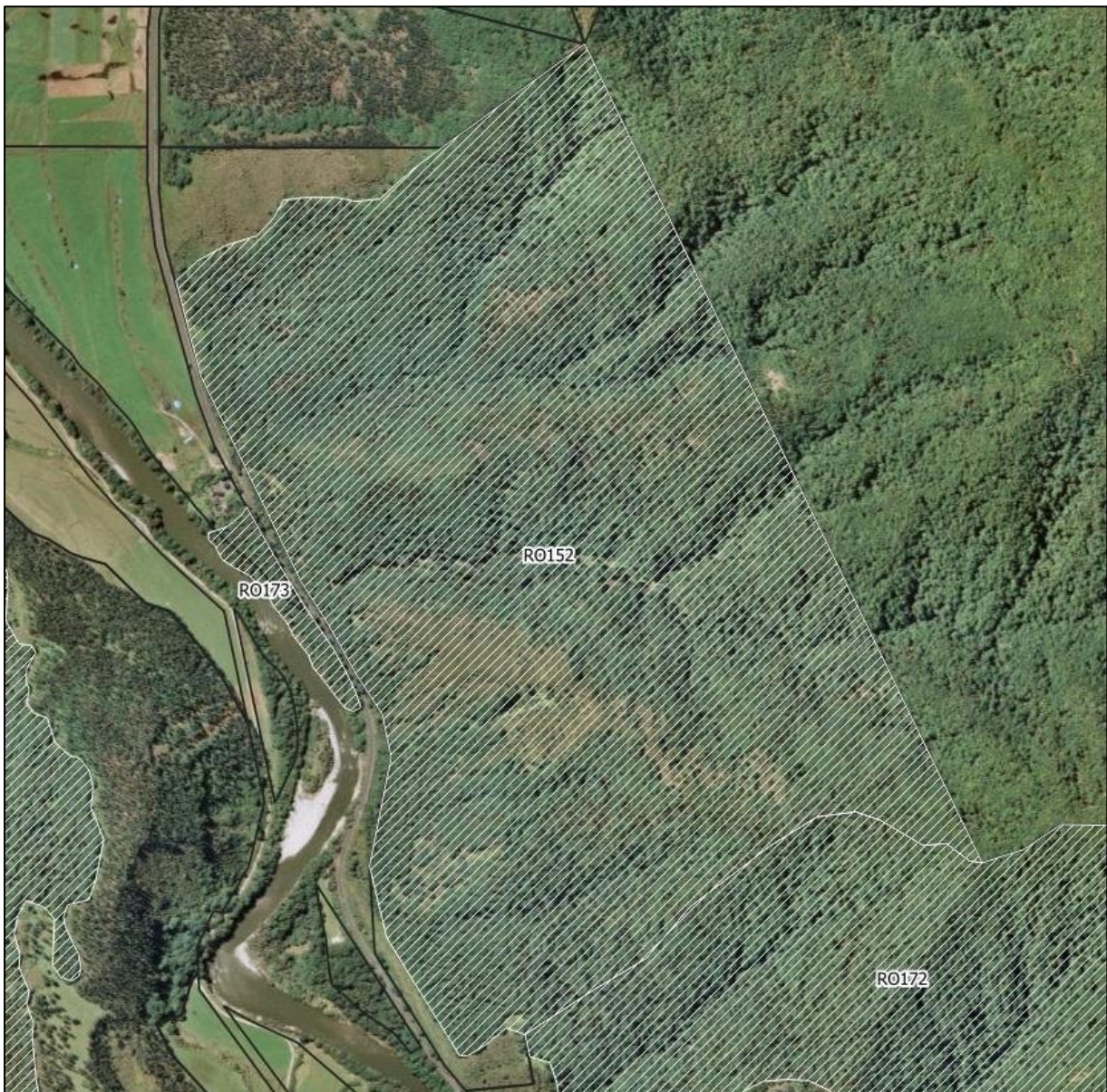
**ECOLOGICAL CONTEXT:**

Site RO152 is in Rotoroa Ecological District, within Spenser Ecological Region (McEwen, 1987). The original vegetation at this part of Rotoroa Ecological District was lowland beech forest, dominated by red beech and silver beech, grading to silver beech-mountain beech forest at higher altitudes. Podocarp forest was present on poorly-drained river terraces, and species such as kowhai and kanuka present along riverbanks. A more detailed description of the ecological district is presented in Attachment 1.

**SITE INFORMATION:**

**SITE No. RO152**

Location: .....Maruia valley  
Central Map Reference (NZTM): .....1534100E-5354960N  
Size (ha.): .....221.25  
Altitude (m): .....200-750  
Landform: .....hill slope  
Ecosystems: .....beech forest  
Ecological District: .....Rotoroa  
Field Survey and Report: .....Mike Harding  
Survey Date: .....4<sup>th</sup> and 5<sup>th</sup> June 2022



*Site RO152 (central white-hatched area)*

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## **SURVEY METHOD AND COVERAGE:**

The field survey upon which this report is based was undertaken over approximately six hours on 4<sup>th</sup> and 5<sup>th</sup> June 2022. The focus of the field survey was to determine the presence and extent of significant indigenous vegetation and significant habitats of indigenous fauna. Survey of indigenous fauna was limited to birds, so it is likely that this assessment underestimates the value of the site for indigenous fauna. Furthermore, cool wet winter conditions were not particularly suitable for fauna survey.

This large site was surveyed by ascending the prominent spur across the highway from the lodge (behind the water tank), descending into the valley south of that spur (to the end of the vehicle track), and then ascending the main spur leading to the south-east corner of the property. Lower-slope forests were then surveyed at two locations adjacent to the highway.

Names of indigenous plant species cited in this report are as listed on the Ngā Tipu o Aotearoa-New Zealand Plants database (Manaaki Whenua-Landcare Research). Plant community names follow the method proposed by Atkinson (1985). The threat status of indigenous species is as listed in publications of the Department of Conservation, referenced in this report.

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## **LANDFORM, GEOLOGY, HYDROLOGY:**

Site RO152 lies on the western slopes of a prominent un-named hill that lies between the Maruia valley and the Ruffe Creek/Pea Soup Creek catchments. It comprises moderately-steep spurs and steeper incised valleys, with gentler colluvial toe-slopes adjacent to the highway. Underlying geology is muscovite-biotite granite of the Karamea Suite (Nathan *et al*, 2002). The site is drained by three large streams, the largest of which is McWha Creek. All streams flow west to the Maruia River, downstream from its confluence with the Shenandoah River.

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## **VEGETATION:**

The main plant communities present at the site are lowland beech forest, montane beech forest, and kanuka forest. These plant communities are described separately below, though the boundaries between the beech forest types are indistinct; these forest types grade from one to the other. Naturalised (exotic) species are indicated with an asterisk\*. A list of all species recorded at the site is appended to this report.

### **Plant Communities**

#### **Lowland Beech Forest:**

This beech forest community is dominated by red beech (*Fuscospora fusca*) and silver beech (*Lophozonia menziesii*). Other canopy or sub-canopy species less commonly present are matai (*Prumnopitys taxifolia*), marbleleaf (*Carpodetus serratus*), broadleaf (*Griselinia littoralis*), lancewood (*Pseudopanax crassifolius*) and wineberry (*Aristotelia serrata*). Kahikatea (*Dacrycarpus dacrydioides*) is locally common at gentler poorly-drained sites.

The forest understorey is relatively open. Common or locally common species are *Neomyrtus pedunculata*, *Coprosma rhamnoides*, stinkwood (*Coprosma foetidissima*), *Raukawa anomalus*, horopito (*Pseudowintera colorata*) and saplings of red beech and silver beech. Also present are lancewood, pokaka (*Elaeocarpus bookerianus*), fuchsia (*Fuchsia excorticata*), pate (*Schefflera digitata*), *Raukawa*

*simplex*, weeping mapou (*Myrsine divaricata*), mingimingi (*Leucopogon fasciculatus*), *Coprosma dumosa*, kohuhu (*Pittosporum tenuifolium*), shining karamu (*Coprosma lucida*), bush lawyer (*Rubus cissoides*), native jasmine (*Parsonsia heterophylla*) and saplings of matai and mountain totara (*Podocarpus laetus*). Epiphytic or perching species are hanging spleenwort (*Asplenium flaccidum*), strap fern (*Grammitis billardierei*) and hanging moss (*Weymouthia* sp.).

Common or locally-common ground-cover species are crown fern (*Blechnum discolor*), kiokio (*Blechnum novae-zelandiae*), bush rice grass (*Microlaena avenacea*), and mosses, including *Dicranoloma robustum*. Less commonly present are water fern (*Histiopteris incisa*), *Blechnum procerum*, mountain kiokio (*Blechnum montanum*), *Blechnum colensoi*, mountain tree fern (*Cyathea colensoi*), soft tree fern (*Cyathea smithii*), bush lily (*Astelia fragrans*), *Leptopteris superba* and hookgrass (*Uncinia* sp.).

Additional species at the forest opening/edge along the vehicle track are ti/cabbage tree (*Cordyline australis*), five-finger (*Pseudopanax arboreus*), tree tutu (*Coriaria arborea*), Himalayan honeysuckle\* (*Leycesteria formosa*), Scotch broom\* (*Cytisus scoparius*), blackberry\* (*Rubus fruticosus* agg.), foxglove\* (*Digitalis purpurea*), prickly shield fern (*Polystichum vestitum*), hard fern (*Paesia scaberula*), *Hypolepis ambigua*, *Lycopodium volubile*, bracken (*Pteridium esculentum*), white clover\* (*Trifolium repens*), selfheal\* (*Prunella vulgaris*), creeping buttercup\* (*Ranunculus repens*), *Nertera dichondrifolia*, *Nertera depressa*, pennywort (*Hydrocotyle novae-zelandiae*), lotus\* (*Lotus pedunculatus*), wall lettuce\* (*Mycelis muralis*), track rush\* (*Juncus tenuis*), *Juncus edgariae* and wire moss (*Polytrichum juniperinum*). Other species at the roadside (possibly planted) are toetoe (*Austroderia richardii*), pukio (*Carex secta*) and flax (*Phormium cookianum*).

#### Montane Beech Forest:

Beech forest on upper slopes is dominated by red beech and silver beech, with silver beech more common at higher altitudes. Other canopy or sub-canopy species less commonly present are kamahi (*Weinmannia racemosa*), marbleleaf, broadleaf, lancewood and wineberry.

The forest understorey is relatively open. Common or locally common species are horopito, *Coprosma rhamnoides*, pokaka, *Neomyrtus pedunculata*, mingimingi, *Coprosma dumosa* and saplings of red beech and silver beech. Other species present are lancewood, mountain tree fern, *Leptecophylla juniperina*, bush lawyer, Spanish heath\* (*Erica lusitanica*) and saplings of mountain totara. Epiphytic or perching species are filmy fern (*Hymenophyllum bivalve*), strap fern, hanging spleenwort and hanging moss.

Common or locally-common ground-cover species are crown fern, water fern, *Lycopodium volubile*, and mosses, including *Dicranoloma robustum*. Less commonly present are climbing rata (*Metrosideros diffusa*), mountain kiokio, *Blechnum vulcanicum*, *Blechnum procerum*, hard fern, bracken, bush rice grass, filmy ferns (*H. bivalve* and *H. demissum*), *Lycopodium scariosum*, *Nertera dichondrifolia*, blue-berry (*Dianella nigra*), foxglove\* and hookgrass (*Uncinia* sp.).

Additional species at damper sites (in gullies) are *Leptopteris superba*, *Leptopteris hymenophylloides*, gully fern (*Pneumatopteris pennigera*), *Blechnum membranaceum*, *Blechnum fluviatile*, *Blechnum colensoi* and kiokio. Additional species at higher altitudes are hard beech (*Fuscospora truncata*), mountain totara (in the sub-canopy) and *Coprosma microcarpa*.

#### Kanuka Forest:

Kanuka forest is present at several locations on the main ridges. It is a secondary forest community where kanuka is regenerating following earlier loss of beech forest, presumably

following fire. It is dominated by kanuka (*Kunzea ericoides* agg.), with lancewood present in the sub-canopy.

Common or locally common species in the open forest understorey are *Leucopogon fasciculatus*, *Coprosma rhamnoides* and Spanish heath\*. Also present are *Coprosma microcarpa*, *Coprosma dumosa*, bush lawyer and saplings of red beech and silver beech. Ground-cover species are crown fern, *Lycopodium volubile*, bush rice grass, bracken, hard fern, *Lycopodium scariosum*, blue-berry, *Nertera dichondrifolia*, foxglove\* and browntop\* (*Agrostis capillaris*).

**Flora**

Seventy-two (72) indigenous vascular plant species were recorded at Site RO152 during this survey.

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**HABITATS OF INDIGENOUS FAUNA:**

The habitat present at this site is forest. Native bird species observed at the site during this survey were bellbird (*Anthornis melanura*), brown creeper (*Mohoua novae-zelandiae*), fantail (*Rhipidura fuliginosa*), grey warbler (*Gerygone igata*), kaka (*Nestor meridionalis*) paradise shelduck (*Tadorna variegata*), South Island robin (*Petroica australis*), silvereye (*Zosterops lateralis*), tomtit (*Petroica macrocephala*) and tui (*Prosthemadera novaeseelandiae*). Other species likely to utilise the habitat at the site are harrier (*Circus approximans*), kereru (*Hemiphaga novaeseelandiae*), morepork (*Ninox novaeseelandiae*), rifleman (*Acanthisitta chloris*), shining cuckoo (*Chrysococcyx lucidus*), welcome swallow (*Hirundo tabitica*) and weka (*Gallirallus australis*).

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**ECOLOGICAL VALUES:**

**Vegetation/Habitats**

The site supports mature beech and tall secondary (kanuka) forest. Larger trees have most likely been logged from the lower slope forest some time ago. It is a relatively large area of forest, very well-buffered, and contiguous with extensive areas of forest that are protected as public conservation land.

**Flora/Fauna**

The site supports three plant species listed as ‘threatened’ by de Lange *et al* (2018):

- *Kunzea ericoides* agg. (kanuka) ..... nationally vulnerable
- *Metrosideros diffusa* (climbing rata) ..... nationally vulnerable
- *Neomyrtus pedunculata* ..... nationally critical

However, these listings result from the threat posed by myrtle rust, and have the qualifiers DP (data poor) and/or De (taxon that does not fit within the criteria; designated to most appropriate listing).

Forest at the site provides habitat for one bird species listed as ‘threatened’ and one species listed as ‘at risk’ by Robertson *et al* (2017).

- *Nestor meridionalis* (kaka) ..... threatened (nationally vulnerable)
- *Petroica australis* (South Island robin) ..... at risk (declining)


A kaka was heard calling on upper slopes near the eastern boundary of the site. Robins were observed throughout the site.

### **ASSESSMENT OF SITE SIGNIFICANCE:**

The significance of sites is determined by assessing indigenous vegetation and habitats of indigenous fauna against the Native Habitats Tasman criteria. Site attributes are assessed against three primary and two secondary criteria. A combination of attribute rankings determines whether a site is significant. This assessment is presented below. The full criteria and explanatory notes are available from Council.

<b>Primary Criteria</b>	<b>Rank</b>	<b>Comments</b>
Representativeness	<b>MH</b>	4a: Primary vegetation/habitat (beech forest) that moderately resembles its natural state; and mature secondary forest (kanuka) that strongly resembles natural regeneration (4b).
Rarity/Distinctiveness	<b>H</b>	5a: Presence of a 'threatened' species (kaka). Provides habitat for an 'at risk' bird species (South Island robin) (4d).
Diversity/Pattern	<b>ML</b>	2a: Presence of a typical diversity of indigenous species for such sites in the ecological district.
<b>Secondary Criteria</b>	<b>Rank</b>	<b>Comments</b>
Ecological Context	<b>H</b>	
Connectivity	H	5a: The site adjoins other indigenous vegetation and is well connected to that vegetation (along more than half the site boundary).
Buffering	MH	4a: The site is well buffered by its location and surrounding vegetation.
Critical Resources	M	3: The site is likely to provide useful habitat for native forest birds.
Size/Shape	<b>H</b>	5a: A relatively large area for this ecosystem type, with a compact shape.
<b>Other Criteria</b>	<b>Rank</b>	<b>Comments</b>
Physical Characteristics	H	Well protected by its location and buffering.
Inherent Resilience	MH	Mature forest that has relatively good ecological resilience.
Threats	M	Feral animals, notably deer.

If a site scores at least as highly as the combinations of primary and secondary scores set out below, it is deemed significant for the purposes of this assessment.

<b>Primary Criteria</b>		<b>Secondary Criteria</b>	
Any of the three primary criteria with a score at least as high as listed		Any of the two secondary criteria with a score at least as high as listed	
		<b>Plus</b>	
	H		—
	MH x 2		—

	MH + M		—
	MH	+	MH
	M x 2	+	H
	M x 2	+	MH x 2
	M	+	H + MH

H = High; MH = Medium-High; M = Medium

Is this site significant under the TDC assessment criteria? **YES**

This site is significant because it is a large and well buffered area of primary (beech) forest, with areas of mature secondary (kanuka) forest, that provide habitat for a ‘threatened’ species (kaka). The site includes an altitudinal sequence from lowland forest (at 200m asl) to montane forest (at 750m asl). It also provides habitat for an ‘at risk’ bird species (South Island robin).

Selecting boundaries for significant sites can be problematic, as vegetation boundaries are not precise (plant communities frequently grade from one type to another) and habitats of indigenous fauna are not easily determined through brief site surveys. In this assessment the lower boundary of the site is the extent of the tall beech forest, along the Shenandoah Highway or adjacent to areas of secondary forest at the northern and southern corners of the property. Other boundaries of the site are the property boundaries, where there are contiguous areas of beech forest on adjacent properties, including public conservation land.

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### **PLANT AND ANIMAL PESTS:**

A number of naturalised plant species are present at the site, most of which are confined to disturbed sites such as the vehicle track. Spanish heath and foxglove are present within the forest though are largely confined to open-canopied forest on the ridges, especially the kanuka forest. Animal pests were not surveyed, though red deer sign (droppings, tracks and browse) was observed throughout the site, and feral pig sign (rooting and dropping) was observed at a number of locations and especially in the kanuka forest. Brushtail possum and ubiquitous mammalian predators (mice, rats, stoats and cats) are likely to be present throughout the site.

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### **OTHER THREATS:**

Parts of the site are on steep slopes that are vulnerable to landslide. Forest on drier spurs is potentially vulnerable to wildfire, particularly if drought events become more common. Erosion of the banks of the Maruia River has led to realignment of the Shenandoah Highway, resulting in the loss of a small area of lower-slope beech forest; further encroachment is possible. No other threats were apparent at the time of survey.

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### **CONDITION AND MANAGEMENT:**

This site supports beech forest and mature kanuka forest that are in moderate condition. The forest canopies appear intact, but the forest understories are presently depleted due to the effects of browsing mammals, notably red deer. The forest-bird habitat is compromised by the presence of mammalian predators and especially fluctuations in predator populations prompted by periodic beech flowering (mast events). The landowners are undertaking pest control work. The main management priorities for protection of indigenous biodiversity at the site are control of feral animals (especially deer and pigs) and continued control of mammalian predators.



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**REFERENCES CITED:**

- Atkinson, I.E.A. 1985. Derivation of mapping units for an ecological survey of Tongariro National Park, North Island, New Zealand. *NZ Journal of Botany* 23: 361-378.
- de Lange, P.J; Rolfe, J.R; Barkla, J.W; Courtney, S.P; Champion, P.D; Perrie, L.R.; Beadel, S.M.; Ford, K.A.; Breitweiser, I.; Schönberger, I.; Hindmarsh-Walls, R.; Heenan, P.B; Ladley, K. 2018. *Conservation status of New Zealand indigenous vascular plants, 2017*. Department of Conservation, Wellington, New Zealand.
- McEwen, W.M. (editor) 1987. Ecological regions and districts of New Zealand, third revised edition (Sheet 3). *New Zealand Biological Resources Centre Publication No.5*. Department of Conservation, Wellington, 1987.
- Robertson, H.A.; Baird, K.; Dowding, J.E.; Elliot, G.P.; Hitchmough, R.A.; Miskelly, C.M.; McArthur, N.; O'Donnell, C.F.J; Sagar, P.M.; Scofield, R.P.; Taylor, G.A. 2017. Conservation status of New Zealand birds, 2016. *New Zealand Threat Classification Series 19*. Department of Conservation, Wellington.
- Walls, G; Simpson, P. 2004. Tasman District Biodiversity Overview. Tasman District Council Technical Report.



*Forest at the lower boundary of Site RO152, at the re-aligned highway.*



*Tall beech forest, with kabikatea, on lower slopes at Site RO152.*



*Mid-altitude beech forest at Site RO152.*



*Kanuka forest on the central spur at Site RO152.*



*Open-canopied wind-damaged beech forest at Site RO152.*

**Site RO152 Species List:**

r=rare; o=occasional; m=moderate numbers; lm= locally moderate; c=common; lc=locally common;  
 f=frequent; lf=locally frequent; e=present only at edge/margin; x=present but abundance not noted;  
 p=planted; a=adjacent/nearby (birds)

(Species scientific names are as listed in the Manaaki Whenua/Landcare Research Nga Tipu o Aotearoa New Zealand Plants database).

Species Name	Common Name	
<b>Trees and Shrubs</b>		
<i>Aristolelia serrata</i>	wineberry/makomako	o
<i>Carpodetus serratus</i>	putaputaweta/marbleleaf	m
<i>Coprosma dumosa</i>		o
<i>Coprosma foetidissima</i>	stinkwood	m
<i>Coprosma lucida</i>	shining karamu	r
<i>Coprosma microcarpa</i>		o
<i>Coprosma rhamnoides</i>		c
<i>Cordyline australis</i>	ti/cabbage tree	r
<i>Coriaria arborea</i>	tree tutu	e
<i>Dacrycarpus dacrydioides</i>	kahikatea/white pine	o
<i>Elaeocarpus hookerianus</i>	pokaka	lm
<i>Fuchsia excorticata</i>	tree fern/kotukutuku	o
<i>Fuscospora fusca</i>	red beech	f
<i>Fuscospora truncata</i>	hard beech	r
<i>Griselinia littoralis</i>	broadleaf/papaumu	o
<i>Kunzea ericoides</i> agg.	kanuka	lc
<i>Leptecophylla juniperina</i>	prickly mingimingi	o
<i>Leucopogon fasciculatus</i>	mingimingi	lc
<i>Lophozonia menziesii</i>	silver beech	f
<i>Melicytus lanceolatus</i>	narrow-leaved mahoe	e
<i>Myrsine divaricata</i>	weeping mapou	o
<i>Neomyrtus pedunculata</i>		m
<i>Pittosporum tenuifolium</i>	kohuhu	o
<i>Podocarpus laetus</i>	mountain totara	o
<i>Prumnopitys taxifolia</i>	matai	o
<i>Pseudopanax arboreus</i>	five-finger	r
<i>Pseudopanax crassifolius</i>	lancewood/horoeka	m
<i>Pseudowintera colorata</i>	horopito	m
<i>Raukahu anomalus</i>		lm
<i>Raukahu simplex</i>		r
<i>Schefflera digitata</i>	pate	o
<i>Veronica salicifolia</i>	koromiko	e
<i>Weinmannia racemosa</i>	kamahi	lm
<b>Lianes</b>		
<i>Metrosideros diffusa</i>	climbing rata	r
<i>Parsonsia heterophylla</i>	native jasmine/kaihua	o
<i>Rubus cissoides</i>	bush lawyer/tataramoa	o
<b>Herbs</b>		
<i>Cardamine</i> sp.		e
<i>Hydrocotyle novaezealandiae</i>	pennywort	o
<i>Nertera depressa</i>		o
<i>Nertera dichondrifolia</i>		o

Species Name	Common Name	
<b>Rushes, Sedges and Grasses</b>		
<i>Astelia fragrans</i>	bush lily	o
<i>Austroderia richardii</i>	toe toe	e
<i>Carex secta</i>	pukio	e
<i>Dianella nigra</i>	blue-berry	o
<i>Juncus edgariae</i>		e
<i>Microlaena avenacea</i>	bush rice grass	lc
<i>Phormium cookianum</i>	coastal flax	e
<i>Uncinia uncinata</i>	hookgrass	lm
<i>Uncinia</i> sp.	hookgrass	o
<b>Ferns</b>		
<i>Asplenium flaccidum</i>	hanging spleenwort	o
<i>Blechnum colensoi</i>		o
<i>Blechnum discolor</i>	crown fern/piupiu	c
<i>Blechnum fluviatile</i>	kiwakiwa	r
<i>Blechnum membranaceum</i>		r
<i>Blechnum montanum</i>	mountain kiokio	o
<i>Blechnum novae-zelandiae</i>	kiokio	lc
<i>Blechnum procerum</i>	small kiokio	o
<i>Blechnum vulcanicum</i>		o
<i>Cyathea colensoi</i>	mountain tree fern	o
<i>Cyathea smithii</i>	soft tree fern	r
<i>Grammitis billardierei</i>	a strap fern	o
<i>Histiopteris incisa</i>	water fern/mata	lc
<i>Hymenophyllum bivalve</i>	a filmy fern	o
<i>Hymenophyllum demissum</i>	a filmy fern	o
<i>Hypolepis ambigua</i>		r
<i>Leptopteris superba</i>	crape fern/Prince of Wales feather	o
<i>Lycopodium scariosum</i>		o
<i>Lycopodium volubile</i>	waewaekoukou	lc
<i>Paesia scaberula</i>	hard fern/matata	o
<i>Pneumatopteris pennigera</i>	gully fern/pakauroharoha	o
<i>Polystichum vestitum</i>	prickly shield fern/puniu	r
<i>Pteridium esculentum</i>	bracken/rahurahu	o
<b>Mosses and Lichens</b>		
<i>Dicranoloma robustum</i>		lc
<i>Polytrichum juniperinum</i>	wire moss	e
<i>Weymouthia</i> sp.		c
<b>Naturalised (exotic) species</b>		
<i>Agrostis capillaris</i>	browntop	o
<i>Cytisus scoparius</i>	broom	e
<i>Digitalis purpurea</i>	foxglove	e
<i>Erica lusitanica</i>	Spanish heath	o
<i>Juncus effusus</i>	soft rush	r
<i>Juncus tenuis</i>	track rush	e
<i>Leycesteria formosa</i>	Himalayan honeysuckle	e
<i>Lotus pedunculatus</i>	lotus	e
<i>Mycelis muralis</i>	wall lettuce	e
<i>Prunella vulgaris</i>	selfheal	e

Species Name	Common Name	
Ranunculus repens	creeping buttercup	e
Rubus fruticosus agg	blackberry	e
Trifolium repens	white clover	e
<b>Native Birds</b>		
Anthornis melanura	bellbird/korimako	c
Mohoua novaeseelandiae	brown creeper	o
Rhipidura fuliginosa	fantail/piwakawaka	o
Gerygone igata	grey warbler/riroriro	o
Nestor meridionalis	kaka	o
Tadorna variegata	paradise shelduck	o
Petroica australis	robin	o
Zosterops lateralis	silveryeye	o
Petroica macrocephala	tomtit/miomiro	o
Prothemadera novaeseelandiae	tui	o



*Upper-montane beech forest at the eastern property boundary at Site RO152.*

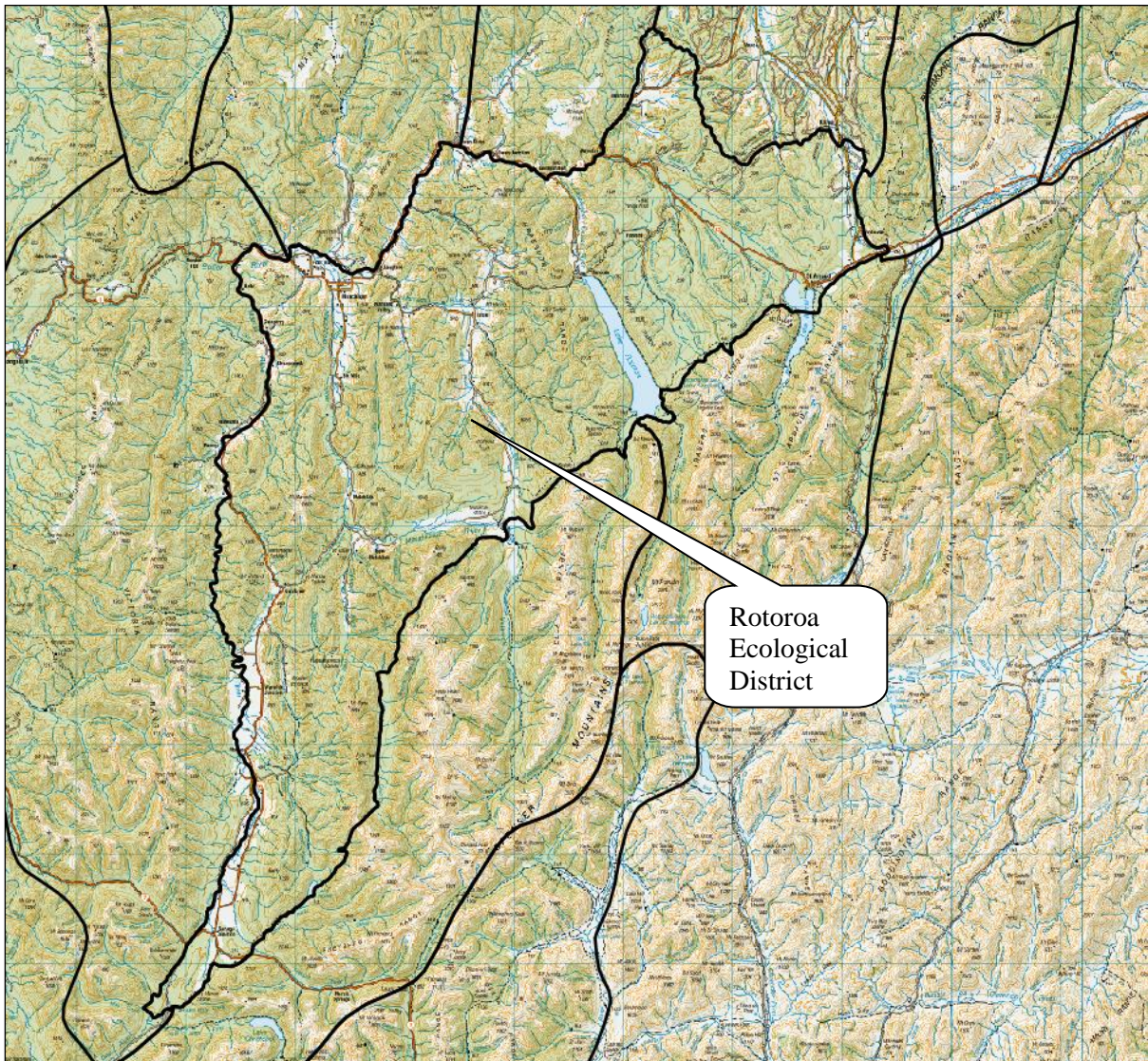
## ATTACHMENT 1:

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### ROTOROA ECOLOGICAL DISTRICT:

#### Location and physical description

Rotoroa ED comprises a large area of inland hill country, rising to an altitude of 1605m. It lies north-west of the Alpine Fault and includes the glacially-derived Lake Rotoroa and Lake Rotoiti, and substantial reaches of the Buller, Matakītaki and Maruia rivers. The geology is complex, including Palaeozoic greywacke and argillite, diorite and granite, Tertiary sedimentary rocks, weathered conglomerate, limestone, glacial outwash terrace sequences, valley alluvium and a small area of ultramafic rocks (at the head of Station Creek). Soils are mostly leached or podzolised due to the fairly high rainfall. The climate is generally moist and is characterised by summer drought and cold winters. The southern part of the ecological district is outside Tasman District. Of the total area of about 160,000ha, 70% is protected as public conservation land administered by DOC (including Nelson Lakes National Park).



## Ecosystem types originally present

Prior to human settlement the ecological district would have been almost entirely covered in forest up to the bush-line (about 1200m). There were tall podocarp forests in the lowland valleys, and pockets of podocarps at sheltered warm hill sites. Otherwise, beech forests were ubiquitous, with hard beech dominant at some lowland sites, red beech dominant on mid slopes, and silver beech and mountain beech dominant on upper slopes. Above the bush-line were fringes of subalpine shrubland, above which were tussock grassland, alpine herbfield and fellfield rich with mountain herbs. Frost flats, present in some of the valleys, would have contained infertile peat bogs and low-stature shrublands. Wetland ecosystems would have included fertile lowland swamps with kahikatea, harakeke (lowland flax), cabbage tree, pukio (*Carex secta*) and raupo. Rivers and streams, including riparian ecosystems and some braided river beds, would have made up a significant portion of the district. The tabulation gives estimates of the extent of these original ecosystems.

INDIGENOUS ECOSYSTEMS – ROTOROA ECOLOGICAL DISTRICT				
Ecosystem type	Original extent (% of ED)	Proportion of original extent remaining (%)	Proportion of original extent/remaining area protected (%)	
Fertile lowland swamp and pond	<1	20	<322	25
Infertile peat bog	<1	20	<322	25
Upland tarn	<1	100	<1613	100
Lake	4	100	6452	100
River, stream, riparian ecosystems	3	70	3387	40
Lowland podocarp forest	10	<5	<806	50
Lowland mixed forest	10	50	8065	50
Lowland beech forest	25	60	24195	50
Upland beech forest	40	90	58068	90
Subalpine forest	-	-	-	-
Lowland shrubland	<1	10	<161	50
Upland/subalpine shrubland	1	100	161	100
Frost flat communities	<1	20	<323	25
Tussock grassland	3	100	4839	100
Alpine herbfield and fellfield	2	100	3226	100

## Existing ecosystems

Most naturally-occurring ecosystems are still present above an altitude of approximately 600m. The condition of these ecosystems is depleted both in fauna and flora due to the effects of ubiquitous introduced mammals. In the lowlands (below 600m) about half of the original forest has been removed, with valley floor podocarp forests reduced to tiny remnants. Some of the original forest cover on the hill country has been replaced by regenerating woody vegetation which is in most places dominated by indigenous species. Most of the valley-floor wetlands have been lost, but some fertile swamps, peat bogs and frost flat communities remain. The large glacial lakes and substantial stretches of braided river beds remain largely intact.

*Adapted from: Walls and Simpson (2004)*